



CAL POLY



2022-2026

Academic Catalog



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CATALOG HOME

WELCOME TO CAL POLY

A Message from President Armstrong

At Cal Poly, we honor the past, celebrate the present, and prepare for the future. We honor the past by remaining firmly committed to our values and traditions, especially our Learn by Doing approach to education. We celebrate what is exceptional about the university today: transforming young adults into resourceful professionals and innovative leaders. We prepare for the future by graduating creative thinkers who have both depth of expertise and breadth of knowledge, and who will be able to help solve the increasingly complex challenges that confront California and the world.

Undergraduate Emphasis: As a predominantly undergraduate university, Cal Poly is known nationally for the quality of its baccalaureate degree programs in a variety of disciplines. We also offer outstanding master's degree programs.

Residential Campus: Cal Poly is a residential campus. Our students find that the campus environment gives them the time, resources and settings in which to explore and discover their values and interests – whether in the classroom, academic-related clubs, residence halls, or other extracurricular activities.

Polytechnic Mission: From its start, Cal Poly has given particular emphasis to instruction in polytechnic disciplines – science, technology, engineering, agriculture, and mathematics. At the same time, we recognize that the liberal arts provide an indispensable foundation for all academic disciplines. We are proud of the truly comprehensive education Cal Poly provides to its students, who graduate as professionals ready to be leaders in industry and society.

Information Technology to Support Teaching and Learning: Cal Poly has been, and continues to be, a leader in the use of information technology to enhance teaching and learning. Technology informs our classes, library, communication, laboratories and research, and more.

Educational Philosophy: Cal Poly is committed to excellence in teaching and learning. In all disciplines, we provide a student-centered, active-learning education, facilitated by a low student-teacher ratio in classes conducted primarily by full-time, regular faculty. The cornerstone of our educational philosophy is our commitment to Learn by Doing - classroom instruction complemented by practical, hands-on learning in the laboratory, the studio, and the world.

Diversity: As a campus, we welcome and nurture a rich array of different perspectives, experiences and cultures. We encourage international and multi-cultural education in order to prepare students for successful participation and competition in a diverse world and a global workforce. We believe that diversity of our students, faculty, and staff enlivens and enriches Cal Poly's educational environment.

We believe these values and our core educational philosophy will sustain us far into the future. But our greatest strength rests in the quality of the students, faculty, staff, alumni, and friends who are the University.

Jeffrey D. Armstrong
President

ABOUT THE CATALOG

The 2022-2026 Cal Poly Catalog

The *Cal Poly Academic Catalog* is published by the Office of the Registrar. The online catalog's home page as well as its page banners were designed by Creative Services at Cal Poly University Communications and Marketing (<https://ucm.calpoly.edu/>).

A Guide to Using the Catalog

Academic terminology and a university catalog can be confusing to someone first entering the University. This section explains some of the jargon you will quickly come to know and explains briefly how the catalog is organized.

Colleges and Departments

The faculty who supply instruction at Cal Poly hold positions in academic departments, which in turn are grouped into Colleges. All of the academic programs offered by the University are described in the catalog. A complete listing of academic programs at Cal Poly may be found on the Programs A-Z (<https://catalog.calpoly.edu/programsaz/>) page.

In the catalog, Colleges are listed in alphabetical order. Departments are also arranged alphabetically within their respective College.

Degrees

A **degree** is an academic rank which the University confers on a student who satisfactorily completes a designated curriculum, or program of study. Cal Poly grants undergraduate degrees – also called baccalaureate degrees – as well as master's degrees.

At the undergraduate level, Cal Poly grants the

- Bachelor of Arts (BA),
- Bachelor of Science (BS),
- Bachelor of Architecture (BArch),
- Bachelor of Fine Arts (BFA), and
- Bachelor of Landscape Architecture (BLA).

At the graduate level, Cal Poly grants the

- Master of Arts (MA),
- Master of Science (MS),
- Master of Agricultural Education (MAGEd),
- Master of Business Administration (MBA),
- Master of City and Regional Planning (MCRP),
- Master of Public Policy (MPP)
- Master of Professional Studies (MPS)

Majors

A **major** is a program of study that provides students with the knowledge, skills and experience necessary to pursue a specific career or advanced study and leads to an undergraduate degree in that subject. Each major is offered in an academic department or program.

Undergraduate applicants to Cal Poly select a major at the time they apply for admission.

General requirements for bachelor's degrees are outlined in General Requirements - Bachelor's Degree (p. 28) and for master's degrees in

Graduate Education (p. 431). The specific requirements for a particular major degree program are listed under the academic department or program that offers the major.

The curriculum display for each bachelor's degree program shows courses arranged by *Major, Support, General Education* and *Electives*. These curriculum displays are useful guides, but students should consult with their academic advisors.

Information regarding academic advising is available on the Academic Advising (p. 442) page.

Courses

Descriptions of Cal Poly courses are located in Courses A-Z (p. 511), arranged alphabetically by subject area with its corresponding course prefix (an abbreviation that represents the subject or offering department). The courses in a bachelor's degree curriculum are identified as *Major Courses, Support Courses, General Education, and Electives*.

Major Courses are designed to provide competence in the professional field in which a degree is earned. They are usually offered by the academic department in which the degree program is offered, but they may include courses from other departments.

Approved Electives are courses that students can choose from within the parameters set by their departments.

Support Courses provide background needed for major courses and are offered by departments other than the department in which the major is offered. For example, most majors in engineering and in the sciences require support courses in mathematics. Some degree programs do not include support courses.

General Education (GE) courses provide a common foundation of knowledge for all undergraduate programs. GE requirements are described in detail on the General Education (p. 28) page.

Free Electives are courses that students can choose simply to pursue their own interests.

Prerequisites are one or more courses that must be completed, or other knowledge, skills, or standards that must be demonstrated, before a student is permitted to take certain courses. Prerequisites (if any) for a course are listed in the course's description in the catalog.

Some prerequisites have their own prerequisites, forming a string of courses that must all be taken. The catalog course description shows the last course in the prerequisite string of courses. For example, ME 212 Engineering Dynamics has prerequisites of MATH 241; and ME 211 or ARCE 211. MATH 241 Calculus IV requires MATH 143, which requires MATH 142, which requires MATH 141. ME 211 Engineering Statics requires MATH 241; and PHYS 141. To enroll in ME 212 Engineering Dynamics, students must have successfully completed MATH 241, MATH 143, MATH 142, MATH 141 and ME 211 or ARCE 211 and PHYS 141.

Statements in the catalog course descriptions may also contain the words "**concurrent**" which means that two or more courses must be taken in the same term or "**corequisite**" which means that the course or courses may be taken prior to the course being described (prerequisite) or in the same term (concurrent).

If a student does not meet a requisite as outlined in a course's description, but can demonstrate to an instructor that they have the

necessary knowledge or skills through alternative means, then the instructor may grant the student permission to enroll in the course.

Crosslisted courses are shared by two or more academic units and have identical titles, descriptions, units, modes of instruction and prerequisites. They are interchangeable for degree requirements. They cannot be repeated for degree credit under separate prefixes. Example: HNRS 141 / MATH 141 Calculus I.

Selected Advanced Topics (470s) are generic courses that offer special topics on an "as needed basis." The specific topic appears in the Schedule of Classes and on the students' transcripts.

Topic courses are shown in the catalog with generic titles and are repeatable with different topics. Specific topic titles appear in the Schedule of Classes and on students' transcripts. Example: ENGL 439 Topics in British Literature, repeatable to 12 units with different topics (e.g., Jane Austen, Victorian Poets, Hardy).

Other statements in the course descriptions include, "**major credit limit**" (total number of units allowed toward the major) and "**total credit limit**" (total number of units students can take a course for credit).

Course Numbering System

Courses are generally numbered according to the plan shown below.

- 010–099 Pre-baccalaureate courses that are not for degree credit.
- 100–299 Courses primarily for freshman and sophomore students.
- 300–399 Courses primarily for advanced undergraduate students with prerequisite coursework.
- 400–499 Courses for advanced undergraduates. Certain 400-level courses can be used in graduate programs. See General Policies (p. 435) for Graduate Education.
- 500–599 Graduate courses.

Credit Hour

As of July 1, 2011 federal law (Title 34, Code of Federal Regulations, sections 600.2 and 600.4) requires all accredited institutions to comply with the federal definition of the credit hour. For all CSU degree programs and courses bearing academic credit, the "credit hour" is defined as "the amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than:

1. One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practice, studio work, and other academic work leading to the award of credit hours."

A credit hour is assumed to be a 50-minute period. In courses in which "seat time" does not apply, a credit hour may be measured by an equivalent amount of work, as demonstrated by student achievement.

Modes of Instruction

The mode of instruction is included in each course description; for supervision/independent study courses, no mode is indicated. Some courses have more than one mode of instruction.

Mode and number of hours classes meet each week

Activity: 2 hours per unit of credit.

Laboratory: 3 hours per unit of credit.

Lecture: 1 hour per unit of credit.

Seminar: 1 hour per unit of credit.

Supervision/Independent Study: Courses involve independent work done by students under the guidance of the faculty and do not meet regularly in a classroom. 3 hours of independent study per week per unit of credit.

Concentrations

A **concentration** is a group of courses designed to provide specialized knowledge within a bachelor's degree program. Completion of a concentration is noted on the student's transcript, but not shown on the diploma.

Specializations

A **specialization** is a similarly specialized group of courses in a master's degree program. Completion of a specialization is noted on the student's transcript and shown on the diploma.

Minors

A **minor** is an integrated, coherent group of courses designed to give a student knowledge in an academic area outside of the major field of study. The minor is completed along with the requirements for the bachelor's degree. For more information and a list including available minors at Cal Poly, see Programs A-Z (<https://catalog.calpoly.edu/programsaz/>). Completion of a minor is noted on the student's transcript, but not shown on the diploma.

Graduate Certificates

A **graduate certificate** is designed to provide a specialized area of study that meets the requirements for professional competence and to expand access to specialized knowledge. The subject matter is advanced and narrow in focus.

The programs are typically designed for working professionals who are seeking to advance their career opportunities by obtaining specialized knowledge in their field or in a new field. Completion of the graduate certificate program will be commemorated by a document bearing the University seal and signed by the program's college dean(s) and is noted on the student's transcript.

Quarters and Quarter Units

Cal Poly's academic calendar consists of four quarters – Fall, Winter, Spring and Summer (see Academic Calendar (p. 17)).

Cal Poly's **academic year** consists of Fall, Winter and Spring quarters.

The **university year** includes, and begins with, Summer quarter.

Each course offered by the University carries a value in **quarter units**, often referred to simply as units or credits.

To convert semester units to quarter units, multiply by 1.5. For example, 6 semester units X 1.5 = 9 quarter units.

Changes of Rules and Policies

Although every effort has been made to assure the accuracy of the information in this catalog, students and others who use this catalog should note that laws, rules, and policies change from time to time and that these changes may alter the information contained in this publication. Changes may come in the form of statutes enacted by the Legislature, rules and policies adopted by the Board of Trustees of the California State University, by the chancellor or designee of the California State University, or by the president or designee of the campus. It is not possible in a publication of this size to include all of the rules, policies and other information that pertain to students, the institution, and the California State University. More current or complete information may be obtained from the appropriate department, school, or administrative office.

Nothing in this catalog shall be construed as, operate as, or have the effect of an abridgment or a limitation of any rights, powers, or privileges of the Board of Trustees of the California State University, the chancellor of the California State University, or the president of the campus. The trustees, the chancellor, and the president are authorized by law to adopt, amend, or repeal rules and policies that apply to students. This catalog does not constitute a contract or the terms and conditions of a contract between the student and the campus or the California State University. The relationship of students to the campus and the California State University is one governed by statute, rules, and policy adopted by the legislature, the trustees, the chancellor, the presidents and their duly authorized designees.

UNIVERSITY LEARNING OBJECTIVES

A Cal Poly education is the result of experiences taking place in the major and in general education, as well as in the curriculum and co-curriculum. The University Learning Objectives (ULOs) allow these experiences to be aligned to a common set of academic expectations.

The ULOs state that all students who complete an undergraduate or graduate program at Cal Poly should be able to:

1. Think critically and creatively
2. Communicate effectively
3. Demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology
4. Work productively as individuals and in groups
5. Use their knowledge and skills to make a positive contribution to society
6. Make reasoned decisions based on an understanding of ethics, a respect for diversity, and an awareness of issues related to sustainability
7. Engage in lifelong learning

Cal Poly shares some of these expectations with other universities (See ULO 1, 2 and 7). Others reflect Cal Poly's unique character as a comprehensive polytechnic that provides students with the breadth of a liberal education and the depth of a disciplinary or professional education (ULO 3-6).

ULO 6 states that all Cal Poly graduates should be able to make reasoned decisions based on a respect and appreciation for diversity and an awareness of issues related to sustainability. Because of the complexity of this objective, the Academic Senate adopted the Diversity Learning Objectives (DLOs) in 2008 and the Sustainability Learning Objectives (SLOs) in 2009, both as addenda to the ULOs.

Diversity Learning Objectives

The DLOs state that all Cal Poly graduates should be able to:

1. Recognize and understand the contributions to knowledge and civilization that have been made by members of diverse cultural and gender groups and other historically marginalized people in the United States and across the world
2. Understand the history of issues related to diversity, social and economic inequities, and political power in the United States and across the world
3. Analyze the current social, political, artistic, and/or economic lives of historically marginalized people in the United States and across the world
4. Analyze the various institutions and structures that create and maintain social, economic, and political inequality in the United States and across the world; and, identify those that offer redress for these issues
5. Define and describe the various issues related to diversity, equity, and inclusion in their respective disciplines

6. Critically examine their own personal beliefs, attitudes, and biases about historically marginalized people and cultures in the United States and across the world

Please see University Policies (p. 9) for the Statement on Diversity and Inclusivity and the Non-Discrimination Policy.

Sustainability Learning Objectives

Cal Poly defines sustainability as the ability of the natural and social systems to survive and thrive together to meet current and future needs. The SLOs state that all Cal Poly graduates should be able to:

1. Define and apply sustainability principles within their academic programs
2. Explain how natural, economic, and social systems interact to foster or prevent sustainability
3. Analyze and explain local, national, and global sustainability using a multidisciplinary approach
4. Consider sustainability principles while developing personal and professional values

Please see Sustainability Practices (p. 458) for more campus sustainability information and the Sustainability Catalog (SUSCAT) (<http://suscat.calpoly.edu/>) website for lists of sustainability courses.

Both the DLOs and SLOs should be understood as operating at a level below the institutional level of the ULOs.

Student Learning Assessment

To determine the effectiveness of various educational experiences, Cal Poly assesses student achievement of learning objectives/outcomes at the course, program, and university levels. This kind of evaluation may take the form of a direct assessment of student work (assignments, exams, projects, performances, etc.), perhaps using standardized rubrics, or an indirect assessment of perceptions via surveys administered to students, graduates, faculty, and employers. The results are intended to be used primarily for the improvement of curricula and pedagogy, although they may also be used for accountability purposes to demonstrate the educational effectiveness of courses, programs, and the institution as a whole. As a result, Cal Poly students should expect that their academic work may be used for assessment purposes.

UNIVERSITY POLICIES

Statement on Commitment to Community

The Cal Poly community values a broad and inclusive campus learning experience where its members embrace core values of mutual respect, academic excellence, open inquiry, free expression and respect for diversity. Membership in the Cal Poly community is consistent with the highest principles of shared governance, social and environmental responsibility, engagement and integrity.

As students, faculty and staff of Cal Poly, we choose to:

- Act with integrity and show respect for ourselves and one another
- Accept responsibility for our individual actions
- Support and promote collaboration in University life
- Practice academic honesty in the spirit of inquiry and discovery
- Contribute to the university community through service and volunteerism
- Demonstrate concern for the well-being of others
- Promote the benefits of diversity by practicing and advocating openness, respect and fairness

Individual commitment to these actions is essential to Cal Poly's dedication to an enriched learning experience for all its members.

Statement on Diversity and Inclusivity

The following excerpt is taken from the *Cal Poly Statement on Diversity and Inclusivity*, which has been endorsed by the Cal Poly Academic Senate Resolution AS-807-15 (<http://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1807&context=senateresolutions>):

At Cal Poly we believe that academic freedom, a cornerstone value, is exercised best when there is understanding and respect for our diversity of experiences, identities, and world views. Consequently, we create learning environments that allow for meaningful development of self-awareness, knowledge, and skills alongside attention to others who may have experiences, worldviews, and values that are different from our own. In so doing, we encourage our students, faculty, and staff to seek out opportunities to engage with others who are both similar and different from them, thereby increasing their capacity for knowledge, empathy, and conscious participation in local and global communities.

In the spirit of educational equity, and in acknowledgement of the significant ways in which a university is transformed by, and can transform the lives of individuals and communities, we strive to increase the diversity at Cal Poly. As an institution that serves the state of California within a global context, we support the recruitment, retention, and success of talented students, faculty, and staff from across all social identities, including people who are from historically and societally marginalized and underrepresented groups.

We are a culturally invested university whose members take personal responsibility for fostering excellence in our own and others' endeavors. To this end, we support an increased awareness and understanding of how one's own identity facets (such as race, ethnicity, gender, sexual orientation, religion, age, disability, social class, and nation of origin) and the combinations/intersections of these identities and experiences that may accompany them can affect our different worldviews.

- * The definition of diversity is specifically inclusive of, but not limited to, an individual's race/ethnicity, sex/gender, socioeconomic status, cultural heritage, disability, and sexual orientation.

Statement on Sustainability

In 1987, the United Nations' World Commission on Environment and Development defined sustainable development as, "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs." In 2009, Cal Poly's Academic Senate adopted a more academically focused definition of sustainability with the passage of Sustainability Learning Objectives (p. 8):

"Cal Poly defines sustainability as the ability of the natural and social systems to survive and thrive together to meet current and future needs. Cal Poly students should be able to consider sustainability when making reasoned decisions. Students should be able to:

- Define and apply sustainability principles within their academic programs
- Explain how natural, economic, and social systems interact to foster or prevent sustainability
- Analyze and explain local, national, and global sustainability using a multidisciplinary approach
- Consider sustainability principles while developing personal and professional values"

As a comprehensive polytechnic university with a hands-on, Learn-by-Doing pedagogy, Cal Poly offers a wide breadth of academic programs in technical disciplines, the arts, and humanities. A Cal Poly education seeks to achieve two distinct but complementary goals – technical knowledge and proficiency in a chosen discipline to prepare for the workplace, and a transformative exposure to diverse cultures and critical thinking to create life-long learners and responsible global citizens.

By definition, sustainability seeks to balance three things - protection of the natural environment, healthy economy, and social justice and equity. As a framework in higher education, sustainability helps foster critical and systems thinking, development of personal and professional ethics, a commitment to environmental stewardship, and inspires students to make positive contributions to human society.

As a Charter Signatory to the Second Nature Climate Commitment, Cal Poly is committed to achieving carbon neutrality and climate resilience as soon as possible, and is infusing this work into curriculum, research, and student experience.

For more information on sustainability at Cal Poly see Sustainability Practices (p. 458).

Policies on the Rights of Individuals

Cal Poly is a community enriched by individual differences. The University is committed to respecting and protecting the rights of individuals. This section presents a summary of University non-discrimination policies and procedures for pursuing complaints under these policies. The Civil Rights and Compliance Office (<https://crco.calpoly.edu/>) has been designated to oversee and coordinate implementation of compliance with campus non-discrimination policies.

Except where otherwise indicated, procedures for reporting incidents of discrimination can be found in "Reporting Guidelines."

CSU Non-discrimination Policy and Procedure for Addressing

Protected Status: Age, Disability (physical or mental), Gender (or sex), Gender Identity (including nonbinary and transgender), Gender Expression, Genetic Information, Marital Status, Medical Condition, Nationality, Race or Ethnicity (including color, caste, or ancestry), Religion or Religious Creed, Sexual Orientation, and Veteran or Military Status.

The California State University is committed to maintaining an inclusive community that values diversity and fosters tolerance and mutual respect. The CSU embraces our community differences in Age, Disability (physical and mental), Gender (or sex), Gender Identity (including nonbinary and transgender), Gender Expression, Genetic Information, Marital Status, Medical Condition, Nationality, Race or Ethnicity (including color, caste, or ancestry), Religion (or religious creed), Sexual Orientation, Veteran or Military Status. All Students and Employees have the right to participate fully in CSU programs, activities (including admission and access), and employment free from Discrimination and/or Harassment based on any Protected Status (see above), Sexual Misconduct, Sexual Exploitation, Dating Violence, Domestic Violence, Stalking and Retaliation pursuant to the Interim CSU Policy Prohibiting Discrimination, Harassment, Sexual Misconduct, Sexual Exploitation, Dating Violence, Domestic Violence, Stalking, and Retaliation Revised December 24, 2021 (<https://calstate.policystat.com/policy/10926024/latest/>) (hereinafter "Interim CSU Policy") and any successor policy. State and federal laws, including the California Equity in Higher Education Act, Title IX of the Education Amendments of 1972, the Violence Against Women Reauthorization Act of 2013 which amends the Jeanne Clery Disclosure of Campus Security and Campus Crimes Statistics Act, commonly known as the Clery Act) (VAWA) under its Campus Sexual Violence Elimination Act provision (Campus SaVE Act), Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, and the Age Discrimination Act of 1975, among other applicable state and federal laws, prohibit such discrimination. Interim CSU Policy (and any successor policy) is the systemwide policy and procedure for addressing allegations of discrimination, harassment & retaliation *made by students, employees, and third parties* against the CSU, a CSU employee, other CSU students or a third-party.

The following person has been designated to handle inquiries regarding the non-discrimination policy and procedure for California Polytechnic State University, San Luis Obispo:

Maren Hufton
Assistant Vice President for the Civil Rights & Compliance Office & Title IX Coordinator
Civil Rights & Compliance Office
Building 33 (Fisher Science), Room 290
1 Grand Avenue, San Luis Obispo, CA 93407
E-mail: mhufton@calpoly.edu or crco@calpoly.edu
Phone: (805) 756-6770

If you are in the midst of an emergency, please call the police immediately by dialing 9-1-1.

Cal Poly University Police Department (when you are on-campus)
Emergency: 911

Non-emergency: 805-756-2281
Location: Building 36
<https://www.afd.calpoly.edu/police/>

Local Police (when you are off-campus)

San Luis Obispo Police
Emergency: 911
Non-Emergency: 805-781-7317
Location: 1042 Walnut Street, San Luis Obispo, CA 93401
(at the intersection of Santa Rosa)

CONFIDENTIAL RESOURCES

Cal Poly Counseling Center

805.756.2511
<https://chw.calpoly.edu/counseling> (<https://chw.calpoly.edu/counseling/>)

Cal Poly Health Services

805.756.1211
Hearing or Speech Impaired: Call 711 (Telecommunications Relay Service)
<https://chw.calpoly.edu>

Cal Poly Safer

805.756.2282
<https://safer.calpoly.edu/>

Lumina Alliance (Formerly RISE & STAND STRONG)

805.545.8888 (24/7 Crisis & Information Hotline)
Contact@LuminaAlliance.org (contact@LuminaAlliance.org)
<https://luminaalliance.org/>

Safety of the Campus Community

Alleged victims and witnesses should not be deterred from reporting any incidents of Sexual Misconduct, Sexual Exploitation, Dating Violence, Domestic Violence, or Stalking out of a concern that they might be disciplined for related violations of drug, alcohol, or other University policies. The University's primary concern is the safety of the Campus community; therefore, a person who participates as a Complainant or witness in investigations or proceedings involving Sexual Misconduct, Sexual Exploitation, Dating Violence, Domestic Violence, or Stalking shall not be subject to discipline for related violations of the Student Conduct Code at or near the time of the incident unless the University determines the violation was egregious, including but not limited to plagiarism, cheating, academic dishonesty, or conduct that places the health and safety of another person at risk.

Protection from Retaliation

It is critical that individuals not be deterred from reporting potential policy violations. Interim CSU Policy prohibits retaliation against individuals for exercising rights under the non-discrimination policy, opposing discrimination, or participating in any related investigation or proceeding.

Information Regarding Discipline

Employees and Students who are found to have violated University non-discrimination policy shall be subject to discipline commensurate to the violation. If employee discipline is warranted, it shall be administered in a manner consistent with applicable collective bargaining agreements, CSU policies, and legal requirements. Student discipline shall be administered in accordance with 5 Cal. Code Regs. § 41301 CSU Student Conduct Procedures, Executive Order 1098 Revised August 14, 2020 and any

successor policy (<https://calstate.policystat.com/policy/8453518/latest/>) (hereinafter "Executive Order 1098").

Further Questions

Individuals with inquiries regarding the non-discrimination policy at California Polytechnic State University, San Luis Obispo, or seeking to file a complaint, may contact:

Civil Rights & Compliance Office
Fisher Science (Bldg. 33), Room 290
1 Grand Avenue, San Luis Obispo, CA 93407
E-mail: crco@calpoly.edu
Phone: (805) 756-6770
<https://crco.calpoly.edu/>

Notice of Non-Discrimination on the Basis of Gender or Sex

The California State University does not discriminate on the basis of gender, which includes sex and gender identity or gender expression, or sexual orientation in its education programs or activities. Title IX of the Education Amendments of 1972, and certain other federal and state laws, prohibit discrimination on the basis of gender or sexual orientation in employment, as well as in all education programs and activities operated by the University (both on and off campus), including admissions. The protection against discrimination on the basis of gender or sexual orientation includes sexual harassment, sexual misconduct, sexual exploitation, dating and domestic violence and stalking.

Any person may report sex discrimination, including sexual harassment (whether or not the person reporting is the alleged to have experienced the conduct that could constitute sex discrimination or sexual harassment), in-person, by mail, by telephone, or by electronic mail, using the contact information listed below for the Title IX Coordinator, or by any other means that results in the Title IX Coordinator receiving the person's verbal or written report. Such a report may be made at any time (including during non-business hours) by using the telephone number or electronic mail address, or by mail to the office address listed for the Title IX Coordinator.

The following person has been designated to handle inquiries regarding the non-discrimination policy and procedure, including Title IX complaints, for Cal Poly, San Luis Obispo:

Maren Hufton
Assistant Vice President for the Civil Rights & Compliance Office & Title IX Coordinator
Civil Rights & Compliance Office
Building 33 (Fisher Science), Room 290
1 Grand Avenue, San Luis Obispo, CA 93407
E-mail: mhufton@calpoly.edu or crco@calpoly.edu
Phone: (805) 756-6770

Questions may also be addressed to:

Office of Civil Rights
San Francisco Office
U.S. Department of Education
50 United Nations Plaza
San Francisco, CA 94102
Telephone: (415) 486-5555
Facsimile: (415) 486-5570

E-Mail: OCR.SanFrancisco@ed.gov

Academic Freedom

Cal Poly recognizes and supports the principle of academic freedom, by which each instructional faculty member, researcher, librarian and counselor has the right to teach, to conduct research, and to publish material relevant to that faculty member's discipline, even when such material is controversial.

The University also guarantees to its faculty the same rights shared by all citizens, which include:

- the right to free expression,
- the right to assemble, and
- the right to criticize and seek revision of the institution's regulations.

At the same time, the faculty should recognize an equally binding obligation to perform their academic duties responsibly and to comply with the internal regulations of the University.

Each faculty member is expected to recognize the right of free expression of other members of the university community.

Faculty shall not claim to be representing the University unless authorized to do so.

Cal Poly endorses the nationally recognized definition of academic freedom from the American Association of University Professors (AAUP): The 1940 Statement of Principles on Academic Freedom and Tenure with 1970 Interpretative Notes, is as follows:

1. Teachers¹ are entitled to full freedom in research and in the publication of results, subject to the adequate performance of their other academic duties; but research, for pecuniary return, should be based upon an understanding with the authorities of the institution.
2. Teachers are entitled to freedom in the classroom in discussing their subject, but they should be careful not to introduce into their teaching controversial subject matter which has no relation to the subject.² Limitations of academic freedom because of religious or other aims of the institution should be clearly stated in writing at the time of appointment.
3. College and university teachers are citizens, members of a learned profession, and officers of an educational institution. When they speak or write as citizens, they should be free from institutional censorship or discipline, but their special position in the community imposes special obligations. As scholars and educational officers, they should remember that the public may judge their profession and institution by their utterances. Hence, they should at all times be accurate, should exercise appropriate restraints, should show respect for the opinions of others, and should make every effort to indicate they are not speaking for the institution.

¹ The footnote from the 1940 Statement states: "The word 'teacher' as used in this document is understood to include the investigator who is attached to an academic institution without teaching duties."

² The footnote from the 1970 Interpretative Notes on the AAUP Statement reads: "The intent of this statement is not to discourage what is 'controversial.' Controversy is at the heart of free academic inquiry which the entire statement is designed to foster. The passage serves to underscore the need for teachers to avoid persistently intruding material which has no relation to their subject." Reference: AAUP. The 1940 Statement of Principles on Academic Freedom and Tenure with 1970 Interpretative Notes, adopted by the Council of the American Association of University Professors in April 1970 and endorsed by the Fifty-sixth Annual Meeting as Association policy, www.aaup.org/AAUP/pubsres/policydocs/contents/1940statement.htm (<https://www.aaup.org/report/1940-statement-principles-academic-freedom-and-tenure/>).

Student Academic Rights & Responsibilities

The classroom (including laboratories, field trips, independent study, etc.) is the essential part of any university where freedom to learn should flourish. The instructor has the responsibility for the manner of instruction and the conduct of the classroom. The instructor should not act in any way that denies the rights of students as set forth below:

Students are free to take reasoned exception to the data or views offered in courses. It is the responsibility of the instructor to take every precaution to ensure that what is presented is factual. If the instructor's presentation is in the area of opinion, belief, or debatable fact, it is the instructor's responsibility to make this clear to the students. Students may be required to know thoroughly the particulars set forth by the instructor, but they are free to reserve personal judgment as to that which is presented in the classroom.

The student has the right to substantial presentations appropriate to the course. Unjustified failure of the instructor to meet or prepare for classes, which results in incompetent performance, is a legitimate ground for student complaints against the instructor.

The student has the right to a statement at the beginning of each quarter providing: instructor's name, office location, office telephone number, and office hours; texts and supplementary materials required for the course; purpose of the course; prerequisites; requirements for grading; frequency and types of tests; and other information to assure student's understanding of the nature and requirements of the course.

A **Fairness Board** has been established to hear grievances of students who believe their academic rights have been denied or violated. The legitimacy of the process and procedure of evaluation in the course shall be the sole criterion of the Fairness Board. Students may contact the Academic Senate at 805.756.1258, www.academicssenate.calpoly.edu/ (<http://academicssenate.calpoly.edu/>) for clarification of the description and procedures for the Fairness Board and the appeal process for grade disputes. Students should address grade disputes involving allegations of academic dishonesty to the Office of Student Rights & Responsibilities at 805.756.2794. Students may also contact the University Ombuds at 805.756.1380 for informal assistance with grade disputes.

Academic Responsibilities

Students enrolled in a class are responsible for meeting standards of performance and conduct established by the University and the instructor. Students are given full control over their enrollment transactions through the Student Information System within the limits of the academic policies and dates as published. Therefore, it is the

students' responsibility to ensure that all their enrollment transactions have been successfully processed in a timely manner. These transactions include, but are not limited to, adding, dropping, withdrawing, auditing, and choosing the desired grading basis when applicable. Students are also responsible to make sure that those enrollment transactions initiated after the add/drop period, during the course of the term, are successfully processed and appropriately reflected in their record before the end of the said term (e.g., course and/or term withdrawals).

Students are responsible for completing and submitting all class assignments, examinations, tests, projects, reports, etc., by scheduled due dates, or face penalties. If any problem arises regarding course work or attendance, the student is held responsible for initiating communication and contact with the instructor. In addition, students are held responsible for behavior and conduct adverse to the preservation of order as established by the University and the instructor. Students are responsible for meeting their degree requirements as provided in the university catalog.

Cheating and Plagiarism

Academic Dishonesty: Cheating and Plagiarism

The University does not condone academic cheating or plagiarism in any form. Faculty are expected to uphold and support the highest academic standards in this matter. Instructors should be diligent in reducing potential opportunities for academic cheating and plagiarism to occur. Students' rights shall be ensured through attention to due process, as detailed on the Office of Student Rights and Responsibilities' webpage for Academic Integrity (<https://osrr.calpoly.edu/academic-integrity/>).

Definition of Cheating

Cheating is defined as obtaining or attempting to obtain, or aiding another to obtain credit for work, or any improvement in evaluation of performance, by any dishonest or deceptive means. Cheating includes, but is not limited to: lying; copying from another's test or examination; discussion at any time of answers or questions on an examination or test, unless such discussion is specifically authorized by the instructor; taking or receiving copies of an exam without the permission of the instructor; using or displaying notes, "cheat sheets," or other information devices inappropriate to the prescribed test conditions; allowing someone other than the officially enrolled student to represent same.

Definition of Plagiarism

Plagiarism is defined as the act of using the ideas or work of another person or persons as if they were one's own without giving proper credit to the source. Such an act is not plagiarism if it is ascertained that the ideas were arrived at through independent reasoning or logic or where the thought or idea is common knowledge. Acknowledgement of an original author or source must be made through appropriate references; e.g., quotation marks, footnotes, or commentary. Examples of plagiarism include but are not limited to the following: the submission of a work, either in part or in whole completed by another; failure to give credit for ideas, statements, facts or conclusions which rightfully belong to another; failure to use quotation marks (or other means of setting apart, such as the use of indentation or a different font size) when quoting directly from another, whether it be a paragraph, a sentence, or even a part thereof; close and lengthy paraphrasing of another's writing without credit or originality; use of another's project or programs or part thereof without giving credit.

Students who have received a grade reduction as a result of academic dishonesty are NOT eligible to receive a CR/NC, or to withdraw from the course in which the grade for the course has been impacted by academic dishonesty. All CR/NC will revert to the letter grade issued by the instructor for the course. For the complete policy regarding Cheating and Plagiarism see Academic Programs and Planning (<https://academicprograms.calpoly.edu/content/academicpolicies/Cheating/>).

For more information, please visit the Academic Integrity webpage by the Office of Student Rights and Responsibilities (<https://osrr.calpoly.edu/academic-integrity/>).

Use and Release of Student Information

https://registrar.calpoly.edu/ferpa_summary (https://registrar.calpoly.edu/ferpa_summary/)

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. This federal law applies to all schools that receive funding under most programs administered by the Department of Education. The primary rights afforded each student are the right to inspect and review his/her education records, the right to seek to have the records amended, and the right to have some control over the disclosure of information from the records.

Responsible Use of Information Technology Resources

Information technology resources are provided to support the University's mission of education, research and service. To ensure these shared and finite resources are used effectively to further the University's mission, each user has the responsibility to:

- Use the resources appropriately and efficiently
- Respect the freedom and privacy of others
- Protect the stability and security of the resources
- Understand and fully abide by established University policies and applicable public laws

The Responsible Use Policy covers authorized use, data security, confidentiality and privacy, copyright infringement and more. All students, faculty and staff acknowledge the policy each time they change their my.calpoly.edu passwords. It can also be viewed by visiting: IT Responsible Use Policy (<https://policy.calpoly.edu/cap/1200/cap-1200/#cap-1203-1>)

E-Mail - an Official Means of Communication to Students

<https://tech.calpoly.edu/services/email-and-calendar-o365> (<https://tech.calpoly.edu/services/email-and-calendar-o365/>)

Campus email is an official method of campus communication to students, and may be used as the sole method of communication for some campus matters. Official university communications are sent to a student's university-assigned e-mail address (username@calpoly.edu). Students are responsible for receiving and reading official email communications in a timely manner and for taking necessary action when appropriate. This also applies when university emails are redirected to a non-university email account.

Campus policy permits colleges, departments, and faculty to use email to send official communications to students, for example, messages

pertaining to the conduct of university business for academic or administrative purposes. Using email for such purposes is at the discretion of the sender and in no way precludes the use of other communication methods.

For more information about the campus email policy and related standards and practices, including frequently asked questions, visit <https://tech.calpoly.edu/services/email-and-calendar-o365> (<https://tech.calpoly.edu/services/email-and-calendar-o365/>).

Accessibility of Cal Poly Electronic and Information Technology Resources

accessibility.calpoly.edu (<http://accessibility.calpoly.edu>)

The Americans with Disabilities Act (ADA) provides that no qualified individual with a disability be denied access to or participation in services, programs, and activities at Cal Poly. This act applies to virtually all aspects of campus activities, including employment, teaching and learning, and services provided to the campus community.

It is the policy of the California State University system to make information technology resources and services accessible to all CSU students, faculty, staff, and the general public regardless of disability status. Cal Poly is committed to ensuring university information and services delivered electronically are made accessible and the needs of individual students and employees with disabilities are accommodated. For more information regarding Cal Poly plans and policies and related standards and practices related to accessibility, visit accessibility.calpoly.edu (<http://accessibility.calpoly.edu>).

Copyright Infringement and File Sharing: What Students Need to Know

security.calpoly.edu/content/faq/dmca-faqs (<http://security.calpoly.edu/content/faq/dmca-faqs/>)

In recent years, copyright holders, like the Recording Industry Association of America (RIAA), have stepped up legal efforts to combat infringement, which includes targeting college students with an increased number of copyright infringement notices. Here's what you should know:

- Hundreds of Cal Poly students receive copyright Infringement notices each year.
- You can receive a notice for downloading or for allowing others to upload content from your computer. If you have file sharing software on your computer, you may be distributing copyrighted materials anytime your computer is on the network.
- If you receive a notice for inappropriate activity on the campus network, your network access will be temporarily disabled and you will be required to complete specific actions before access is reinstated.
- Repeat offenders will be referred to the Office of Student Rights and Responsibilities for further disciplinary action.

Please review these frequently asked questions to learn more about peer-to-peer file sharing and copyright infringement, the potential dangers and penalties you may incur from file sharing, and what you can do to protect yourself and your computer. security.calpoly.edu/content/faq/dmca-faqs (<http://security.calpoly.edu/content/faq/dmca-faqs/>).

Information Security Program

security.calpoly.edu (<http://security.calpoly.edu>)

Information security is everyone's responsibility. Only you can protect your personal devices and information. By following some basic security practices, you can help protect university data and devices you access, as well as your own; this includes using anti-virus and other technical safeguards (e.g., keeping software and operating systems up-to-date, using strong passwords, not responding to "phishing" emails, and avoiding unsecured network connections).

It is the collective responsibility of all users to ensure:

- Confidentiality of information which Cal Poly must protect from unauthorized access
- Integrity and availability of information stored on or processed by Cal Poly information systems
- Campus compliance with applicable laws, regulations, and policies governing information security and privacy protection.

Cal Poly's Information Security Office provides direction to the campus to accomplish the above while not inhibiting the sanctioned use of campus information assets as required to meet the university's core mission and academic and administrative goals. To help safeguard and secure campus information and information resources, all users and campus departments are expected to adhere to these policies and standards where applicable. Please report suspected violations and questions to security@calpoly.edu.

ACCREDITATION

The University is fully accredited by the WASC Senior College and University Commission (WSCUC). WSCUC is a regional accrediting agency that is recognized by the U.S. Department of Education as certifying institutional eligibility for federal funding, including student access to federal financial aid. WSCUC may be contacted at:

WASC Senior College and University Commission
985 Atlantic Avenue, Suite 100
Alameda, California 94501
Phone: 510.748.9001

During the process of reaffirming its accreditation, Cal Poly completes a self-study and then undergoes a review by a WSCUC visiting team representing institutional peers. After the last such process in Spring 2012, Cal Poly received a full ten-year extension of its accreditation, i.e., until 2022. The university has completed another self-study and subsequently underwent a site visit in April 2022. At the time of publication of this catalog, the results are pending. More information about this process may be found at wasc.calpoly.edu (<https://wasc.calpoly.edu>).

Notice to Students RE: Professional Licensure and Certification

California State University programs for professions that require licensure or certification are intended to prepare the student for California licensure and certification requirements. Admission into programs for professions that require licensure and certification does not guarantee that students will obtain a license or certificate. Licensure and certification requirements are set by agencies that are not controlled by or affiliated with the California State University and licensure and certification requirements can change at any time.

The California State University has not determined whether its programs meet other states' educational or professional requirements for licensure and certification. Students planning to pursue licensure or certification in other states are responsible for determining whether, if they complete a California State University program, they will meet their state's requirements for licensure or certification. This disclosure is made pursuant to 34 CFR §668.43(a)(5)(v)(C).

Program Accreditation. The School of Education offers teaching and service credentials which are fully accredited by the California Commission on Teacher Credentialing (CCTC). The credentials are described in catalog sections Teaching Credential Programs (p. 414) and Graduate Programs (p. 415) in the School of Education (p. 414) section of this Catalog.

In addition, Cal Poly has a number of accredited degree programs:

Program	Accrediting Agency
Accounting, MS	Association to Advance Collegiate Schools of Business (AACSB)
Agricultural Systems Management, BS	Engineering Technology Accreditation Commission of ABET ¹
Art and Design, BFA	National Association of Schools of Art and Design (NASAD)
Architecture, BArch	National Architectural Accrediting Board (NAAB)

Business Administration, BS, MBA	Association to Advance Collegiate Schools of Business (AACSB)
Business Analytics, MS	Association to Advance Collegiate Schools of Business (AACSB)
City and Regional Planning, BS, MCRP	Planning Accreditation Board (PAB)
Computer Science, BS	Computing Accreditation Commission of ABET ¹
Construction Management, BS	American Council for Construction Education (ACCE)
Dietetic Internship	Accreditation Council for Education in Nutrition and Dietetics (ACEND)
Economics, BS	Association to Advance Collegiate Schools of Business (AACSB)
Engineering Programs:	
Aerospace Engineering, BS	Engineering Accreditation Commission of ABET ¹
Architectural Engineering, BS	Engineering Accreditation Commission of ABET ¹
Biomedical Engineering, BS	Engineering Accreditation Commission of ABET ¹
BioResource and Agricultural Engineering, BS	Engineering Accreditation Commission of ABET ¹
Civil Engineering, BS	Engineering Accreditation Commission of ABET ¹
Computer Engineering, BS	Engineering Accreditation Commission of ABET ¹
Electrical Engineering, BS	Engineering Accreditation Commission of ABET ¹
Environmental Engineering, BS	Engineering Accreditation Commission of ABET ¹
Industrial Engineering, BS	Engineering Accreditation Commission of ABET ¹
Manufacturing Engineering, BS	Engineering Accreditation Commission of ABET ¹
Materials Engineering, BS	Engineering Accreditation Commission of ABET ¹
Mechanical Engineering, BS	Engineering Accreditation Commission of ABET ¹
Software Engineering, BS	Engineering Accreditation Commission of ABET ¹
Forest and Fire Sciences, BS	Society of American Foresters (SAF)
Graphic Communication, BS	Accrediting Counsel for Collegiate Graphic Communications (ACCGC)
Industrial Technology and Packaging, BS	Association to Advance Collegiate Schools of Business (AACSB)
Journalism, BS	Accrediting Council on Education in Journalism and Mass Communications (ACEJMC)
Landscape Architecture, BLA	American Society of Landscape Architects (ASLA), Landscape Architectural Accreditation Board (LAAB)
Music, BA	National Association of Schools of Music (NASM)

Nutrition, BS (Applied Nutrition Concentration)	Accreditation Council for Education in Nutrition and Dietetics (ACEND)
Quantitative Economics, MS	Association to Advance Collegiate Schools of Business (AACSB)
Recreation, Parks, and Tourism Administration, BS	Council on Accreditation of Parks, Recreation, Tourism and Related Professions (COAPRT)
Taxation, MS	Association to Advance Collegiate Schools of Business (AACSB)

¹ Formerly the Accreditation Board for Engineering and Technology (<https://www.abet.org/>)

ACADEMIC CALENDAR 2022-2026

Please note: This is not intended to be construed as an employee work calendar.

APPROVED - JULY 19, 2021

Fall Term 2022

Date	Event
September 12, Monday	Beginning of fall term (faculty only)
September 19, Monday	Fall term classes begin
September 30, Friday	End of second week of instruction
October 7, Friday	End of third week of instruction – Census date
November 4, Friday	End of seventh week of instruction
November 11, Friday	Academic holiday – Veterans' Day observed
November 21 - 27, Monday-Sunday	Academic holiday – Thanksgiving
December 2, Friday	Last day of classes
December 3, Saturday	Common final exams (optional)
December 5 - 9, Monday-Friday	Final examination period
December 10, Saturday	Mid-Year Commencement
December 12, Monday	Evaluation Day (faculty workday, no classes)
TBD	Grades Due (faculty workday, no classes), End of fall term
December 13 - January 8, Tuesday-Sunday	Academic Holiday

Winter Term 2023

Date	Event
January 9, Monday	Beginning of winter term – classes begin
January 16, Monday	Academic holiday – Martin Luther King, Jr.'s Birthday observed
January 17, Tuesday	Classes follow a Monday schedule
January 23, Monday	End of second week of instruction
January 30, Monday	End of third week of instruction – Census date
February 20, Monday	Academic holiday – Washington's Birthday observed
February 27, Monday	End of seventh week of instruction
March 17, Friday	Last day of classes
March 18, Saturday	Common final exams (optional)
March 20 – 24, Monday-Friday	Final examination period
March 27, Monday	Evaluation Day (faculty workday, no classes), End of winter term
March 28 - April 2, Tuesday-Sunday	Academic holiday

Spring Term 2023

Date	Event
April 3, Monday	Beginning of spring term – classes begin
April 14, Friday	End of second week of instruction
April 21, Friday	End of third week of instruction – Census date
May 19, Friday	End of seventh week of instruction
May 29, Monday	Academic holiday – Memorial Day observed
June 9, Friday	Last day of classes
June 10, Saturday	Common final exams (optional)
June 12 – 16, Monday-Friday	Final examination period
June 17 – 18, Saturday-Sunday	Commencement; End of spring term; End of university year (faculty only)

For the most current information, see the 2022-23 calendar via the Academic Calendar website (<https://registrar.calpoly.edu/academic-calendar/>).

ADMISSIONS

Undergraduate

Office of Admissions
 Building (172H), 2nd Floor, Room 2-20
 Phone: 805.756.2311; Fax: 805.756.5911
 Tour Information Line: 805.756.5734
 Email: admissions@calpoly.edu
<https://admissions.calpoly.edu/>

Admissions

Cal Poly comprehensively reviews all applications, seeking students who have strong academic records and are active in and outside the classroom. Admission to Cal Poly is highly competitive. Beyond the basic California State University qualifications, Cal Poly considers other factors for admission deemed important to the campus and does so in an objective format. Review the selection criteria for undergraduate applicants by starting here: Cal Poly Admissions (<https://www.calpoly.edu/admissions/>).

Applicants are notified of a formal decision by April 1.

First-Year Factors

When a first-year application is reviewed, the following are considered:

- The applicant's intended program of study (the major to which application is made)
- The applicant's college preparatory courses in secondary school
- GPA earned in college preparatory courses
- The applicant's extra-curricular activities and work experience
- Non-cognitive variables deemed important to the campus

For a comprehensive look at Cal Poly's selection criteria for a first-year applicant, including deadlines, visit Cal Poly Admissions Selection Criteria (<https://www.calpoly.edu/admissions/first-year-student/selection-criteria/>).

The majors below have additional requirements:

- Art and Design – qualified first-year applicants will be requested to submit an electronic portfolio per specific instructions provided to the applicant
- Music – qualified first-year applicants will be requested to audition either in person or via specified media

New Transfer Factors

When an upper-division¹ transfer application is reviewed, the following are considered:

- The applicant's intended program of study (the major to which application is made)
- The number of units completed
- Completion of CSU and Cal Poly program required coursework with a grade of 'C' or better
- General Education (G.E. Breadth) or Intersegmental General Education Transfer Curriculum (IGETC) courses
- Academic performance in college courses (GPA)

- The applicant's extracurricular activities and work experience
- Non-cognitive variables deemed important to the campus

For a comprehensive look at Cal Poly's selection criteria for a new transfer applicant, including deadlines, visit <https://www.calpoly.edu/admissions/transfer-student/selection-criteria> (<https://www.calpoly.edu/admissions/transfer-student/selection-criteria/>).

The majors below have additional requirements:

- Art and Design – qualified new transfer applicants will be requested to submit an electronic portfolio per specific instructions provided to the applicant
- Music – qualified new transfer applicants will be requested to audition either in person or via specified media
- Architecture – qualified new transfer applicants will be requested to submit a portfolio per specific instructions provided to the applicant

¹ Cal Poly only considers new transfer applicants at the junior level (60 or more transferable semester units or 90 quarter units by the time of transfer [end of previous spring term for Fall admission]). Cal Poly *does not* accept applications for these categories:

- Lower-division new transfer applicants (less than 60 transferable semester units or 90 transferable quarter units upon transfer)
- Students seeking a second baccalaureate degree
- Students seeking professional growth or professional development

Appeals to Undergraduate Admission Decisions - First Year and New Transfers

Cal Poly does not set aside spaces for students who appeal admission decisions. Every denied application has been reviewed for maximum consideration. Therefore, for an appeal to have merit it must bring to light new academic information, as well as information pertaining to extenuating circumstances that was not present in the application information that clearly shows the student to be stronger than had been earlier evidenced. Neither grades received in the current academic year nor mistakes made by the applicant on the application are a basis for an appeal or the reversal of a decision.

Review the Cal Poly Admissions website for complete information and instructions regarding the process to submit an appeal here (<https://www.calpoly.edu/admissions/not-selected/>).

Application Procedures

For admission consideration, Cal Poly requires applicants to submit the online application (<https://www2.calstate.edu/apply> (<https://www2.calstate.edu/apply/>)) with the corresponding \$70.00 application fee, which is both non-refundable and non-transferable. The application and fee cannot be used to apply to another term.

Applicants should not submit additional information beyond the information submitted on the application unless requested to do so by the Admissions Office. Applicants are advised to submit complete and accurate information on the application for admission. Failure to file complete, accurate, and authentic application documentation may result in denial of admission, cancellation of academic credit, suspension, or expulsion (Section 41301 of Title V, California Code of Regulations).

View detailed online application information at <https://www.calpoly.edu/admissions> (<https://www.calpoly.edu/admissions/>).

Cal Poly Application Filing Periods

Cal Poly accepts undergraduate (first-year or new transfer) applications for the Fall term only.

First-Year Applicants apply through the online process. This process requires applicants to submit Cal Poly's online application with the corresponding fee during the application filing period of October 1 to November 30.

*Please note: Applicants will receive notification of their admission status by April 1. Those selected must accept or decline Cal Poly's offer of admission by May 1.

New Transfer Applicants apply through the online process. This process requires applicants to submit Cal Poly's online application with the corresponding fee during the application filing period of October 1 to November 30.

*Please note: Applicants will receive notification of their admission status by April 1. Those selected must accept or decline Cal Poly's offer of admission by May 1.

Offers of admission to Cal Poly are conditional pending satisfactory compliance with the "Terms and Conditions of Admission" found online at Terms and Conditions for First-Year Students (<https://www.calpoly.edu/admissions/first-year-student/accepted/admitted/checklist/terms-and-conditions/>) and Terms and Conditions for Transfer Students (<https://www.calpoly.edu/admissions/transfer-student/accepted/admitted/terms-and-conditions/>).

The California Promise Program

The California Promise Program enables a specific number of CSU campuses to establish pledge programs for entering first-time students who are both interested and able to complete baccalaureate degrees in four years. All campuses have established programs for students with Associate Degrees for Transfer from any California Community College to complete their baccalaureate degrees in two years. The program is limited to students who are residents of California.

Students who commit to enter either the four-year or two-year pledge will be given a priority registration appointment for each state-supported enrollment period and will be provided with routine and thorough academic advisement. In order to remain in the program, students must meet with their advisors as prescribed, develop an enrollment plan and complete 30 semester units or the quarter equivalent within each academic year, including summer. Participating campuses may stipulate other requirements as well. Interested students entering the CSU should contact campus offices or visit The California Promise Program (https://www2.calstate.edu/apply/freshman/getting_into_the_csu/Pages/the-california-promise-program.aspx) webpage.

The California Promise at Cal Poly

Cal Poly has established a pilot pledge program for students with Associate Degrees for Transfer to complete their baccalaureate degrees in two years. The Bachelor of Arts in English is the only major available at this time. Interested students should contact Cal Poly's Transfer Center (transfer (transfer@calpoly.edu)@calpoly.edu (transfer@calpoly.edu)), or visit Cal Poly's [The California Promise Program](https://academicprograms.calpoly.edu/california-promise-program-cal-poly/) (<https://academicprograms.calpoly.edu/california-promise-program-cal-poly/>) webpage.

Former/Returning Students

Former Students Returning in the Same Major

Students who were previously enrolled at Cal Poly and who wish to return to the university must follow the guidelines appropriate to their category.

Former undergraduate students who left Cal Poly in **good standing (2.0 or higher GPA)**, before completing their degree, and who wish to resume their former program (major) at Cal Poly, can essentially be reinstated after submitting a paper CSU undergraduate application and transcripts from any institutions attended after leaving Cal Poly. A returning student is one who has no enrollment record for three consecutive regular terms (fall, winter, spring). If you have missed 2 terms, you may enroll without completing a returning student application. Once you have missed 3 terms, you must complete a returning student application. An application and corresponding fee must be filed or postmarked before the application deadline date listed below for the appropriate term:

Term	Deadline
Fall Quarter	July 1st
Winter Quarter	October 1st
Spring Quarter	February 1st

Former students **who did not leave the university in good standing** (i.e., were academically disqualified), will have their application and transcripts sent to their department college for review before reinstatement can occur. Applicants in this category are advised to contact their major's academic department or advising center to begin dialogue about satisfying any requirements **before** submitting their application. For more details regarding applying as a returning student please visit the Returning Students website (<https://www.calpoly.edu/admissions/returning-students/>).

Former Students Returning in a New Major

Former Cal Poly students wishing to return to Cal Poly in a different major must file an online application with the corresponding fee by the same application deadline as new applicants. Applicants in this category will compete equally with new applicants for the available transfer openings in their declared major.

Other Information

Consistency with State Regulations

The philosophy of the Cal Poly Admissions Office is consonant with the mission of California Polytechnic State University and is in accordance with Title V, Chapter 1, Subchapter 3, of the California Code of Regulations, and specifically, the California Code of Regulations for the California State University System, Title V, Section 40600.

Graduate Admission Requirements

View online information for graduate admission here (<https://www.calpoly.edu/admissions/graduate-student/>).

Determination of Residence for Tuition Purposes

The Cal Poly Admissions Office determines the residence status of all new and returning students for tuition purposes. View comprehensive online information here (<https://www.calpoly.edu/admissions/residency-for-tuition-purposes/>).

International Students

Office of Admissions

Building (172H), 2nd Floor, Room 2-20
 Phone: 805.756.2311; Fax: 805.756.5911
 Tour Information Line: 805.756.5734
<https://www.calpoly.edu/admissions> (<https://www.calpoly.edu/admissions/>)
 Email: admissions@calpoly.edu

International Admissions

Cal Poly, as part of the California State University (CSU) system, assesses the academic preparation of international students using factors such as academic performance, verification of English proficiency, and financial resources (to meet federal regulations). For this purpose, international students include those who hold U.S. visas as students, exchange visitors, or those in other nonimmigrant classifications. The CSU uses separate requirements and application filing dates in the admission of international students.

Reference the International Admissions (<https://www.calpoly.edu/admissions/international-student/>) section on the Cal Poly Admissions website for detailed information.

Application Procedures

Cal Poly does not have a separate international application. International applicants submit the online application (<https://www2.calstate.edu/apply> (<https://www2.calstate.edu/apply/>)) appropriate to their level of entry with the corresponding \$70.00 application fee which is both non-refundable and non-transferable. The Cal Poly Admissions Office will contact each international applicant regarding additional requirements once the application has been received. View application information, deadlines and selection timelines by visiting <https://www.calpoly.edu/admissions/international-student/dates-and-deadlines> (<https://www.calpoly.edu/admissions/international-student/dates-and-deadlines/>).

For more information about international admission in addition to the application for admission requirements:

International First Year Applicants – visit <https://www.calpoly.edu/admissions/international-student/selection-criteria> (<https://www.calpoly.edu/admissions/international-student/selection-criteria/>).

International New Transfer Applicants – visit <https://www.calpoly.edu/admissions/international-student/selection-criteria> (<https://www.calpoly.edu/admissions/international-student/selection-criteria/>). Please note: Cal Poly does not accept applications for undergraduate transfer students with less than 60 transferable semester units (90 quarter units) or applications for second undergraduate degrees.

International Graduate Applicants – visit <https://www.calpoly.edu/admissions/international-student/selection-criteria> (<https://www.calpoly.edu/admissions/international-student/selection-criteria/>).

After all required documents have been received, the Admissions Office will determine eligibility for admission and will notify the applicant of the result. International applicants admitted to Cal Poly will complete a visa questionnaire and receive a Certificate of Eligibility for Nonimmigrant Student Status (I-20 form) which is necessary to obtain a student visa to enter the United States or for requesting permission from the U.S. Citizenship and Immigration Services (USCIS) for transfer to Cal Poly from another U.S. institution. Other requirements may be imposed by USCIS. Applicants should note the I-20 form is valid for enrollment only at Cal Poly for the term indicated and that it includes an expiration date.

Deadlines

Undergraduate Deadlines for International Students

Term	Application Filing Period	File Completion Deadline
Fall only	Oct 1- Nov 30	March 1

Graduate Deadlines for International Students

Term	Application Filing Period	File Completion Deadline
Fall	Oct 1 - program deadline or April 1st, whichever date is earlier	File Completion deadline is the same as the program deadline or April 1st, whichever date is earlier
Winter	June 1 - September 1	September 1
Spring	August 1 - December 1	December 1

For detailed information about deadlines, visit <https://www.calpoly.edu/admissions/international-student/dates-and-deadlines> (<https://www.calpoly.edu/admissions/international-student/dates-and-deadlines/>).

International students should also visit the Cal Poly International Center website at <https://international.calpoly.edu/> for additional international student information and services.

FINANCIAL INFORMATION

Fees and Expenses

<https://afd.calpoly.edu/fees/>

The CSU makes every effort to keep student costs to a minimum. Tuition and fees listed in published schedules or student accounts may need to be increased when public funding is inadequate. Therefore, CSU reserves the right, even after tuition or fees are initially charged or initial payments are made, to increase or modify any listed tuition or fees. All listed fees, other than mandatory systemwide tuition, are subject to change without notice, until the date when instruction for a particular semester or quarter has begun. All CSU listed tuition and fees should be regarded as **estimates** that are subject to change upon approval by the Board of Trustees, the Chancellor, or the Presidents, as appropriate. Changes in mandatory systemwide tuition will be made in accordance with the requirements of the Working Families Student Fee Transparency and Accountability Act (Sections 66028 - 66028.6 of the Education Code).

The following reflects applicable systemwide tuition and fees for quarter campuses that were authorized by the Board of Trustees at the March 2017 meeting. These rates are subject to change.

SCHEDULE OF TUITION AND FEES 2021/22

All Students

Application Fee (nonrefundable), payable online at the time of application via credit card, e-check or PayPal: \$70

2021/22 Basic Tuition

Units	Per Quarter
Undergraduate Tuition	
6.1 or more units	\$1,914
0 to 6.0 units	\$1,110
Credential Program Tuition	
6.1 or more units	\$2,220
0 to 6.0 units	\$1,288
Graduate/Post Baccalaureate Tuition	
6.1 or more units	\$2,392
0 to 6.0 units	\$1,388

2021/22 Graduate Professional Program Fee

	Quarter
Charge Per Unit	\$180

The graduate business professional fee is paid on a per unit basis in addition to basic tuition and campus fees for specific graduate business programs authorized to assess the fee:

- Master of Business Administration (M.B.A.)
- Master of Science (M.S.) programs in Accountancy
- Master of Science (M.S.) programs in Business Administration
- Master of Science (M.S.) programs in Business Analytics
- Master of Science (M.S.) programs in Business and Technology
- Master of Science (M.S.) programs in Entrepreneurship and Innovation

- Master of Science (M.S.) programs in Finance
- Master of Science (M.S.) programs in Health Care Management
- Master of Science (M.S.) programs in Health Services Administration
- Master of Science (M.S.) programs in Information Systems
- Master of Science (M.S.) programs in Information Technology
- Master of Science (M.S.) programs in Marketing
- Master of Science (M.S.) programs in Taxation

2021/22 Nonresident Students (U.S. and Foreign)

Nonresident Tuition (in addition to basic tuition and other systemwide fees charged all students) for all campuses:

	Quarter
Charge Per Unit	\$264

The total nonresident tuition paid per term will be determined by the number of units taken.

Mandatory systemwide tuition is waived for those individuals who qualify for such exemption under the provisions of the California Education Code (see section on fee waivers).

Students are charged campus fees in addition to tuition and systemwide fees. Information on campus fees can be found by contacting the individual campus(es).

Credit Cards:

Visa, MasterCard, American Express and Discover credit cards may be used for payment of student tuition and fees but may be subject to a non-refundable credit card processing fee.

SCHEDULE OF TUITION AND FEES 2022/23

2022/23 Basic Tuition

Units	Per Quarter
Undergraduate Tuition	
6.1 or more units	\$1,914
0 to 6.0 units	\$1,110
Credential Program Tuition	
6.1 or more units	\$2,220
0 to 6.0 units	\$1,288
Graduate/Post Baccalaureate Tuition	
6.1 or more units	\$2,392
0 to 6.0 units	\$1,388

2022/23 Graduate Professional Program Fee

	Quarter
Charge Per Unit	\$180

The graduate business professional fee is paid on a per unit basis in addition to basic tuition and campus fees for specific graduate business programs authorized to assess the fee:

- Master of Business Administration (M.B.A.)
- Master of Science (M.S.) programs in Accountancy
- Master of Science (M.S.) programs in Business Administration
- Master of Science (M.S.) programs in Business Analytics

- Master of Science (M.S.) programs in Business and Technology
- Master of Science (M.S.) programs in Entrepreneurship and Innovation
- Master of Science (M.S.) programs in Finance
- Master of Science (M.S.) programs in Health Care Management
- Master of Science (M.S.) programs in Health Services Administration
- Master of Science (M.S.) programs in Information Systems
- Master of Science (M.S.) programs in Information Technology
- Master of Science (M.S.) programs in Marketing
- Master of Science (M.S.) programs in Taxation

2022/23 Nonresident Students (U.S. and Foreign)

Nonresident Tuition (in addition to basic tuition and other systemwide fees charged all students) for all campuses:

	Quarter
Charge Per Unit	\$264

The total nonresident tuition paid per term will be determined by the number of units taken.

Mandatory systemwide tuition is waived for those individuals who qualify for such exemption under the provisions of the California Education Code (see section on fee waivers).

Students are charged campus fees in addition to tuition and systemwide fees. Information on campus fees can be found by contacting the individual campus(es).

Credit Cards:

Visa, MasterCard, American Express and Discover credit cards may be used for payment of student tuition and fees but may be subject to a non-refundable credit card processing fee.

Schedule of Fees

Please refer to <https://afd.calpoly.edu/fees/> (<https://www.afd.calpoly.edu/fees/>) for complete information on fees, including on-campus housing, meal costs, and parking fees.

All regularly enrolled students, both undergraduate and graduate, pay registration and tuition fees determined by the number of units per quarter. In addition to registration and basic tuition fees, nonresident and foreign students pay nonresident tuition fees. Mandatory system-wide tuition and other fees are waived for those individuals who qualify for such exemption under the provisions of the California Education Code (see Student Fee Waivers).

Registration and Tuition Fees Per Quarter

Registration and Tuition Fees are the sum of two types of fees:

1. Campus-Wide Fees that are payable irrespective of college, and
2. Campus Academic Fees, which vary by college/academic unit.
Campus-wide fees include: basic Tuition Fee, Associated Students Fee, Health Facilities Fee, Instructionally Related Activities Fee, Health Services Fee, University Union Fee, and Campus Services Card Fee. Nonresident and foreign students are also charged per unit the nonresident tuition fee and an annual Opportunity Fee.

Cal Poly registration and tuition fees are due at the time of registration, and all prior term balances must be paid in full in order to register. Fees

that are not paid by the seventh day following a student's registration become past due, and a registration hold is placed on the account that prevents adding or swapping classes. If registration and tuition fees are still past due as of the next published cancellation date, then the student may be canceled from all enrolled classes. Students who have accepted financial aid, have an approved third-party contract on file, or are receiving fee waivers are not subject to class cancellation or financial registration holds until the quarter's first financial aid disbursement date. Financial aid students whose awards are insufficient to pay fees in full are billed for the balance, and are unable to register for subsequent quarters until the balance has been paid.

Refund of Tuition and Mandatory Fees, Including Nonresident Tuition

Regulations governing the refund of tuition and mandatory fees, including nonresident tuition, for students enrolling at the California State University are included in §41802 of Title 5, California Code of Regulations. For purposes of the refund policy, mandatory fees are defined as those system-wide and campus fees that are required to be paid in order to enroll in state-supported academic programs at the CSU. Refunds of fees and tuition charges for self-support, special session, and extended education programs or courses at the CSU are governed by a separate policy established by the University available at <http://www.extended.calpoly.edu/faq/policies.html#>

In order to receive a full refund of tuition and mandatory fees, less an administrative charge established by the campus, including nonresident tuition, a student must cancel registration or drop all courses prior to the first day of instruction for the term. Information on procedures and deadlines for canceling registration and dropping classes is available online at <https://registrar.calpoly.edu/>.

For state-supported semesters, quarters, and non-standard terms or courses of four (4) weeks or more, a student who withdraws during the term in accordance with the University's established procedures or drops all courses prior to the campus-designated drop period will receive a refund of mandatory fees, including nonresident tuition, based on the portion of the term during which the student was enrolled. No student withdrawing after the 60 percent point in the term is entitled to a refund of any mandatory fees or nonresident tuition.

A student who, within the campus designated drop period and in accordance with the campus procedures, drops units resulting in a lower tuition and/or mandatory fee obligation shall be entitled to a refund of applicable tuition and mandatory fees less an administrative charge established by the campus.

For state-supported non-standard terms or courses of less than four (4) weeks, no refund of tuition and mandatory fees, including non-resident tuition, will be made unless a student cancels registration or drops all classes, in accordance with the university's established procedures and deadlines, prior to the first day of instruction for state-supported non-standard terms or courses or prior to the first meeting for courses of less than (4) weeks.

Students also receive a refund of tuition and mandatory fees, including nonresident tuition, under the following circumstances

- The tuition and fees were assessed or collected in error;
- The University canceled the course for which the tuition and fees were assessed or collected;

- The University makes a delayed decision that the student was not eligible to enroll in the term for which tuition and mandatory fees were assessed and collected and the delayed decision was not due to incomplete or inaccurate information provided by the student; or
- The student was activated for compulsory military service.

Students who are not entitled to a refund as described above may petition the University for a refund demonstrating exceptional circumstances and the chief financial officer of the University or designee may authorize a refund if he or she determines that the fees and tuition were not earned by the University. Information concerning any aspect of the refund of fees may be obtained from the Student Accounts Office in Building 1, Room 211. Contact information can be found at https://afd.calpoly.edu/student_accounts/ (https://www.afd.calpoly.edu/student_accounts/).

Fees and Debts Owed to the University

Should a student or former student fail to pay a fee or a debt owed to the institution, including tuition and student charges, the institution may "withhold permission to register, to use facilities for which a fee is authorized to be charged, to receive services, materials, food or merchandise, or any combination of the above from any person owing a debt" until the debt is paid (see Title 5, California Code of Regulations, Sections 42380 and 42381).

Prospective students who register for courses offered by the University are obligated for the payment of charges and fees associated with registration for those courses. Failure to cancel registration in any course for an academic term prior to the first day of the academic term gives rise to an obligation to pay student charges and fees including any tuition for the reservation of space in the course.

The institution may withhold permission to register or other services offered by the institution from anyone owing fees or another debt to the institution. The institution may also report the debt to a credit bureau, offset the amount due against any future state tax refunds due the student, refer the debt to an outside collection agency and/or charge the student actual and reasonable collection costs, including reasonable attorney fees if litigation is necessary, in collecting any amount not paid when due. If a person believes he or she does not owe all or part of an asserted unpaid obligation, that person may contact Student Account at (805) 756-1428.

The institution can still charge a fee for the issuance of the transcript pursuant to their published transcript processing fees.

Credit Cards

Visa, Master Card, Discover Card, and American Express may be used for payment of registration and tuition fees, nonresident tuition fees, housing, dining plans and certain other University fees using the web credit card system. The University also accepts electronic check payments, known as eCheck or ACH, using the web on-line payment systems. Details concerning the use of electronic checks and credit cards for fee payments may be obtained from the University website under https://afd.calpoly.edu/Student_Accounts/online_payments.asp (https://www.afd.calpoly.edu/student_accounts/online_payments.asp). Credit cards may be used for the purchase of theatre and sports events tickets from the Ticket Office or PolyTIX online ticketing website, Bookstore purchases, parking permits and payment of parking citations with University Police, and for Extended Education program fees. Contact the individual service center for specific credit card information.

Fee Waivers and Exemptions

The California Education Code provides for the waiver of mandatory systemwide tuition fees as summarized below:

Section 66025.3(a) –

Dependent eligible to receive assistance under Article 2 of Chapter 4 of Division 4 of the Military and Veterans Code; child of any veteran of the United States military who has a service-connected disability, has been killed in service, or has died of a service-connected disability, and meets specified income provisions; dependent, or surviving spouse who has not remarried of any member of the California National Guard who, in the line of duty, and while in the active service of the state, was killed, died of a disability resulting from an event that occurred while in the active service of the state, or is permanently disabled as a result of an event that occurred while in the active service of the state; and any undergraduate student who is a recipient of a Medal of Honor, or undergraduate student who is a child of a recipient of a Medal of Honor who is no more than 27 years old, who meets the income restriction and California residency requirement.

Section 68120.3 - Current or former foster youth who are 25 years of age or younger; has been in foster care for at least 12 consecutive months after reaching 10 years of age; meet one of the following: i) is under a current foster care placement order by the juvenile court, ii) was under a foster care placement order by the juvenile court upon reaching 18 years of age, iii) was adopted, or entered guardianship, from foster care; completes and submits the Free Application for Federal Student Aid (FAFSA); maintains a minimum grade point average and meets the conditions necessary to be in good standing at the campus; and meets the financial need requirements established for Cal Grant A awards under Chapter 1.7 of Part 42. The waiver of mandatory systemwide tuition and fees under this section applies only to a person who is determined to be a resident of California pursuant to Chapter 1 (commencing with Section 68000) of Part 41 of the California Education Code.

Section 66602 - A qualifying student from the California State University who is appointed by the Governor to serve as Trustee of the California State University for the duration of his or her term of office.

Section 68120 - Surviving spouse or child of a deceased California resident who was employed by a public agency, or was a contractor or an employee of a contractor, performing services for a public agency with principal duties consisted of active law enforcement service or active fire suppression and prevention, and was killed in the performance of active law enforcement or active fire suppression and prevention duties (referred to as Alan Pattee Scholarships).

Additionally, a person who qualifies for the waiver under this section as a surviving child of a contractor or of an employee of a contractor, who performed services for a public agency, must be enrolled as an undergraduate student at the California State University and meet the applicable income restriction requirement with supporting documentation (i.e. his/her income, including the value of parent support, does not exceed the maximum household income and asset level for an applicant for a Cal Grant B award).

Section 68120.3 - Surviving spouse (until January 1, 2033) or surviving child (until attaining the age of 30) of a deceased California resident who was a licensed physician or licensed nurse employed by or under contract with a health facility regulated and licensed by the State Department of Public Health to provide medical services, or a first responder employed to provide emergency services as described in Section 8562 of the

Government Code. The deceased person's principal duties consisted of providing medical services or emergency services during the COVID-19 pandemic state of emergency (started March 4, 2020, until the Governor lifts the state of emergency), and the deceased person died of COVID-19 during the COVID-19 pandemic state of emergency. The person who qualifies for this waiver must enroll as an undergraduate student at a campus of the California State University, was a resident of California during the COVID-19 pandemic state of emergency, and the annual income (including the value of parent's support) does not exceed the maximum household income and asset level for an applicant for a Cal Grant A award, as set forth in Section 69432.7.

Section 68121 – A qualifying student (until attaining the age of 30) enrolled in an undergraduate program who is the surviving dependent of any individual killed in the September 11, 2001, terrorist attacks on the World Trade Center in New York City, the Pentagon building in Washington, D.C., or the crash of United Airlines Flight 93 in southwestern Pennsylvania, if the student meets the financial need requirements set forth in Government Code Section 69432.7 for the Cal Grant A Program and either the surviving dependent or the individual killed in the attacks was a resident of California on September 11, 2001.

Section 69000 – A California resident who has been exonerated, as that term is defined in Section 3007.05(e) of the Penal Code; completes and submits the FAFSA; and meets the financial need requirements established for Cal Grant A awards. The student's mandatory systemwide tuition and fees waived pursuant to this subdivision shall not have in excess of the equivalent of six years of full-time attendance in an undergraduate program.

Students who may qualify for the above benefits should contact the Admissions/Registrar's Office for further information and/or an eligibility determination.

The California Education Code provides for the following nonresident tuition exemptions as summarized below:

Section 68075 - A student who is a member of the Armed Forces of the United States stationed in this state, except a member of the Armed Forces assigned for educational purposes to a state-supported institution of higher education, is entitled to resident classification only for the purpose of determining the amount of tuition and fees.

If that member of the Armed Forces of the United States who is in attendance at an institution is thereafter transferred on military orders to a place outside this state where the member continues to serve in the Armed Forces of the United States, the member shall not lose the member's resident classification so long as the member remains continuously enrolled at that institution.

Section 68075.7 – A nonresident student is exempt from paying nonresident tuition or any other fee that is exclusively applicable to nonresident students if the student (1) resides in California, (2) meets the definition of "covered individual" as defined in Section 3679(c)(2) of Title 38 of the United States Code, (3) is eligible for education benefits under the federal Montgomery GI Bill®-Active Duty program or the Post-9/11 GI Bill® program as each read on January 1, 2017.

Section 68122 – A student who is a victim of trafficking, domestic violence, and other serious crimes who has been granted a status under Section 1101(a)(15)(T)(i) or (ii), or Section 1101(a)(15)(U)(i) or (ii), of Title 8 of the United States Code shall be exempt from paying nonresident tuition to the same extent as individuals who are admitted to the United

States as refugees under Section 1157 of Title 8 of the United States Code.

Section 68130.5 – A student, other than a person excluded from the term "immigrant" for purposes of the federal Immigration and Nationality Act (8 U.S.C. Sec. 1101), pursuant to paragraph (15) of subsection (a) of Section 1101 of Title 8 of the United States Code, who is not a resident of California is exempt from paying nonresident tuition if the student meets the requirements of (1) through (4), below:

1. Satisfaction of the requirements of either subparagraph (A) or subparagraph (B):
 - a. A total attendance of, or attainment of credits earned while in California equivalent to, three or more years of full-time attendance or attainment of credits at any of the following:
 - i. California high schools.
 - ii. California high schools established by the State Board of Education.
 - iii. California adult schools established by a county office of education, a unified school district or high school district, or the Department of Corrections and Rehabilitation (subject to the class hours' requirement).
 - iv. Campuses of the California Community Colleges (subject to the credit requirements).
 - v. A combination of those schools set forth in clauses (i) to (iv), inclusive.
 - b. Three or more years of full-time high school coursework, and a total of three or more years of attendance in California elementary schools, California secondary schools, or a combination of California elementary and secondary schools.
2. Satisfaction of any of the following:
 - a. Graduation from a California high school or attainment of the equivalent thereof.
 - b. Attainment of an associate degree from a campus of the California Community Colleges.
 - c. Fulfillment of the minimum transfer requirements established for the California State University for students transferring from a campus of the California Community Colleges.
3. Registration as an entering student at, or current enrollment at, an accredited institution of higher education in California not earlier than the fall semester or quarter of the 2001–02 academic year.
4. In the case of a person without lawful immigration status, the filing of an affidavit with the institution of higher education stating that the student has filed an application to legalize his or her immigration status, or will file an application as soon as he or she is eligible to do so.

Procedure for the Establishment or Abolishment of Campus-Based Mandatory Fees

The law governing the California State University provides that specific campus fees defined as mandatory, such as a student association fee and a student center fee, may be established. A student association fee must be established upon a favorable vote of two-thirds of the students voting in an election held for this purpose (Education Code, Section 89300). The campus President may adjust the student association fee only after the fee adjustment has been approved by a majority of students voting in a referendum established for that purpose. The required fee shall be subject to referendum at any time upon the presentation of a petition to the campus President containing the signatures of 10 percent of the regularly enrolled students at the University. Student association fees support a variety of cultural and recreational programs, childcare centers, and special student support programs. A student center fee may be established only after a fee referendum is held which approves by a two-thirds favorable vote, the establishment of the fee (Education Code Section 89304). Once bonds are issued, authority to set and adjust student center fees is governed by provisions of the State University Revenue Bond Act of 1947, including, but not limited to, Education Code sections 90012, 90027, and 90068.

The process to establish and adjust other campus-based mandatory fees requires consideration by the campus fee advisory committee and a student referendum as established by Executive Order 1102 (<http://www.calstate.edu/Budget/student-fees/fee-policy/referendum-consultation.shtml>). The campus President may use alternate consultation mechanisms if he/she determines that a referendum is not the best mechanism to achieve appropriate and meaningful consultation. Results of the referendum and the fee committee review are advisory to the campus President. The President may adjust campus-based mandatory fees but must request the Chancellor establish a new mandatory fee. The President shall provide to the fee advisory committee a report of all campus-based mandatory fees. The campus shall report annually to the Chancellor a complete inventory of all campus-based mandatory fees.

For more information or questions, please contact the Budget Office in the CSU Chancellor's Office at 562.951.4560.

Financial Aid

Financial Aid Office
Administration Bldg. (01), Room 212
Phone: 805.756.2927; Fax: 805.756.7243
<https://www.calpoly.edu/financial-aid> (<https://www.calpoly.edu/financial-aid/>)

The University has a variety of scholarships, grants, part-time employment opportunities and loans designed to assist students financially. Additional current information may be obtained by accessing the Financial Aid Office website.

The application for financial aid is called the Free Application for Federal Student Aid (FAFSA). The FAFSA is available at studentaid.gov (<https://studentaid.gov/>). The priority filing period for Cal Poly is October 1st through March 2nd for the following fall. Students who submit a valid FAFSA during that time are given priority for limited grant and scholarship funds. All students are encouraged to file the FAFSA if they believe that they need financial assistance to pay for their educational expenses.

Typical Student Expenses

Each year the Financial Aid and Scholarship Office posts its anticipated student Cost of Attendance (COA) on their website at: <https://www.calpoly.edu/financial-aid/costs-and-affordability> (<https://www.calpoly.edu/financial-aid/costs-and-affordability/>)

Please refer to that website for the most up-to-date information.

Cancellation of Registration or Withdrawal from the Institution and Financial Aid

Students who find it necessary to cancel their registration or to withdraw from all classes after enrolling for any academic term *are required* to follow the University's official withdrawal procedures. Failure to follow formal University procedures may result in an obligation to pay fees, the assignment of failing grades in all courses and the need to apply for readmission before being permitted to enroll in another academic term. Information on canceling registration and withdrawal procedures is available from the Office of the Registrar, Administration Building, Room 222, 805.756.2531.

Students who receive financial aid funds *must consult* with the Financial Aid and Student Accounts Offices prior to withdrawing from the University regarding any refunds or repayments of grant or loan assistance received for that academic term or payment period. Students who have received financial aid and withdraw from the institution during the academic term or payment period may need to return or repay some or all of the funds received, which may result in a debt owed to the institution.

University Scholarships

General Information

Scholarships are awarded each spring for the following fall. Criteria include financial need, scholastic achievement, participation in school activities, community service, honors and organizational affiliations, and educational objectives. Some scholarships have additional requirements which relate to a concentration or field of study, geographic origin, class level, and project or design portfolios. Generally a student must have at least a 3.0 grade point average.

There are numerous scholarships available due to the generous support of individuals and corporations. Please refer to the Financial Aid web site for detailed information.

Annual Deadline Date to Apply: Incoming students are automatically considered for scholarships. Continuing students should check with their department for any departmental deadlines.

How to Apply

The Financial Aid Office website offers the latest information at <https://www.calpoly.edu/financial-aid> (<https://www.calpoly.edu/financial-aid/>). For need-based scholarships, completing the FAFSA is required.

Scholarship Notifications

Scholarships are normally awarded during the spring and summer for the following academic year. During that time award offer notices are emailed directing the student to the self-service portal to view financial aid awards which include scholarship amount, disbursement and donor information. Awardees must accept on-line scholarship offers acknowledging program responsibilities and requirements. Recipients must be in good academic standing and maintain full-time enrollment

while receiving a scholarship (continuing education and Open University units are excluded). Some scholarships require recipients to have earned at least one-half the value of the scholarship during the previous year.

Scholarships are awarded for an academic year and are typically disbursed in quarterly increments. Non-attendance results in cancellation or a prorated amount.

Athletic Program Grants-In-Aid

Cal Poly athletic grants-in-aid are offered to selected students participating in intercollegiate athletics. Grants are renewable on a quarterly basis, the requisites for renewal being at the discretion of the University.

The grant-in-aid is subject to the financial limitations imposed by the National Collegiate Athletic Association and any conference of which the University is a member. Financial aid, scholarships, specific outside resources and employment are considered in determining compliance with these limitations. Additional information can be provided by the Athletic Department.

Other Scholarships

In addition to University scholarships, awards from various private donors and organizations are available to assist students with University expenses. Interested students should make inquiries for such awards directly to sponsoring organizations. Currently, Cal Poly students are beneficiaries of several million dollars of outside scholarship assistance each year. Students should take advantage of FREE scholarship search services; many who charge are selling information that is readily available at no cost. Other sources of scholarship funding may be available from:

- community organizations
- employers
- professional, career and trade associations

For valuable links visit the scholarship website at <https://www.calpoly.edu/financial-aid/types-of-aid/scholarships/outside-scholarships> (<https://www.calpoly.edu/financial-aid/types-of-aid/scholarships/outside-scholarships/>).

Grants

Federal Pell Grants are designed to help undergraduates and teaching credential candidates pay for their education. The Pell Grant amount is determined by the Expected Family Contribution, the cost of education, full-time or part-time enrollment and terms of enrollment. To apply, complete the FAFSA for the upcoming year.

Federal TEACH Grants are available to students who commit to four years of teaching in a high need area (science, mathematics, special education, and, in California, agriculture) in a school serving low income families. The grant converts to a federal unsubsidized loan if the teaching commitment is not met. To apply, complete the FAFSA for the upcoming year and contact the financial aid office.

Federal Supplemental Educational Opportunity Grant (SEOG) is designed to assist undergraduate students who have substantial financial need. To apply, complete the FAFSA by **March 2** for the upcoming school year.

Cal Grants

The California Student Aid Commission (CSAC) awards entitlement and competitive Cal Grants. To qualify, students must be California residents or eligible under AB 540. If applying for a Cal Grant for the first time,

students must complete the FAFSA and a Cal Grant GPA verification form. Request the GPA Verification Form from your high school or college. To apply, complete the FAFSA and mail the GPA Verification Form to CSAC by **March 2**.

For the latest information on the Cal Grant program, visit the CSAC website at www.csac.ca.gov (<http://www.csac.ca.gov>).

Cal Grant A is awarded to middle- and low-income undergraduates. New awards are limited to students who are freshmen, sophomores or juniors. Cal Grant A covers a portion of student registration fees and eligibility is tied to a family's incoming and assets as reported on the FAFSA. Cal Grant A may be renewed until completion of four years of college attendance. Recipients must continue to meet eligibility standards. Students may be eligible for an additional year of Cal Grant A at Cal Poly if enrolled in a designated five-year program or the teaching credential program.

Cal Grant B is awarded to low-income undergraduate students. First year recipients receive stipend only. Cal Grant B renewal recipients receive stipend plus a portion of registration fees. Eligibility is tied to a family's incoming and assets as reported on the FAFSA. Cal Grant B may be renewed until completion of four years of college attendance and students must meet eligibility standards. Students may be eligible for an additional year of Cal Grant B at Cal Poly if enrolled in a designated five-year program or the teaching credential program.

State Educational Opportunity Program Grant (SEOP) assists undergraduate students who have been admitted to the University through the Educational Opportunity Program (EOP). To apply, complete the FAFSA by **March 2** for the upcoming school year.

State University Grant (SUG) covers a portion of student registration fees. SUG is available to undergraduate and graduate students who are California residents or eligible under AB 540 and show financial need. To apply, complete the FAFSA by **March 2** for the upcoming year. The SUG and the Cal Grant pay the same portion of registration fees. Students can receive only one or the other, not both.

Employment

Federal Work-Study (FWS) is a need-based program which provides part-time employment for students. Work-Study jobs assist students financially and may provide career related work experience. FWS positions are either on- or off-campus with approved departments/organizations. Pay rates vary depending on job requirements and student skills. To receive priority consideration, complete the FAFSA by **March 2** for the upcoming school year.

Loans

Loans are for educational purposes only, with specific provisions for repayment. There are three types: Federal Direct Student Loans (FDSL), Federal Parent Loans (PLUS), and on a very limited basis, Cal Poly Long-Term Educational Loans.

Federal Subsidized Direct Loans are available to students through the U.S. Department of Education. Annual amounts are based on the students' need as determined by the FAFSA and federal limits. The federal government pays the interest on the loan while the student is in school and there are deferment provisions. To apply, complete the FAFSA for the upcoming year.

Federal Unsubsidized Direct Loans are available for students who are ineligible for some or all of a subsidized Federal Direct Loan. With

the exception of demonstrated financial need, borrowers must meet all eligibility criteria under the Federal Direct Loan program. Interest payments begin immediately after the loan is disbursed or the borrower may elect to defer payment and add the interest to the amount owed. An additional amount of Unsubsidized Direct Loan, above the Federal Subsidized Direct limit, may be available to independent students and to dependent students whose parents are denied a PLUS Loan.

Federal Parent Loans (PLUS) enable borrowers to obtain low interest loans for educational costs through the U.S. Department of Education. PLUS loan repayment begins when the loan is disbursed. To apply, complete the FAFSA.

University Long-Term Educational Loans are available to students who demonstrate long-term financial need. Some require written application, recommendations and interviews. The interest rate is four percent on the unpaid balance during repayment. Typically, interest accrues after the specified due date, graduation or withdrawal from the University. A one percent service charge is deducted from each loan disbursement.

University Short-Term Emergency Loans are designed to help students cope with unanticipated, educationally-related financial emergencies. Registration fees, rent, or utility bills are expenses that students should plan and are not considered emergencies as defined under this program. Full-time enrollment and a minimum 2.0 GPA are required. Each application is reviewed on a case-by-case basis. For further information, visit the Financial Aid Office website at <https://www.calpoly.edu/financial-aid/types-of-aid/other-loans/emergency-loans> (<https://www.calpoly.edu/financial-aid/types-of-aid/other-loans/emergency-loans/>), or stop by the office.

GENERAL REQUIREMENTS – BACHELOR'S DEGREE

General Graduation Requirements

There are eight general requirements which all students must meet in order to earn the bachelor’s degree from Cal Poly and participate in commencement. The more students understand their progress toward meeting these requirements and relate them to the many programs available, the better the chance of creating an exciting educational experience and avoiding errors which may delay graduation.

Students must be formally admitted to the major in which they wish to graduate, and must matriculate, in order to earn a degree.

The specific requirements for each degree program are shown under the academic department offering the major and include a curriculum display with courses listed by Major, Support, Concentration (if applicable), General Education, and Free Electives. Each major has a degree flow chart, which shows the recommended sequence of courses leading to the degree; see the "Degree Flowcharts" link at the top of this page.

Students are responsible for meeting all requirements, and should embrace the responsibility. Advice is available from faculty advisors, college advising centers, the Office of the Registrar, and students’ online Degree Progress Reports. Students should plan their degree programs carefully and review them frequently with their advisors. Students are strongly encouraged to access their Degree Progress Report frequently, including after they register each quarter, to verify that courses in which they enrolled are fulfilling requirements as expected. They are also encouraged to address any unanticipated deficiencies in the information shown on their Degree Progress Report, while realizing that recently received substitutions, transfer credit, etc., may not yet be reflected in the Degree Progress Report. As they approach graduation, careful attention to the Degree Progress Report will help ensure that they complete degree requirements in a timely fashion.

Minimum Requirements for Graduation

1. Minimum Number of Units

Baccalaureate degree programs Minimum 180 units
 Individual baccalaureate degree programs may require more than 180 units. (Title 5, Sections 40500, 40501, 40505, 40507) A minimum of 60 units overall must be upper division (defined as any course completed by the student at the 300- or 400-level; this could include transfer work completed at the upper-division level at a four-year institution).

NOTE: A maximum of 16 units of internship and cooperative education coursework can be applied to the bachelor’s degree. A maximum of 105 units of coursework from community colleges can be applied to the total units required for the degree. See Evaluation of Transfer Credit (p. 50) for more details.

Degree	Minimum # of major units at 300-400 level
Bachelor of Arts (BA)	18
Bachelor of Science (BS)	27
Bachelor of Fine Arts (BFA)	27
Bachelor of Architecture (BArch)	41

Bachelor of Landscape Architecture (BLA) 41

2. Grade Point Average (GPA)

Students must earn at least a 2.000 GPA in all three of the following: 1) all Higher Education units earned (all college-level work), 2) Cal Poly cumulative units earned, and 3) the major (the courses used to meet Major Courses, see the curriculum sheet; support courses do not count toward major GPA). For a definition of GPA and grade points and units graded, please refer to the Grading section of this catalog.

3. U. S. Cultural Pluralism (USCP) Requirement

Students must complete the USCP requirement. See the separate section on USCP.

4. General Education (GE) Requirements

Students must complete the GE requirements as indicated in the degree program and shown in the GE section of this catalog. A CSU-mandated minimum of 72 units of GE overall must be completed.

5. Graduation Writing Requirement (GWR)

Students must demonstrate competency in writing skills (as described below).

6. Senior Project

A senior project is required for all Cal Poly students (as described below).

7. Academic Residence Requirements

The minimum requirements for units taken in residence at Cal Poly are:

- 50 quarter units
- 36 of the 50 units in residence must be upper division
- 18 of the 36 upper division units in residence must be in the major
- 12 units of General Education
- 28 units in residence of the last 40 units counted toward the degree

Extension credit or credit by examination may not be used to fulfill the residence requirements. However, a maximum of 36 quarter units of extension credit may be counted toward the bachelor’s degree.

8. Disciplinary Condition

When an allegation has been made that a student has violated the Interim CSU Policy Prohibiting Discrimination, Harassment, Sexual Misconduct, Sexual Exploitation, Dating Violence, Domestic Violence, Stalking, and Retaliation, Revised December 24, 2021, or any of the Standards for Student Conduct (Title 5, section 41301 of the California Code of Regulations), and the student is under inquiry and/or investigation or a sanction has been applied for a violation, degree conferral may be impacted. If a student is expelled from the University, regardless of academic progress, including when a student has completed all academic requirements at the time of the expulsion, the student will not receive a degree. Expulsion means permanent separation from the University and no degree will be conferred.

9. Graduation Application Process

When undergraduate students reach 72% or more of degree completion (78% for Architecture and Landscape Architecture majors) as indicated on their Academic Progress gauge on Poly Profile, the Office of the Registrar will assign an expected graduation term for them that is the greater of either: one year away or four years from their first admit term (five years for students in Architecture and Landscape Architecture). Transfer students will be given no less than

three years from their admit term. This process occurs each quarter except summer.

Students will receive an email from evaluations@calpoly.edu, informing them that their graduation term has been set for them, and that they are expected to graduate by that term.

The expected graduation term can be viewed in the Student Center and Poly Profile.

Students are not able to register beyond their expected graduation term.

However, there may be legitimate reasons why some students need to extend their graduation term beyond the one that is automatically set for them.

Students with such academically or personally justifiable reasons to extend their graduation term can fill out the [Request to Extend Expected Graduation Term—Undergraduate](#) form and see their advisor for possible approval of the request to extend. The form can be found at: https://registrar.calpoly.edu/registrar_forms (https://registrar.calpoly.edu/registrar_forms/).

The [Notification of Earlier Expected Graduation Term—Undergraduate](#) form should be used by students who wish to move their graduation term earlier than the one assigned for them by the university. Advisor approval is not needed to move to an earlier graduation term.

Once notified that their graduation term has been set, students should access their Degree Progress Report each time they register, to ensure that they are fulfilling the requirements for their degree.

Students are encouraged to submit any and all paperwork (substitutions, transcripts for requirements completed elsewhere, etc.) in a timely fashion in order to expedite conferral of degrees.

If a student breaks enrollment prior to completion of degree requirements, she or he may be required to re-enroll and may be held to catalog requirements in effect at that time.

Final Degree Conferral

When undergraduate students reach 72% or more of degree completion, as indicated on their Academic Progress Gauge on Poly Profile, the Office of the Registrar will assign an expected graduation term for them that is a full four years after their initial admit term, or one year away, whichever is greater. Transfer students will be given an expected graduation term that is three years after their initial admit term. Students will receive an email from the Evaluations Unit of the Office of the Registrar informing them that their expected grad term has been set. The expected graduation term can be viewed in the Student Center and Poly Profile.

Graduate (Master's) students must submit a [Graduate Application for Graduation](#) Form to the Graduate Education Office at least two quarters prior to the anticipated term of degree completion.

The actual date of graduation (degree conferral) is the end of the quarter in which all requirements have been met. This date may differ from the student's last quarter of enrollment (for example, a student who completes the Graduation Writing Requirement [GWR] or submits Senior Project for final grading after the last term of enrollment).

Graduating students receive one complimentary diploma. Additional diplomas may be ordered from the Office of the Registrar's Online

Diploma Service (<https://www.michaelsutter.com/calpoly/>). The diploma is not ordered until all degree requirements have been completed. The diploma is mailed to the student's mailing address by the Evaluations Unit in the Office of the Registrar approximately three to four weeks after the degree has been conferred. It is the student's responsibility to update their mailing address on the Cal Poly Portal (<https://myportal.calpoly.edu>) prior to the end of the final quarter of enrollment, to ensure the receipt of their diploma.

Concentrations and minors are not noted on the diploma; they are noted on the transcript. Latin honors are noted on both the diploma and the transcript; the Distinction notation for Master's students is noted on both the diploma and the transcript.

Once a degree has been awarded, subsequent revision or alteration of any transcript entry is permitted only for correction of proven error as certified by the appropriate academic dean and the Registrar. No changes are made to the academic record 60 days following the degree conferral date.

Commencement

The Commencement Office (<https://commencement.calpoly.edu/>) provides graduates and guests with a memorable and meaningful graduation experience that symbolizes the culmination of their academic achievements. Commencement ceremonies are coordinated in collaboration with the Office of the Vice President for Student Affairs and the university's Commencement Operations and Policy Committees, which are held twice annually in June and December.

To be eligible to participate in commencement ceremonies, students must satisfy at least one of the following:

- Completed all degree requirements and have not participated in a previous commencement ceremony;
- Be currently enrolled in classes that will complete all of that student's degree requirements; or,
- Be registered for classes for the following term that will allow the student to complete all of their degree requirements.

Students completing all degree requirements in the Winter, Spring or Summer terms are automatically eligible to participate in the Spring (June) Commencement. Students completing all degree requirements in the Fall term are eligible for Fall (December) Commencement. Graduate (Masters) students must submit a Request for Graduation Evaluation Form to the Graduate Education Office at least two quarters prior to the anticipated term of degree completion.

Students who wish to participate in a commencement ceremony other than the one for which they are scheduled and in which they are eligible to participate must complete a Commencement Request Form (<https://commencement.calpoly.edu/eligibility/>).

Graduation Writing Requirement (GWR)

The Graduation Writing Requirement (GWR) is a CSU Board of Trustees mandate designed to ensure that students demonstrate effective written communication skills at the upper division before they enter the professional workforce. All undergraduate students who are seeking a Cal Poly degree must fulfill the GWR before a diploma can be awarded.

Undergraduate students with 90 or more completed units should attempt to fulfill the requirement before their senior year. Upper-division transfer

students who completed the requirement at another CSU campus prior to enrollment at Cal Poly may transfer completion of the requirement.

Students should review the requirements of their major program of study to determine which of the following options is the appropriate pathway for GWR completion:

1. Pass a GWR-certified course (p.) with a grade of C or better (C- or below does not qualify). The course may be taken on a credit/no credit basis, but the student must earn a minimum grade of C in order to satisfy the GWR component of the class. Available sections of GWR-certified courses are searchable in the class schedule. For a full list of courses, please see the GWR Courses website (p.) in the Courses A-Z section of the Cal Poly Catalog.
2. Pass the GWR Portfolio (<https://writingandlearning.calpoly.edu/gwrportfolio/>) via UNIV 401.

Further information on pathways to meeting this degree requirement may be obtained from the Office of Writing and Learning Initiatives, Kennedy Library (35) Room 202A (805-756-2067), or on the GWR webpage, <https://writingandlearning.calpoly.edu/gwr> (<https://writingandlearning.calpoly.edu/gwr/>).

Senior Project

All Cal Poly undergraduate students shall complete a senior project as part of their baccalaureate degree program requirements.

Definition: A capstone experience is a high-impact educational practice in which students (a) integrate and evaluate the knowledge and skills gained in both the General Education (GE) and major curricula and (b) demonstrate career or postgraduate readiness.

As a bridge from college to career/postgraduate success, the senior project at Cal Poly is a capstone experience with achievable outcomes that culminates in a self-directed final production or product carried out under faculty direction. Senior projects analyze, evaluate, and synthesize a student's general and discipline-specific educational experiences; relate to a student's field of study, future employment, and/or postgraduate scholastic goals; and include an element of critical, self-reflectiveness to facilitate student development and promote the metacognitive awareness that leads to lifelong learning.

Expected Outcomes: While major programs of study are responsible for designing specific senior project learning outcomes, all senior projects at Cal Poly provide an opportunity for holistic, competency-based assessment that demonstrates a strong foundation in general and discipline-specific knowledge as well as an advanced proficiency in the core competencies of critical thinking, written and oral communication, information literacy, and quantitative reasoning.

Furthermore, senior projects broadly address program learning objectives, which align with one or more University Learning Objectives (p. 8).

Forms & Examples: Senior projects may be research-, project-, and/or portfolio-based; individually supervised or course-based; independently completed or team-based; discipline-specific and/or interdisciplinary. They may take forms including, but not limited to, the following:

- an experiment;
- a self-guided study;
- a student-generated research project;

- participation in a faculty-generated research project;
- engagement in an industry-driven project;
- a report based on a prior or concurrent co-op/internship or service learning experience;
- a design or construction project;
- a portfolio of work documenting the results of creative practices, and/or
- a public presentation or performance.

Requirements: Each academic department determines specific senior project requirements, yet all senior projects and senior project policies adhere to the following requirements.

Senior projects shall

- commence when, or after, a student has earned senior standing, though completion of preparatory courses and/or research may precede senior standing;
- serve as a bridge from the college experience to professional/postgraduate readiness;
- include clearly defined student learning outcomes that are aligned with program learning objectives;
- have faculty oversight with scheduled meetings for which specific timelines/outcomes are defined;
- include a formal proposal and/or statement of intent to be submitted to the faculty advisor;
- involve inquiry, analysis, evaluation, and creation;
- demonstrate core competencies in critical thinking, written and/or oral communication, information literacy, and quantitative and/or qualitative reasoning;
- require a process/production and culminate in a final product as defined at the program level;
- include an explicit element of self-reflection;
- adhere to discipline-specific norms of academic integrity and ethical practices;
- be individually and formally assessed;
- include a minimum count of 3 units, or 90 hours of work, with no maximum;
- take no more than three quarters to complete;
- be assigned grades consistent with Cal Poly's policy on grading (<https://academicprograms.calpoly.edu/content/academicpolicies/grading/>).

Note: Senior projects shall neither consist solely of a co-op/internship experience nor solely of a test/exam of any kind, and senior projects shall not be unsupervised.

Archiving: Each academic department determines a process for archiving senior projects, whether at the department or college level and/or in collaboration with Kennedy Library. Policies and procedures governing submissions to Kennedy Library's institutional repository are based on University policies pursuant to the Family Educational Rights and Privacy Act (FERPA), intellectual property rights, and CSU accessibility requirements. Senior projects submitted to Digital Commons, the institutional repository hosted by Kennedy Library, become part of university's scholarly record.

California State University (CSU) General Education Breadth Requirements (p. 31)
GE Program Learning Outcomes (p. 31)

GE Course Substitutions (p. 31)
 GE Study Abroad (p. 31)
 Transfer Credit (p. 31)
 GE Requirements (p. 31)
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 GE 2020 Standard and High-Unit Templates (p. 32)
 General Education Courses (p. 33)

General Education Mission Statement

Adopted by the General Education Governance Board on April 7, 2021.

The General Education (GE) program is one of the primary means for realizing Cal Poly's vision of a comprehensive polytechnic education. GE integrates all disciplines in a program of liberal education accessible to all Cal Poly students. GE complements the major and promotes an understanding and appreciation of the foundational disciplines that ground all intellectual inquiry. The program affords students the opportunity to contextualize the knowledge from their major programs by presenting relevant scientific, humanistic, artistic, and technological perspectives. Because Cal Poly students declare their major upon matriculation, their experience of GE develops side-by-side with the major. Through the university's distinctive commitment to Learn by Doing, GE imparts transferable skills, nurtures creativity, fosters critical thinking and ethical decision making, supports integrative learning, and prepares students for civic engagement and leadership. In GE, students work inclusively with peers from diverse intellectual, disciplinary, and social backgrounds. Cal Poly's GE program also provides an opportunity for students to develop intellectual humility, an interdisciplinary mindset, and lifelong habits of mind.

California State University (CSU) General Education Breadth Requirements

Consistent with the California State University (CSU) General Education Breadth Requirements, Cal Poly's General Education (GE) program has been designed to complement major courses and electives completed by each baccalaureate candidate. The GE program seeks to cultivate well-rounded and informed persons. GE requirements are designed to provide CSU students with the knowledge, skills, experiences, and perspectives that will enable them to expand their capacities to take part in a wide range of human interests and activities; confront personal, cultural, moral, and social problems that are an inevitable part of human life; and develop an enthusiasm for lifelong learning. Faculty are encouraged to assist students in making connections among disciplines to achieve coherence in the undergraduate educational experience.

GE Program Learning Outcomes

Adopted Spring 2014 by the General Education Governance Board

After completing Cal Poly's General Education Program, students will be able to:

1. Construct and critique arguments from a logical perspective.
2. Use appropriate rhetorical strategies to connect with diverse audiences through oral, written, and visual modes of communication.
3. Address real world problems by demonstrating broad disciplinary knowledge, skills, and values in arts, humanities, sciences, and technology.
4. Understand the value of a general education in relation to major course of study.

5. Collaborate with people of different backgrounds, values, and experience.
6. Evaluate global and local issues and their impact on society.
7. Use intention and reflection to develop and improve one's own learning.

GE Course Substitutions

Students are expected to complete the GE courses published for their degree program. Cal Poly GE courses **must** be selected from the approved GE list. Substitutions are not permitted except in extraordinary circumstances. Students requesting exceptions must follow petition procedures, outlined on the GE website <https://ge.calpoly.edu/students/petitions/>. This process may take several weeks.

GE Study Abroad

Students should first review the GE website for study abroad courses that have already been pre-approved for Cal Poly GE credit. If the course is not there, students are strongly encouraged to submit a GE study abroad petition (<https://ge.calpoly.edu/study-abroad/>) before going abroad in order to determine if the course will be granted GE credit. For assistance with GE study abroad petitions, contact the Cal Poly International Center at studyabroad@calpoly.edu.

Transfer Credit

Transfer credit for GE courses is accepted from California institutions, as approved by the Chancellor's Office. For more information, go to How to Use Assist (<https://registrar.calpoly.edu/how-use-assist/>) located on the Office of the Registrar's website. Some Cal Poly programs specify particular GE courses for major or support; these courses must be met with articulated equivalencies. Refer to <https://assist.org/> for California Community College both CSU GE lists and specific articulation agreements.

GE Requirements

- All Cal Poly students are required to take 72 quarter units of General Education.
- A minimum of 12 units is required in residence (i.e., Cal Poly enrollment).
- A minimum of 12 units is required at the upper-division level (8 units upper-division for ABET-accredited engineering programs)
- For students admitted in Fall 2016 or later, a grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).
- Double Counting: Some majors indicate specific GE courses to fulfill both GE and major requirements. (These are listed in the major's curriculum display.) Students should consult their academic advisors during freshman year for clarification.
- All GE courses are 4 units unless otherwise indicated.

Writing Component

All General Education courses must have an appropriate writing component. In achieving this objective, writing in most courses should be viewed primarily as a tool of learning (rather than a goal in itself as in a composition course), and faculty should determine the appropriate ways to integrate writing into coursework. The writing component may take different forms according to the subject matter and the purpose of a

course. Outside of the GE areas specified below, at least 10% of the grade in all GE courses must be based on appropriate written work (e.g., lab reports, math proofs, essay questions, word problems, exam questions).

Writing Intensive Policy

GE areas A2, A3, Upper-Division C, and Upper-Division D are designated as Writing Intensive. All courses in these areas must include a minimum of 3,000 words of writing and base 50% or more of a student's grade on written work. GE area C2 is also designated as Writing Intensive, but all courses in this area must include a minimum of 2,000 words of writing and base 50% or more of a student's grade on written work. All Writing Intensive courses must include process-oriented writing instruction in which faculty provide ongoing feedback to students to help them grasp the effectiveness of their writing in various disciplinary contexts. The kind and amount of writing must be a factor in determining class sizes.

Golden Four

The "Golden Four" classes are a set of foundational learning classes that set the stage for future learning within GE and within the major programs. As such, students are encouraged to complete these four courses within the first year. These courses are all three courses within Area A plus B4: Mathematics/Quantitative Reasoning. The three courses within Area A provide instruction and practice in writing, speaking, and critical thinking. Completion of one or more courses within this area is often a prerequisite for other GE courses. All Golden Four subareas require students to earn a grade of C- or better. (Other GE courses require a passing grade of D- or better.)

GE 2020 Standard and High-Unit Templates

Cal Poly's GE program includes two templates: the Standard Template and the High-Unit Template. A "high-unit" program, as it relates to GE, refers to undergraduate programs within the College of Engineering along with the other ABET-accredited programs of ARCE and BRAE. Only these programs are considered high-unit degree programs and, as such, only students within those degrees will follow the High-Unit Template.

Majors In Templates in Table Below

High-Unit: ARCE, BRAE, and College of Engineering majors

Standard: All other majors

X = non-unit requirement

	Standard	High-Unit
ENGLISH LANGUAGE COMMUNICATION AND CRITICAL THINKING (AREA A)		
Oral Communication (A1) ¹	4	4
Written Communication (A2-Writing Intensive) ¹	4	4
Critical Thinking (A3-Writing Intensive) ¹	4	4
Unit Sub-total	12	12

¹ For students admitted in Fall 2016 or later, a grade of C- or better is required in one course in this GE Area.

	Standard	High-Unit
SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING (AREA B)		
Physical Science (B1)	4	4
Life Science (B2)	4	4
Laboratory Activity (B3)	(in B1 or B2)	(in B1 or B2)
Mathematics/Quantitative Reasoning (B4) ¹	4	8
Upper-Division B	4	4
Area B Electives	X	8
Unit Sub-total	16	28

¹ For students admitted in Fall 2016 or later, a grade of C- or better is required in one course in this GE Area.

	Standard	High-Unit
ARTS AND HUMANITIES (AREA C)		
Lower-division courses in Area C must come from three different prefixes		
Arts: Arts, Cinema, Dance, Music, Theatre (C1)	4	4
Humanities: Literature, Philosophy, Languages other than English (C2-Writing Intensive)	4	4
Lower-Division C Elective - Select a course from either C1 or C2	4	4
Upper-Division C (Writing Intensive)	4	4
Unit Sub-total	16	16

	Standard	High-Unit
SOCIAL SCIENCES (AREA D)		
Standard: Select courses in Area D from at least two different prefixes		
American Institutions (D1 - Title 5, Section 40404 Requirement)	4	4
Lower-Division (D2)	4	X
Upper-Division D (Writing Intensive)	4	X
Area D Elective		
High-Unit: Select either a lower-division D2 or an upper-division D course	X	4
Unit Sub-total	12	8

	Standard	High-Unit
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LIFELONG LEARNING AND SELF-DEVELOPMENT (AREA E)

Lower-Division (E)	4	4
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	Standard	High-Unit
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ETHNIC STUDIES (AREA F)

Ethnic Studies (F)	4	4
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	Standard	High-Unit
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GE ELECTIVES IN AREA B, C, AND D

GE Electives - Select courses from two different areas; may be either lower- or upper-division levels (Standard)	8	X
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GE TOTAL	72 units	72 units
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General Education Courses

- ENGLISH LANGUAGE COMMUNICATION AND CRITICAL THINKING (AREA A) (p. 33)
- SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING (AREA B) (p. 33)
- ARTS AND HUMANITIES (AREA C) (p. 35)
- SOCIAL SCIENCES (AREA D) (p. 37)
- LIFELONG LEARNING AND SELF-DEVELOPMENT (AREA E) (p. 39)
- ETHNIC STUDIES (AREA F) (p. 39)

ENGLISH LANGUAGE COMMUNICATION AND CRITICAL THINKING (AREA A)

	Standard	High-Unit
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ENGLISH LANGUAGE COMMUNICATION AND CRITICAL THINKING (AREA A)	12	12
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Oral Communication (A1)	4	4
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COMS/HNRS 101 Public Speaking

COMS/HNRS 102 Principles of Oral Communication

	Standard	High-Unit
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Written Communication (A2)	4	4
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ENGL 132 Writing and Rhetoric Stretch (Part II)

ENGL 133 Multilingual Writing and Rhetoric

ENGL 134 Writing and Rhetoric

ES 134 Writing & Rhetoric

	Standard	High-Unit
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Critical Thinking (A3)	4	4
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COMS 126	Argument and Advocacy
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COMS 145	Reasoning, Argumentation, and Writing
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ENGL/HNRS 145	Writing Arguments
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ENGL/HNRS 147	Writing Arguments about STEM
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ES 145	Reasoning, Argumentation, & Writing
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PHIL 126	Logic and Argumentative Writing
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WGQS 145	Reasoning, Argumentation, and Writing on Gender and Sexuality
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SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING (AREA B)

	Standard	High-Unit
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SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING (AREA B)	16	28
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Physical Science (B1) (B1 & B3=lab course)	4	4
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ASTR 101	Introduction to the Solar System
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ASTR 102	Introduction to Stars and Galaxies
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CHEM 110	World of Chemistry (B1 & B3)
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CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3)
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CHEM 125	General Chemistry for Physical Science and Engineering II (B1 & B3)
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CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3)
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GEOL 102	Introduction to Geology
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GEOL 203	The Geologic Record: Fossils and the History of Life
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PHYS 104	Introductory Physics
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PHYS 111	Contemporary Physics for Nonscientists
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PHYS 121	College Physics I
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PHYS 122	College Physics II (B1 & B3)
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PHYS 141/ HNRS 134	General Physics I
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PHYS 142/ HNRS 132	General Physics II (B1 & B3)
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PHYS 143	General Physics III (B1 & B3)
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PSC 101	Matter and Energy (B1 & B3)
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PSC 201	Physical Oceanography
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SS 120	Introductory Soil Science (B1 & B3)
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SS 130	Soils in Environmental and Agricultural Systems (B1 & B3)
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	Standard	High-Unit
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Life Science (B2) (B2 & B3=lab course)	4	4
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ANT 250	Biological Anthropology
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ASCI 112	Principles of Animal Science
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ASCI 215	Safe Handling of Animal-Based Foods for Consumers (B2 & B3)
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BIO 111	General Biology (B2 & B3)
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BIO 114	Plant Diversity and Ecology (B2 & B3)
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BIO 123	Biology of Sex
BIO 150	Diversity and History of Life (B2 & B3)
BIO 161	Introduction to Cell and Molecular Biology (B2 & B3)
BIO 222	Biodiversity of California
BIO 227	Wildlife Conservation Biology
BOT 121	General Botany (B2 & B3)
BRAE 220	Introduction to Biological Systems (B2 & B3)
DSCI 229	General Dairy Manufacturing (B2 & B3)
LA 220	Landscape Ecology: Concepts, Issues, and Interrelationships
MCRO 221	Microbiology (B2 & B3)
MCRO 224	General Microbiology I (B2 & B3) (5)
MSCI 111	Survey of Marine Biology
PLSC 110	People, Pests and Plagues (B2 & B3)
For Engineering students only; concurrent enrollment required:	
BIO 213	Life Science for Engineers (2)
BRAE/BMED 213	Bioengineering Fundamentals (2)

	Standard	High-Unit
Laboratory Activity (B3) – to be taken with a course in B1 or B2	X	X

	Standard	High-Unit
Mathematics/ Quantitative Reasoning (B4)	4	8

BUS 204	Financial Literacy
CSC 121	Computing for All I
CSC 122	Computing for All II
MATH 112	Nature of Modern Math
MATH 115	Stretch Precalculus Algebra I (3)
MATH 116	Precalculus Algebra I (3)
MATH 117	Precalculus Algebra II (3)
MATH 118	Precalculus Algebra
MATH 119	Precalculus Trigonometry
MATH/HNRS 141	Calculus I
MATH/HNRS 142	Calculus II
MATH/HNRS 143	Calculus III
MATH 161	Calculus for the Life Sciences I
MATH 162	Calculus for the Life Sciences II
MATH 182	Calculus for Architecture and Construction Management
MATH 221	Calculus for Business and Economics
MATH 227	Mathematics for Elementary Teaching I
STAT 130	Introduction to Statistical Reasoning
STAT 217	Introduction to Statistical Concepts and Methods

STAT 218	Applied Statistics for the Life Sciences	
STAT 251	Statistical Inference for Management I	
STAT 252	Statistical Inference for Management II (5)	
	Standard	High-Unit
Upper-Division B	4	4
AERO/HNRS 310	Air and Space	
AG/PLSC 315	Principles of Organic Crop Production	
AG/ISLA/SCM/UNIV 330	Cal Poly Land: Nature, Technology, and Society	
AG/EDES/ENGR/GEOG/ISLA/SCM/UNIV 350	The Global Environment	
AG/ASCI 360	Holistic Management	
ARCE 360	Equilibrium Without Statics	
ASCI 319	Physiological Chemistry of Animals	
ASTR 324	Longitude, Navigation, and Timekeeping	
BIO 302	Human Genetics	
BIO 305	Biology of Cancer	
BIO/CHEM 308	Genetic Engineering Technology	
BOT 311	Plants, People and Civilization	
BRAE 340	Irrigation Water Management	
BRAE 348	Energy for a Sustainable Society	
CHEM 314	Biochemistry: Fundamentals and Applications	
CHEM 349	Chemical and Biological Warfare	
CHEM 369	Biochemical Principles	
CM 317	Sustainability and the Built Environment	
CSC 320	Practical Computer Security for Everyone	
EE 322	Microcontrollers for Everyone	
ENVE 323	Engineering for the Environment	
ENVE 324	Introduction to Air Pollution	
ERSC 335	Soil, Water, and Civilization	
ES/WGQS 350/HNRS 353	Gender, Race, Culture, Science & Technology (USCP)	
FSN 305	Nutrition & Exercise for Health & Disease Prevention	
FSN 319	The Science of Food for the Consumer	
FSN 340	Fermented Foods	
GEOL 305	Seismology and Earth Structure	
IME 320	Human Factors and Technology	
ISLA 305	Topics in Public Engagements with STEM	
ITP 330	Packaging Fundamentals	
ITP 341	Packaging Polymers and Processing	
LA/NR 317	The World of Spatial Data and Geographic Information Technology	

MATE 359	Living in a Material World
MATH 304	Vector Analysis
MATH 344	Linear Analysis II
ME 313	Engineering Principles in Everyday Life
MSCI 330	Technologies for Ocean Discovery
NR 304	Agroecology
NR 310	Global Climate Change
NR 312	Technology of Wildland Fire Management
NR 321	Water Resources Technology and Society
PHYS 305	Classical Mechanics I
PLSC 329	Plants, Biotechnology, and the Media
PSC 307	Nuclear Energy and Weapons in the Modern World
PSC 320	Energy, Society and the Environment
PSC/UNIV/HNRS 392	Appropriate Technology for the World's People: Design
PSY 340	Biopsychology
PSY 344	Behavioral Genetics
SCM 360	Selected Environmental Issues of California's Central Coast
STAT 312	Statistical Methods for Engineers
STAT 313	Applied Experimental Design and Regression Models
STAT 321	Probability and Statistics for Engineers and Scientists
STAT 350	Probability and Random Processes for Engineers
WVIT 300	Survey of Grape Growing and Winemaking

	Standard	High-Unit
High Unit students select 2 courses from B1-B4	X	8

ARTS AND HUMANITIES (AREA C)

	Standard	High-Unit
ARTS AND HUMANITIES (AREA C)		
Lower-division courses in Area C must come from three different prefixes	16	16
Arts: Arts, Cinema, Dance, Music, Theatre (C1)	4	4

ARCE 260	History of Structures
ARCH 201	Architecture Design Studio for Non-Majors
ARCH 217	History of World Architecture: Prehistory - Middle Ages

ARCH 218	History of World Architecture: Middle Ages - 18th Century
ARCH 219	History of World Architecture: 18th Century - Present
ART 101	Fundamentals of Drawing
ART 111	Introduction to the Visual Arts
ART 112	Western Art: A Thematic History
ART 122	Introduction to Digital Photography
ART 145	Ceramics I
ART 148	Beginning Sculpture
COMS 208	Performance, Literature, and Culture
DANC 221	Dance Appreciation
ENGL 272	Introductory Topics in Cinematic Expression
LA 211	History of Landscape Architecture: Ancient Civilizations through Colonial America
LA 212	History of Modern and Contemporary Landscape Architecture
MU 101	Introduction to Music Theory
MU 120	Music Appreciation
MU 221	Jazz Styles (USCP)
MU 227	Popular Music of the USA (USCP)
TH 210	Introduction to Theatre
TH 227	Theatre History I
TH 228	Theatre History II
WGQS/HNRS 210	Gender and Sexuality in Visual and Popular Culture

	Standard	High-Unit
Humanities: Literature, Philosophy, Languages other than English (C2)	4	4

ENGL 230	British Literature: Beginnings to 1789
ENGL 231/HNRS 232	British Literature: 1789 to the Present
ENGL 241	American Literature: Beginnings to 1865
ENGL/HNRS 242	American Literature: 1830 to the Present
ENGL/HNRS 251	Introduction to Classical Literature
ENGL 252	Introduction to Medieval through Enlightenment Literature
ENGL 253	Introduction to Romantic through Modernist Literature
ENGL/LS 255	Children's Literature in a Diverse Society
FR 233	Critical Reading in French Literature
GER 233	Critical Readings in German Literature
PHIL/HNRS 230	Philosophical Classics: Knowledge and Reality

PHIL/HNRS 231	Philosophical Classics: Ethics and Political Philosophy
SPAN 233	Introduction to Hispanic Readings
Study Abroad C2 courses	
CHIN 141	Elementary Mandarin Chinese I Study Abroad
CHIN 142	Elementary Mandarin Chinese II Study Abroad
CHIN 143	Elementary Mandarin Chinese III Study Abroad
CHIN 241	Intermediate Mandarin Chinese I Study Abroad
CHIN 242	Intermediate Mandarin Chinese II Study Abroad
CHIN 243	Intermediate Mandarin Chinese III Study Abroad
ITAL 141	Elementary Italian I Study Abroad
ITAL 142	Elementary Italian II Study Abroad
ITAL 143	Elementary Italian III Study Abroad
ITAL 241	Intermediate Italian I Study Abroad
SPAN 141	Elementary Spanish I Study Abroad
SPAN 142	Elementary Spanish II Study Abroad
SPAN 143	Elementary Spanish III Study Abroad
SPAN 241	Intermediate Spanish I Study Abroad
SPAN 242	Intermediate Spanish II Study Abroad
SPAN 243	Intermediate Spanish III Study Abroad

	Standard	High-Unit
Lower-Division C Elective 4 - Select a course from either C1 or C2.		4

	Standard	High-Unit
Upper-Division C	4	4
ARCH 320	Topics in Architectural History	
ARCH/ES 326	Native American Architecture and Place (USCP)	
ART 311	Art History - Nineteenth Century Art	
ART 314	History of Photography	
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements	
ART 370	Michelangelo	
ART 371	Topics in Renaissance Art	
COMS 308	Group Performance of Literature	
DANC 321	Cultural Influence on Dance in America (USCP)	
ENGL 311	Advanced Rhetorical Inquiry and Composing	
ENGL 312	Translingual Rhetorical Inquiry and Writing	
ENGL 316	Writing Sustainability	
ENGL 330	British Literature: Beginnings to 1485	
ENGL 331	British Literature: 1485-1660	

ENGL/HNRS 332	British Literature: 1660-1798
ENGL/HNRS 333	British Literature: 1798-1832
ENGL 334	British Literature: 1832-1914
ENGL 335	British Literature: 1914-Present
ENGL 339	Introduction to Shakespeare
ENGL 340	American Literature: Beginnings-1865
ENGL/HNRS 341	American Literature: 1865-1914
ENGL/HNRS 342	American Literature: 1914-1956
ENGL/HNRS 343	American Literature: 1956-Present
ENGL/HNRS 345	Women Writers of the Twentieth and Twenty-First Centuries (USCP)
ENGL 346	Ethnic American Literature (USCP)
ENGL/HNRS 347	African American Literature (USCP)
ENGL 348	Asian American Literature (USCP)
ENGL 349	Gender in Twentieth and Twenty-First Century Literature (USCP)
ENGL 350	The Modern Novel
ENGL 351	Modern Poetry
ENGL/HNRS 352	Modern Drama
ENGL 354	The Bible as Literature and in Literature and the Arts
ENGL 370	World Cinema
ENGL 371	Film Styles and Genres
ENGL 372	Film Directors
ENGL 373	Topics on Gender Representations in Film
ENGL 374	Disability and Diversity in American Film (USCP)
ENGL/HNRS 380	Literary Themes
ENGL 381	Diversity in Twentieth and Twenty-First Century American Literature (USCP)
ENGL 382	LGBT Literature and Media (USCP)
ENGL 386	Creative Nonfiction
ENGL 387	Fiction Writing
ENGL 388	Poetry Writing
ES 300	Chicano/a Non-Fiction Literature (USCP)
ES 301	Latina/o Literature of the United States (USCP)
ES 302	Chicana/o Literature (USCP)
ES 303	Latina/o Poetry and Politics (USCP)
ES 324	Chicana/o Film (USCP)
ES 340	Cultural Production and Ethnicity
ES/NR 360	Ethnicity and the Land (USCP)
FR 305	Significant Works in French
FR 350	French Literature in English Translation
GER 305	Significant Works in German
GER 350	German Literature in English Translation
ISLA 303/ HNRS 304	Values and Technology

ISLA/HNRS 320	Topics and Issues in Values, Media and Culture
ISLA/WGQS 335	Feminist Studies of Popular Culture and Whiteness
MU 324	Music and Society
MU 328	Women in Music (USCP)
PHIL 301	Philosophical Topics
PHIL 309	Early Greek Philosophy through Plato
PHIL 310	Aristotle and Hellenistic Philosophy
PHIL 312	Medieval Philosophy
PHIL 313	Early Modern Rationalism
PHIL 314	Early Modern Empiricism
PHIL 315	Kant and 19th Century European Philosophy
PHIL 317	History of Analytic Philosophy
PHIL 318	Phenomenology
PHIL 319	Existentialism
PHIL 321	Philosophy of Science
PHIL 322	Philosophy of Technology
PHIL 323/ HNRS 325	Ethics, Science and Technology
PHIL 327	Robot Ethics
PHIL 328	Technologies and Ethics of Warfare
PHIL 331	Ethics
PHIL 332	History of Ethics
PHIL 333	Political Philosophy
PHIL 334	Philosophy of Law
PHIL 335/ HNRS 336	Social Ethics (USCP)
PHIL/WGQS 336	Feminist Ethics, Gender, Sexuality and Society (USCP)
PHIL 337	Business Ethics
PHIL 339	Biomedical Ethics
PHIL 340	Environmental Ethics
PHIL 341	Professional Ethics
PHIL 342	Philosophy of Religion
PHIL 343	Power, Alienation, and Political Life
PHIL 350	Aesthetics
PHIL 351	Philosophy of Literature
PHIL 361	Indian Philosophy
PHIL 362	Chinese and East Asian Philosophy
PHIL 369	Postmodernism
RELS 301	Religions of Asia
RELS 302	Abrahamic Religions: Judaism, Christianity, and Islam
RELS 304	Judaism
RELS 306	Hinduism
RELS 307	Buddhism
RELS 310	Christianity
RELS 311	Islam
RELS/WGQS 370	Religion, Gender, and Society (USCP)
RELS 372	Spiritual Extremism: Asceticism, Mysticism, and Madness

RELS 374	Religion and Violence
RELS 378	Religion and Contemporary Values
RELS 390	Topics in Religious Studies
SPAN 305	Significant Works in Spanish
SPAN 307	Spanish and Latin American Film
SPAN 340	Chicano/a Authors (USCP)
SPAN 350	Hispanic Literature in English Translation
SPAN 351	Chicano/Latino Writers in the United States (USCP)
TH 305	Topics in Diversity on the American Stage (USCP)
TH 390	Global Theatre and Performance
WLC 307	World Cultures through Film
WLC 310	Humanities in World Cultures
WLC 312	Humanities in Chicano/a Culture (USCP)
WLC 350	Literatures in World Cultures

SOCIAL SCIENCES (AREA D)

	Standard	High-Unit
SOCIAL SCIENCES (Area D)	12	8

Standard: Select courses in Area D from at least two different prefixes

American Institutions (D1 - Title 5, Section 40404 Requirement)	4	4
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ES/HNRS 112	Race, Culture, and Politics in the United States (USCP)
HIST 201/ HNRS 203	United States History to 1865 (USCP)
HIST/HNRS 202	United States History Since 1865 (USCP)
HIST 206	United States Cultures (USCP)
POLS 112	American and California Government
WGQS 201/ HNRS 204	Gender and Sexuality in US Society and Politics (USCP)

	Standard	High-Unit
Lower-Division (D2)	4	X

ANT 201	Cultural Anthropology
ANT 202	World History Before Writing
ECON/HNRS 201	Survey of Economics
ECON 222	Macroeconomics
GEOG 150	Human Geography
HIST 210	World History to 1800
HIST/HNRS 213	Modern Political Economy
HIST/HNRS 216	Comparative Social Movements
HIST 221	World History, Beginnings to 1000 CE
HIST 222	World History, 1000-1800

HIST/HNRS 223	World History, 1800 - Present
HIST 225	The World at War
HNRS 161	Creating Sustainable Communities I (2)
HNRS 162	Creating Sustainable Communities II (2)
HNRS 164	Sustainability and Communities
JOUR 228	Media, Self and Society
RELS 201	Religion, Dialogue, and Society
RPTA 201	Sociocultural Dimensions of Work and Leisure
SOC 110	Comparative Societies
SOC 218	International Political Economy

	Standard	High-Unit
Upper-Division D	4	X

Area D Elective

High-Unit: Select either a lower-division D2 or an upper-division D course	X	4
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Upper-Division D

ANT 330	Indigenous South Americans
ANT 344	Sex, Death, and Human Nature
ANT 345	Human Behavioral Ecology
ANT 360	Human Cultural Adaptations
BRAE/NR 349	Water for a Sustainable Society
BUS 311	Managing Technology in the International Legal Environment
CM 318	Housing and Communities
COMS 316	Intercultural Communication (USCP)
COMS 320	Intergroup Communication
COMS 384	Media Effects
COMS 386	Communication, Media, and Politics
CRP 303	Digital Cities
CRP 325	Reflections on Biking, Walking and the City
CRP 334	Cities in a Global World
ECON/HNRS 303	Economics of Poverty, Discrimination and Immigration (USCP)
ECON 304	Comparative Economic Systems
ES/NR 308	Fire and Society
ES 310	Hip-Hop, Poetics and Politics (USCP)
ES 320	African Americans in Popular Culture (USCP)
ES 321	Native Americans in Popular Culture (USCP)
ES 322	Asian Americans in Popular Culture (USCP)
ES 323	Latina/os in Popular Culture (USCP)
ES 330	The Chinese American Experience (USCP)
ES 335	The Filipina/o American Experience (USCP)

ES/WGQS 345	Queer Ethnic Studies (USCP)
ES/WGQS 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development
ES 380	Critical Race Theory (USCP)
ES 381	The Social Construction of Whiteness (USCP)
GEOG 308	Global Geography
GEOG 370	Geography of Latin America
GEOG 380	Geography of the Caribbean
HIST 306	The Witch-Hunts in Europe, 1400-1800
HIST 307	European Thought 1800-2000
HIST/HNRS 308	The Trans-Atlantic Slave Trade
HIST 309	Cultures of West Africa and the African Diaspora
HIST 310/ HNRS 312	East Asian Culture and Civilization
HIST 311	Comparative World Environmental History & Sustainability Since 1492
HIST 313	Modern Middle East
HIST 316	Modern East Asia
HIST/HNRS 317	The Lure of the Sea
HIST 318	The City in the Modern World
HIST 319	Modern South and Southeast Asia
HIST 320	Colonial and Revolutionary America
HIST 321	Civil War America
HIST 322/ HNRS 323	Modern America
HIST 326	United States Foreign Relations since 1898
HIST/HNRS 334	Modern Europe, 1789-1914
HIST/HNRS 335	Modern Europe, 1914-Present
HIST 336	Britain at War: The British, the Americans and the Struggle for Freedom, 1939-1945
HIST 337	Colonial Latin America
HIST 338	Modern Latin America
HIST/HNRS 350	The Scientific Revolution, c. 1500-1800
ISLA 316	London: From Roman Colony to World Capital
KINE 323	Sport and Gender (USCP)
KINE 324	Sports, Media and American Popular Culture (USCP)
LS 350	Identity and Equity in American Schools (USCP)
NR 308	Fire and Society
NR 323	Human Dimensions in Natural Resources Management
NR 324	Social Dimensions of Sustainable Food and Fiber Systems
NR/RPTA 328	Environmental Leadership and Community Engagement
POLS 325	Global Political Issues

POLS 337	U.S. and China in the Contemporary World
POLS/HNRS 338	Critical Issues in American Politics
POLS 339	Authoritarian and Democratic Rule
POLS 348	Early American Political Thought
POLS 349	Contemporary American Political Thought
PSC/UNIV/HNRS 391	Appropriate Technology for the World's People: Development
PSY 304	Intergroup Dialogues
PSY 311	Environmental Psychology
PSY 318	Psychology of Aging
PSY 352	Conflict Resolution: Violent and Nonviolent
RELS 344	Approaches to Religion and Spirituality
SOC 315	Global Race and Ethnic Relations
SOC 321	Migration (USCP)
SOC 326	Sociology of the Life Cycle
SOC 327	Social Change (USCP)
SOC 343	Contemporary Societies of the Developing World
SOC 377	Sociology of Religion
WGQS 301	Contemporary Issues in Women's and Gender Studies (USCP)
WGQS 302	Contemporary Issues in Queer Studies (USCP)
WGQS 320	Women, Gender and Sexuality in Global Perspective
WGQS 325	Masculinity Studies
WGQS/HNRS 340	Sexuality Studies
WLC 315	Critical Issues in Latin American Studies
WLC 370	Language, Technology and Society

LIFELONG LEARNING AND SELF-DEVELOPMENT (AREA E)

	Standard	High-Unit
Lower-Division E	4	4
COMS 211	Interpersonal Communication	
DANC 210	Active Wellness	
EDES 123	Principles of Environmental Design	
FSN 250	Food and Nutrition: Culture and Customs (USCP)	
HLTH 250	Healthy Living	
HLTH 255	Personal Health: A Multicultural Approach (USCP)	
HLTH 260	Women's Health Issues (USCP)	
PSY 201	General Psychology	
PSY 202	General Psychology	
RPTA 255	Leadership and Diverse Groups	

ETHNIC STUDIES (AREA F)

	Standard	High-Unit
Ethnic Studies (F)	4	4
Area F is fulfilled with one class, typically taken at the lower division level		
ES/HNRS 252	Global Origins of Race in the U.S.	
ES 253	Introduction to American Indian Studies	
ES 254	Introduction to African American Studies	
ES 255	Introduction to Latino/a/x Studies	
ES 256	Introduction to Asian American Studies	
ES 304	Race & American Literature	
ES 312	Race & Media Studies	
ES 382	Racial Capitalism	

	Standard	High-Unit
GE ELECTIVES (AREAS B, C, and D)		
Select any Area B, C, or D course listed above; courses must be from two different areas; may be either lower-division or upper-division. In addition to the courses listed above, the following courses can be used in fulfillment of the GE Electives.	8	X

Area C Electives

CHIN 201	Intermediate Mandarin Chinese I	
CHIN 202	Intermediate Mandarin Chinese II	
CHIN 203	Intermediate Mandarin Chinese III	
FR 201	Intermediate French I	
FR 202	Intermediate French II	
FR 203	Intermediate French III	
GER 201	Intermediate German I	
GER 202	Intermediate German II	
GER 203	Intermediate German III	
ITAL 201	Intermediate Italian I	
JPNS 201	Intermediate Japanese I	
SPAN 201	Intermediate Spanish I	
SPAN 202	Intermediate Spanish II	
SPAN 203	Intermediate Spanish III	

United States Cultural Pluralism (USCP)

USCP courses must fulfill all of the following criteria; and, according to AS-836-17, they must also address the Diversity Learning Objectives (DLOs). USCP courses must:

1. Focus on one or more diverse groups (identified in the Cal Poly Statement on Diversity (<https://catalog.calpoly.edu/universitypolicies/#Statement%20on%20Diversity%20and%20Inclusivity>)) whose contributions to American society have been impeded by cultural, legal, economic, and political conflict or whose social, cultural, legal, economic, and political opportunities have been restricted in the United States;
2. Cover the historical and/or contemporary social issues resulting from conflict or restricted opportunities that include but are not limited to problems associated with discrimination based on age, ethnicity, gender, nationality, abilities, religion, sexual orientation, socioeconomic status, or race in the United States;
3. Address the diverse intellectual, philosophical, and cultural perspectives of historically marginalized people in the United States;
4. Emphasize the voices and contributions of historically marginalized groups in the United States such that the course content must prominently include sources written and/or produced by historically marginalized people;
5. Foster critical thinking skills by using intersectional frameworks of analyses that are necessary for adequately understanding and analyzing various social issues related to diversity and equity in the United States;
6. Require students to examine critically their own beliefs, attitudes, and potential biases related to historically marginalized people in the United States.

In addition to satisfying these criteria, USCP courses must also address the Diversity Learning Objectives (https://academicprograms.calpoly.edu/content/academicpolicies/diversity_lo/).

Students are required to complete *one* USCP course. This course also fulfills a requirement for Major, Support, General Education, or Free Elective category.

The following courses fulfill the United States Cultural Pluralism requirement.

ANT 415	Native American Cultures	4	ENGL 349	Gender in Twentieth and Twenty-First Century Literature (Upper-Division C) ¹	4
ARCH/ES 326	Native American Architecture and Place (Upper-Division C) ¹	4	ENGL 374	Disability and Diversity in American Film (Upper-Division C) ¹	4
ART/WGQS 375	Intersectional Feminist Art Histories	4	ENGL 381	Diversity in Twentieth and Twenty-First Century American Literature (Upper-Division C) ¹	4
COMS 316	Intercultural Communication (Upper-Division D) ¹	4	ENGL 382	LGBT Literature and Media (Upper-Division C) ¹	4
CRP/ES 215	Planning for and with Multiple Publics	4	ES/HNRS 112	Race, Culture, and Politics in the United States (D1) ¹	4
DANC 321	Cultural Influence on Dance in America (Upper-Division C) ¹	4	ES 114	Introduction to Ethnic Studies	4
ECON/HNRS 303	Economics of Poverty, Discrimination and Immigration (Upper-Division D) ¹	4	ES 300	Chicano/a Non-Fiction Literature (Upper-Division C) ¹	4
ENGL/HNRS 345	Women Writers of the Twentieth and Twenty-First Centuries (Upper-Division C) ¹	4	ES 301	Latina/o Literature of the United States (Upper-Division C) ¹	4
ENGL 346	Ethnic American Literature (Upper-Division C) ¹	4	ES 302	Chicana/o Literature (Upper-Division C) ¹	4
ENGL/HNRS 347	African American Literature (Upper-Division C) ¹	4	ES 303	Latina/o Poetry and Politics (Upper-Division C) ¹	4
ENGL 348	Asian American Literature (Upper-Division C) ¹	4	ES 310	Hip-Hop, Poetics and Politics (Upper-Division D) ¹	4
			ES 320	African Americans in Popular Culture (Upper-Division D) ¹	4
			ES 321	Native Americans in Popular Culture (Upper-Division D) ¹	4
			ES 322	Asian Americans in Popular Culture (Upper-Division D) ¹	4
			ES 323	Latina/os in Popular Culture (Upper-Division D) ¹	4
			ES 324	Chicana/o Film (Upper-Division C) ¹	4
			ES 325	African American Gender & Sexuality	4
			ES 330	The Chinese American Experience (Upper-Division D) ¹	4
			ES 335	The Filipina/o American Experience (Upper-Division D) ¹	4
			ES/WGQS 345	Queer Ethnic Studies (Upper-Division D) ¹	4
			ES/WGQS 350/ HNRS 353	Gender, Race, Culture, Science & Technology (Upper-Division B) ¹	4
			ES/NR 360	Ethnicity and the Land (Upper-Division C) ¹	4
			ES 380	Critical Race Theory (Upper-Division D) ¹	4
			ES 381	The Social Construction of Whiteness (Upper-Division D) ¹	4
			FSN 250	Food and Nutrition: Culture and Customs (E) ¹	4
			HIST 201/HNRS 203	United States History to 1865 (D1) ¹	4
			HIST/HNRS 202	United States History Since 1865 (D1) ¹	4
			HIST 206	United States Cultures (D1) ¹	4
			HIST 208	Survey of California History	4
			HIST 406	African-American History from 1865	4

HIST/WGQS 435	American Women's History from 1870	4
HLTH 255	Personal Health: A Multicultural Approach (E) ¹	4
HLTH 260	Women's Health Issues (E) ¹	4
JOUR 219	Multicultural Society and the Mass Media	4
KINE 323	Sport and Gender (Upper-Division D) ¹	4
KINE 324	Sports, Media and American Popular Culture (Upper-Division D) ¹	4
LS 350	Identity and Equity in American Schools (Upper-Division D) ¹	4
MU 221	Jazz Styles (C1) ¹	4
MU 227	Popular Music of the USA (C1) ¹	4
MU 325	America's Music	4
MU 328	Women in Music (Upper-Division C) ¹	4
PHIL 335/HNRS 336	Social Ethics (Upper-Division C) ¹	4
PHIL/WGQS 336	Feminist Ethics, Gender, Sexuality and Society (Upper-Division C) ¹	4
POLS 310	The Politics of Race, Class, Gender and Sexuality	4
POLS 343	Civil Rights in America	4
POLS 445	Voting Rights and Representation	4
PSY 260	African American Psychology	4
PSY 372	Multicultural Psychology	4
PSY 475	The Social Psychology of Prejudice	4
RELS/WGQS 370	Religion, Gender, and Society (Upper-Division C) ¹	4
SOC 216	US Race and Ethnic Relations	4
SOC 321	Migration (Upper-Division D) ¹	4
SOC 327	Social Change (Upper-Division D) ¹	4
SOC/WGQS 423	Gender and Work	4
SPAN 111	Elementary Hispanic Language and Culture	4
SPAN 206	Spanish for Heritage Speakers	4
SPAN 340	Chicano/a Authors (Upper-Division C) ¹	4
SPAN 351	Chicano/Latino Writers in the United States (Upper-Division C) ¹	4
TH 305	Topics in Diversity on the American Stage (Upper-Division C) ¹	4
WGQS 201/ HNRS 204	Gender and Sexuality in US Society and Politics (D1) ¹	4
WGQS 301	Contemporary Issues in Women's and Gender Studies (Upper-Division D) ¹	4
WGQS 302	Contemporary Issues in Queer Studies (Upper-Division D) ¹	4
WGQS 450	Feminist Theory	4
WLC 312	Humanities in Chicano/a Culture (Upper-Division C) ¹	4

¹ Course also satisfies GE requirement

Choice of Catalog / Catalog Rights

Cal Poly typically issues a new catalog every one or two years, and the requirements for degree programs may change from one catalog to the next. Students have the right to choose the catalog they will use, as described in Section 40401 of Title 5 of the *California Code of Regulations*.

An undergraduate student remaining in attendance in regular sessions at any California State University campus, at any California Community College, or any combination of California community colleges and campuses of the California State University may, for purposes of meeting graduation requirements, elect to meet the catalog requirements in effect at the campus from which the student will graduate either:

1. at the term the student began such attendance, or
2. at the term of entrance to the campus granting the degree, or
3. at the term of graduation, or
4. as allowed by campus policy: Cal Poly also allows students to elect the requirements of any catalog in effect during their regular attendance.

Campus authorities may authorize or require substitutions for discontinued courses. A campus may require a student changing his or her major or any minor field of study to complete the major or minor requirements in effect at the time of the change.

For purposes of this section, "attendance" means attendance in at least one semester or two quarters each university year. Absence due to an approved leave of absence or for attendance at another accredited institution of higher learning shall not be considered an interruption in attendance, if the absence does not exceed two years.

Choice of Catalog Older than 10 years for Returning Students

Returning students may request to complete their degrees on a catalog older than 10 years only if all remaining degree requirements at the time they left Cal Poly do not exceed 16 units. The decision to approve or disapprove a student's request is based on: (1) her/his willingness to complete the remaining degree requirements within a specified timeframe, and (2) her/his ability to demonstrate, with written documentation, reasonable currency of knowledge and skills in her/his degree field to the satisfaction of the faculty in the applicable major, as certified by the department chair. Both the college dean and the Senior Vice Provost for Academic Programs must give approval.

Currency in the degree field may be demonstrated by additional coursework, in addition to the remaining degree requirements on the student's original catalog, and/or by relevant work experience, to be determined by the department chair. Because Cal Poly degrees are always granted for the term in which requirements are completed, additional requirements may vary, depending on the amount of time elapsed and on the major field, in order to reconcile the curriculum of an older catalog with current trends in the academic discipline.

The expiration of a catalog is determined by adding 10 years to the last term in which that catalog was in effect (e.g., the 2017-19 catalog will be "older than 10 years" after Spring Quarter 2029).

Students are not allowed to complete a degree that is no longer offered by the University.

Note: In addition to the remaining degree requirements on the student's catalog, s/he may also be required to complete the GWR. Check with the Evaluations Unit in the Office of the Registrar.

ACADEMIC STANDARDS AND POLICIES

Academic Placement

Placement Measures for First Year GE Written Communication and Mathematics/Quantitative Reasoning Courses

First year skills assessment and placement for General Education written communication and mathematics/quantitative reasoning courses shall be based on systemwide skills assessment standards that include the Early Assessment Program/Smarter Balanced Achievement Levels, high school coursework, high school GPA and math GPA.

Skills assessments are not a condition for admission to the CSU; they are a condition of enrollment. These skills assessments are designed to inform entering first year students of placement in appropriate baccalaureate-level courses based on their skills and needs.

First-time first year students identified as benefitting from additional support as determined by the skills assessment will be placed in supported instruction. Supported instruction is designed to assist students in credit bearing courses. Students may also be required to participate in the Early Start Program. The Early Start Program gives students the opportunity to earn college credit in written communication and/or mathematics/quantitative reasoning the summer before their first term.

Note: While the CSU has removed ACT/SAT standardized test requirements from its undergraduate admissions process, students are encouraged to submit test scores to help guide skills assessments, particularly for placement in the appropriate first-year mathematics/quantitative reasoning course.

Within the assessments and placement sections for written communication and mathematics/quantitative reasoning below, measures such as Smarter Balanced Assessment and/or ACT/SAT scores may be bypassed if no score has been submitted.

Assessments and Placement for GE Written Communications

Has fulfilled the GE Subarea A2 English Requirement

The student has met the requirement via completion of one of the following:

Advanced Placement (AP) Test

- 3 or above: AP Language and Composition
- 3 or above: AP Composition and Literature

College Transfer Coursework

- Completed approved college course that satisfies CSU GE Area A2 (written communication) with a grade of C- or better

Placement in a GE Subarea A2 English Course

The student has met examination standards and/or multiple measures-informed standards via one of the criteria below:

English CAASPP/EAP Test:

- Standard Exceeded
- Standard Met and completed 12th grade approved year-long English course (CSU ERWC, AP, Weighted Honors English) with grade of C- or better

*English New SAT Test, if score has been submitted:

- 550 or above
- 510 – 540 and completed 12th grade approved year-long English course (CSU ERWC, AP, Weighted Honors English) with grade of C- or better English

ACT Test, if score has been submitted:

- 22 or higher
- 19-21 and completed 12th grade approved year-long English course (CSU ERWC, AP, Weighted Honors English) with grade of C- or better

High School Courses and GPA:

- Weighted GPA 3.3 or above
- GPA 3.0 or above and completed approved 12 grade year-long English course (AP, CSU ERWC, Weighted Honors English)
- GPA 3.0 or above and completed Honors English
- GPA 3.0 or above and 5 or more years of high school English

Placement in a Supported GE Subarea A2 English Course

The student has met examination standards and/or multiple measures-informed standards via one of the criteria below:

*English New SAT Test, if score has been submitted:

- 510 – 540 and 4 or more years of high school English
- *SAT score conversion for scores prior to March 2016 (old SAT): <https://collegereadiness.collegeboard.org/sat-scoring-before-march-2016> (<https://collegereadiness.collegeboard.org/sat-scoring-before-march-2016/>)

ACT Test, if score has been submitted:

- 19-21 and 4 or more years of high school English

High School Courses and GPA:

- Weighted GPA 3.0 or above and 4 or more years of high school English

Placement in a Supported GE Subarea A2 English Course and Participation in the Early Start Program Required

Based on multiple measures evaluation, the student would benefit from additional academic support including participation in the Early Start English Program. Visit the CSU Early Start Program webpage (<https://www.csusm.edu/readiness/earlystart/>) to learn about the Early Start Program.

The goal of the Early Start English Program is to better prepare students in written communication before the fall term of their first year, improving students' chances of successful completion of a baccalaureate degree.

- If required to participate in Early Start English, as determined by multiple measures, students will begin in the summer before the start of the first year.

- For general information about the Early Start Program, including fees and course listings, visit the CSU Early Start Program webpage (<https://www.csusm.edu/readiness/earlystart/>). Students also are encouraged to visit the Cal Poly Early Start Program webpage (<https://earlystart.calpoly.edu/>) information once admitted.
- Eligible financial aid applicants with an Estimated Family Contribution (EFC) of \$6,000 or less will be eligible for waiver of the per unit ESP fee. For more information on assessments, placement, and the Early Start Program, please visit <http://www.csustudentsuccess.org/>.

Assessments and Placement for GE Mathematics/Quantitative Reasoning: Non-Math Intensive Majors (Algebra and Statistics Disciplines, Non-STEM and Undecided Majors)

Has fulfilled the GE Subarea B4 Math/Quantitative Reasoning Requirement

The student has met the requirement via completion of one of the following:

Advanced Placement (AP) Test:

- 3 or above: Calculus AB
- 3 or above on AP Calculus BC
- 3 or above on AP Statistics
- 3 or above on AP Computer Science Principles

International Baccalaureate (IB) Test:

- 4 or above on Math Higher Level (HL)

College Level Examination Program (CLEP):

- 50 or above on: Calculus, College Algebra, College Algebra-Trigonometry, Pre-Calculus or Trigonometry

College Transfer Coursework:

- Completed math/quantitative reasoning college course with a C- or better that satisfies CSU GE Area B4

Placement in a GE Subarea B4 Math/Quantitative Reasoning Requirement

The student has met examination standards and/or multiple measures-informed standards via one of the following criteria:

CAASPP/EAP Math Exam:

- Standard Exceeded
- Standard Met and completed 12th grade approved year-long math course beyond Algebra 2 with a C- or better
- Standard Met and 4 or more years of high school math or quantitative reasoning

***New SAT Math Test, if scores are submitted:**

- 570 or above
- 550 or above on Subject Test in Math Level 1 or 2
- 520 – 560 and completed 12th grade approved year-long math course beyond Algebra 2 with a C- or better

ACT Math Test, if scores are submitted:

- 23 or above
- 20-22 and completed 12th grade approved year-long math course beyond Algebra 2 with a C- or better

High School Courses and GPA:

- Weighted math GPA 3.0 or above and completed 12th grade approved year-long math course beyond Algebra 2 with a C- or better
- Weighted math GPA 3.0 or above and 5 or more years of high school math or quantitative reasoning
- Weighted high school GPA 3.7 or above
- Weighted high school GPA 3.5 or above and 4 or more years of high school math or quantitative reasoning

Placement in a Supported GE Subarea B4 Math/Quantitative Reasoning Requirement

The student has met examination standards and/or multiple measures-informed standards via one of the criteria below:

High School GPA:

- Weighted math GPA 3.3 or above
- Weighted high school GPA 3.0 or above

Placement in a Supported GE Subarea B4 Math/Quantitative Reasoning Requirement and Participation in the Early Start Program Required

Based on multiple measures evaluation, the student would benefit from additional academic support including participation in the Early Start Math Program. Visit the CSU Early Start Program webpage (<https://www.csusm.edu/readiness/earlystart/>) to learn about the Early Start Program.

The goal of the Early Start Math Program is to better prepare students in mathematics/quantitative reasoning before the fall term of their first year, improving students' chances of successful completion of a baccalaureate degree.

- If required to participate in Early Start Math, as determined by multiple measures, students will begin in the summer before the start of the first year.
- For general information about the Early Start Program, including fees and course listings, visit the CSU Early Start Program webpage (<https://www.csusm.edu/readiness/earlystart/>). Students also are encouraged to visit the Cal Poly Early Start Program webpage (<https://earlystart.calpoly.edu/>) information once admitted.
- Eligible financial aid applicants with an Estimated Family Contribution (EFC) of \$6,000 or less will be eligible for waiver of the per unit ESP fee. For more information on assessments, placement, and the Early Start Program, please visit <http://www.csustudentsuccess.org/>.

Assessments and Placement for GE Mathematics/Quantitative Reasoning: Pre-STEM/STEM and Other Math- Intensive Majors

Has fulfilled the GE Subarea B4 Math/Quantitative Reasoning Requirement

The student has met the requirement via completion of one of the following:

Advanced Placement (AP) Test:

- 3 or above on AP Calculus AB
- 3 or above on AP Calculus BC
- 3 or above on AP Statistics
- 3 or above on AP Computer Science Principles

International Baccalaureate (IB) Test:

- 4 or above on Math Higher Level (HL)

College Level Examination Program (CLEP):

- 50 or above on: Calculus, College Algebra, College Algebra-Trigonometry, Pre-Calculus or Trigonometry

College Transfer Coursework:

- Completed math/quantitative reasoning college course with a C- or better that satisfies CSU GE Area B4

Placement in a GE Subarea B4 Math/Quantitative Reasoning Requirement

The student has met examination standards and/or multiple measures-informed standards via one of the criteria below:

CAASPP/EAP Math Exam:

- Standard Exceeded
- Standard Met and completed 12th grade approved year-long math course beyond Algebra 2 with a C- or better

*New SAT Math Test, if scores are submitted:

- 570 or above
- 550 or above on Subject Test in Math Level 1 or 2
- 520 – 560 and completed 12th grade approved year-long math course beyond Algebra 2 with a C- or better

ACT Math Test, if scores are submitted:

- 23 or above
- 20-22 and completed 12th grade approved year-long math course beyond Algebra 2 with a C- or better

High School Courses and GPA:

- Weighted math GPA 3.5 or above and completed 12th grade approved year-long math course beyond Algebra 2 with a grade of C- or better
- Weighted math GPA 3.5 or above and 5 or more years of high school math or quantitative reasoning
- Weighted high school GPA 3.7 or above

Placement in a Supported GE Subarea B4 Math/Quantitative Reasoning Requirement

The student has met examination standards and/or multiple measures-informed standards via the criteria below:

High School Math GPA:

- Weighted math GPA 3.3 or above

Placement in a Supported GE Subarea B4 Math/Quantitative Reasoning Requirement and Participation in the Early Start Program Required

Based on multiple measures evaluation, the student would benefit from additional academic support including participation in the Early Start Math Program. Visit the CSU Early Start Program webpage (<https://www.csusm.edu/readiness/earlystart/>) to learn about the Early Start Program.

The goal of the Early Start Program (ESP) is to better prepare students in mathematics/quantitative reasoning before the fall term of their first year, improving students' chances of successful completion of a baccalaureate degree.

- If required to participate in ESP, as determined by multiple measures, students will begin in the summer before the start of the first year.
- For general information about ESP, including fees and course listings, visit the CSU Early Start Program webpage (<https://www.csusm.edu/readiness/earlystart/>). Students also are encouraged to visit the Cal Poly Early Start Program webpage (<https://earlystart.calpoly.edu/>) information once admitted.
- Eligible financial aid applicants with an Estimated Family Contribution (EFC) of \$6,000 or less will be eligible for waiver of the per unit ESP fee. For more information on assessments, placement and the Early Start Program, please visit <http://www.csustudentsuccess.org/>

Please visit the Cal Poly Mathematics Department for Mathematics Placement Exam (MAPE) Information (<https://math.calpoly.edu/mape/>).

Academic Standards

Academic Obligations

All students are expected to be diligent in the pursuit of their courses of study in order that both they and the State receive maximum benefit from the educational opportunities provided. Each student is responsible for his or her enrollments and timely adds, drops, and withdrawals following campus policy.

Students are expected to satisfy the academic demands required by their instructors in such ways as they may set forth, in order to satisfy the instructor that they are performing their assignments in a proper manner.

Instructors are expected to give first priority to meeting their scheduled classes and other assigned responsibilities, including keeping regular office hours for student conferences.

In classroom settings, instructors have the authority and responsibility to establish rules, maintain order, and to dismiss students from a class session for violation of the rules or misconduct. Violations or misconduct warranting more than a single dismissal from a class session should be referred by the instructor to the Office of Student Rights & Responsibilities at 805.756.2794 for disciplinary action.

Expected Academic Progress (EAP) Policy

Expected Academic Progress is defined as making appropriate degree progress each academic year by earning a certain percentage of degree applicable units that meet major, support, general education, concentration, and free elective (if applicable) requirements that are directly associated with the student's declared major.

Expected Academic Progress (EAP) is monitored for all undergraduate students each quarter. Students who fall behind in their EAP will be designated as having an **EAP deficiency** and may be required to meet

with their academic advisor. Although this designation will not be noted on their transcript, students will be expected to make up this deficiency.

Those students who are required to meet with their advisor are expected to review and discuss their academic progress, and to create a reasonable academic plan to help get the student back on track. Attending summer session, either at Cal Poly, a community college, or another regionally accredited institution, may be suggested. Should the student decide to attend another institution, he or she must confirm that the courses they decide to take at that institution will apply to their Cal Poly degree requirements upon transfer.

If the student continues to have an EAP deficiency, their department or college **may have a hold placed on their registration for the next term or place them on Administrative Academic Probation (see the section on Administrative Academic Probation).**

Those students who have a demonstrated need to attend Cal Poly on a part-time basis for at least three consecutive quarters may be considered exempt from the EAP policy. These students will be required to submit an EAP Exemption Request through their advisors in order to be evaluated for exemption.

In addition to the university's EAP policy, the College of Engineering has additional requirements. Please see the College of Engineering Advising Center for details.

I. Native EAP Policy (Students entering Cal Poly as first-time freshmen)

Every full-time undergraduate student is required to make reasonable academic progress toward completion of the bachelor's degree. EAP is monitored for all Cal Poly students in order to help them graduate in a timely manner.

Students entering Cal Poly as first-time freshmen and who are enrolled in four-year degree programs (e.g., BA, BS, BFA) are expected to graduate in twelve quarters. Normally, this will not include summer terms, as summer is considered an opportunity to make up for any lack of progress in prior quarters or to bank progress for future quarters.

To maintain Expected Academic Progress, the following standards should be met by the end of each respective year:

First year: Completion of at least **20%** of the total number of units required for the degree.

Second year: Completion of at least of **45%** of the total number of units required for the degree.

Third year: Completion of at least **75%** of the total number of units required for the degree.

Fourth year: Completion of at least **100%** of the total number units required for the degree.

Example: A student enrolled in a four-year degree program requiring 180 total units would need to complete no fewer than 36 units by the end of the first year, no fewer than 81 units by the end of the second year, no fewer than 135 by the end of the third year, and no fewer than 180 by the end of the fourth year.

To determine the standards for programs requiring more than 180 total units, multiply the total units required by .20, .45, .75, or 1.0 for each respective year. Students enrolled in a five-year degree (e.g., BArch, BLA) or blended programs must also demonstrate Expected Academic

Progress and should consult with their major department for specific requirements.

Benchmark Courses: In addition to monitoring the number of required units completed, some departments may identify specific benchmark courses that should be completed by the end of each respective year. Students should check with their advisor for such requirements.

Degree Applicable Units: Departments rely on data derived from each student's Degree Progress Report (DPR) to verify that the expected number of units completed constitute degree-applicable units (units that advance the student toward degree completion). In tallying these units for the purpose of monitoring EAP, degree-applicable credits earned from Advanced Placement (AP), International Baccalaureate (IB), and accredited baccalaureate-level transfer work will be included.

Concentrations: If the student's major requires a concentration, units taken for the concentration are included in assessing EAP. The concentration should be declared no later than reaching 90 units (junior standing).

Minors: Minors are optional at Cal Poly and are not a part of a student's EAP. Depending on the student's major, courses taken for the minor may or may not represent degree-applicable units (see "Maximum Units" below). Students who decide to pursue a minor should declare their minor no later than the end of their junior year. Minors must be completed within the EAP requirements identified (i.e., maximum number of units and quarters allowed for the degree). No minor will be awarded after the baccalaureate degree requirements have been met.

Maximum Units: Students graduating on time (this would be 12 quarters, excluding summers, for students enrolled in four-year degree programs) have no cap on the number of units they may complete at Cal Poly.

Students who do not graduate on time may complete no more than 24 Cal Poly units above the number required for the degree. Exceeding the allowable 24 units may result in a hold being placed on the student's registration or the student being placed on administrative academic probation. The student will be required to submit a **Degree Completion Plan** to the major department before he or she is allowed to continue their education at Cal Poly. The Degree Completion Plan may include only degree-applicable units, as the student will not be allowed to take non-degree-applicable classes during this period. In tallying the Maximum Units, *only Cal Poly units* will be included. Credit earned from AP, IB, and transfer work will not be used in the Maximum Units calculation.

Students contemplating a change of major or the addition of a second major should be aware that the maximum unit cap applies in these circumstances. As outlined in the Change of Major section elsewhere in the catalog, major changes should be undertaken only if the new major will not result in exceeding the maximum units cap of 24 Cal Poly units above the number required for the degree. The same holds true for a second major. In the case of a change of major, the cap would be 24 units above the number required for the new major. In the case of a second major, the cap would be 24 units above the minimum required for the primary major.

Failure to make reasonable academic progress as prescribed by this policy may result in a hold being placed on the student's registration or the student being placed on administrative-academic probation. Students will be notified via their Cal Poly email address if a hold has been placed on their record or if they are being placed on administrative-academic probation. Continued failure to meet EAP standards may result in disqualification from the University.

Exemptions: Students who have to comply with an externally imposed set of degree progress standards (e.g., athletes following NCAA regulations) may continue to follow those guidelines. Other students for whom the Expected Academic Progress policy represents undue hardship may appeal for exemption through their advisor. Such appeals should be supported with documentation as appropriate (e.g., a physician's note).

II. Transfer EAP Policy

Every full-time undergraduate student is required to make reasonable academic progress toward completion of their bachelor's degree. EAP is monitored for all Cal Poly students in order to help them graduate in a timely manner.

Ideally, those who enter Cal Poly as upper division transfer students and who are enrolled in four-year degree programs (BA, BS, BFA) are expected to graduate in two years (six quarters). However, EAP policy does allow students three years (nine quarters, *excluding summer quarters*) to complete their degree requirements at Cal Poly, should they still have remaining lower division requirements after they are admitted as junior transfers.

To maintain Expected Academic Progress, the following standards should be met by the end of the specified year of study at Cal Poly (note that these standards are based on the assumption that all upper division transfer students enter with at least 90 degree-applicable units and are General Education (GE) certified for lower division GE not specified by the major):

First year: Completion of at least **55%** of the total number of units required for the degree.

Second year: Completion of at least **80%** of the total number units required for the degree.

Third year: Completion of **100%** of the total number of units required for the degree.

Example: A transfer student enrolled in a four-year degree program requiring 180 total units would need to have completed no fewer than 99 degree-applicable units by the end of the first year, no fewer than 144 degree-applicable units by the end of the second year, and no fewer than 180 degree-applicable units by the end of the third year of study.

To determine the standards for programs requiring more than 180 total units, multiply the total units required by .55 or .80 or 1.0 for each respective year. Students enrolled in five-year degrees (e.g., BArch, BLA) or blended programs must also demonstrate Expected Academic Progress and should consult with their major department for specific requirements.

Benchmark Courses: In addition to monitoring the number of degree-applicable units completed, some departments may identify specific benchmark courses that should be completed by the end of each respective year. Students should check with their advisor for such requirements.

Degree Applicable Units: Departments rely on data derived from each student's Degree Progress Report (DPR) to verify that the minimum number of units completed constitute degree-applicable units (units that advance the student toward degree completion). In tallying these units for the purpose of monitoring satisfactory progress, degree-applicable credit earned from Advanced Placement (AP), International Baccalaureate (IB), and accredited baccalaureate level transfer work will be included.

Concentrations: If the student's major requires a concentration, units taken for the concentration are included in assessing the EAP. The concentration should be declared as soon as possible and no later than the end of the second quarter of study at Cal Poly.

Minors: Minors are optional at Cal Poly and are not a part of a student's Expected Academic Progress. Depending on the student's major, courses taken for the minor may or may not represent degree-applicable units (See "Maximum Units" below). Students electing a minor should declare the minor as soon as possible and no later than the end of the first year of study at Cal Poly. Minors must be completed within the EAP requirements identified (e.g., maximum number of units and quarters allowed for the major). No minor will be awarded after the baccalaureate degree requirements have been met.

Maximum Units: Transfer students graduating on time (in 9 quarters, excluding summers, for transfer students enrolled in four-year degree programs) have no cap on the number of units they may complete at Cal Poly. **Transfer students who are NOT on track to graduate on time may complete no more than 24 Cal Poly units above the number required for the degree.** Exceeding the allowable 24 units may result in a hold placed on the student's registration or the student being placed on administrative-academic probation. Students must submit a **Degree Completion Plan** to their major department before they will be allowed to continue their education at Cal Poly, and may enroll *only* in degree applicable units. In tallying the Maximum Units, *only Cal Poly units* will be included. Credit earned from AP, IB, and transfer work will not be used in the Maximum Units calculation.

Students contemplating a change of major or the addition of a second major should be aware that the maximum unit cap applies in these circumstances. As outlined in the Change of Major section elsewhere in the catalog, major changes should be undertaken only if the new major will not result in exceeding the maximum unit cap of 24 Cal Poly units above the number required for the degree. The same holds true for a second major. In the case of a change of major, the cap would be 24 units above the number required for the new major. In the case of a second major, the cap would be 24 units above the minimum required for the primary major.

Failure to make reasonable academic progress as prescribed by this policy may result in a hold being placed on the student's registration or the student being placed on administrative-academic probation. Students will be notified via their Cal Poly email address if a hold has been placed on their record or if they are being placed on administrative-academic probation. Continued failure to meet EAP standards may result in disqualification from the University.

Exemptions: Students complying with an externally imposed set of degree progress standards (e.g., athletes following NCAA regulations) may continue to follow those guidelines. Other students for whom the Expected Academic Progress policy represents undue hardship may appeal for exemption through their advisor. Such appeals should be supported with documentation as appropriate (e.g., a physician's note).

Undergraduate Academic Probation and Disqualification

Core Values/Guiding Principles

Every student admitted to Cal Poly should have the maximum opportunity to earn a Cal Poly degree. As a university, we should be providing assistance and guidance wherever possible to achieve this goal. When students find themselves in academic difficulty, we should be creating pathways for

success, preferably at Cal Poly. Our policies should reflect this premise as much as possible.

Definitions:

Academic Probation: The term grade point average (unadjusted for any subsequent grade forgiveness), Cal Poly cumulative grade point average, and/or higher education grade point average (GPA) drops below 2.000.

Academic Progress: The degree progress that students make by the end of each academic term by successfully completing units applicable to their declared major. Students' actual academic progress is displayed in the form of a "gauge" showing percent completed and is available on their student portal, in their Poly Profile under the Academic Progress section.

Academic Progress Level: At Cal Poly, students' academic degree progress is divided into four levels, denoting the progress that students are expected make by the end of each of the 4 years that it takes to complete their degree (5 year degree programs have five levels). For detailed information, please see the Academic Standards (p. 45) section of the Cal Poly Catalog.

Academic Progress Level GPA Limits: The minimum GPA that students must attain in order to remain eligible to enroll at Cal Poly. The Academic Progress Level GPA Limits correspond to the Academic Progress Levels as outlined in the policy under Section II. Academic Disqualification.

Academic Success Contract: A set of academic conditions that students who are either in academic probation or administrative-academic probation status, or academic disqualification or administrative-academic disqualification status have to meet in order to remain eligible to enroll at Cal Poly.

Term Grade Point Average (Term GPA): The grade point average based on all graded work for the term (quarter).

Cal Poly Cumulative Grade Point Average (CPSLO GPA): The grade point average based on all graded work completed only at Cal Poly.

Higher Education Cumulative Grade Point Average (Higher Ed GPA): Grade point average based on all graded work completed at all colleges and universities including Cal Poly.

Disqualification: Academic status that may lead to dismissal.

Dismissal: Administrative action that prevents students from enrolling at Cal Poly for any future quarters. Dismissal may result from academic disqualification or administrative-academic disqualification status, from a disciplinary proceeding. Dismissed students may or may not be allowed to return to Cal Poly, depending on the reason for the dismissal.

Reinstatement: Administrative action that restores students' eligibility to enroll at Cal Poly. Reinstatement may result from the approval of an appeal of disqualification or the removal of a disciplinary sanction.

Academic performance is considered in determining students' eligibility to remain enrolled. Uniform standards for academic probation/disqualification and for administrative-academic probation/disqualification are in effect at all campuses of the California State University. When they do not meet these standards, undergraduate students may be placed on academic probation status and later placed on academic disqualification status or be placed on administrative-academic probation status and later placed on administrative-academic disqualification status. Once placed on any disqualification status,

students will be dismissed if no action is taken on behalf of the student, or if an appeal for continued enrollment is not approved by the university.

Undergraduate students are placed on academic probation or on academic disqualification status under the conditions stated below. For minimum academic standards applicable to graduate and post-baccalaureate students, see the Graduate Programs section of the catalog.

I. Academic Probation

Undergraduate students are automatically placed on academic probation status when the current term grade point average (unadjusted for any subsequent grade forgiveness), Cal Poly cumulative grade point average, and/or higher education grade point average (GPA) drops below 2.000 (i.e., the equivalent of an average grade of C). Students are notified promptly via campus email by the Office of the Registrar if placed on academic probation status. Students are responsible for checking their campus email accounts regularly.

II. Academic Disqualification

Undergraduate students will be placed on academic disqualification status if their Cal Poly cumulative GPA (CPSLO GPA) or their higher education GPA (Higher Ed GPA) falls below the following academic progress level GPA limits based on the corresponding academic progress levels (degree applicable work completed):

Academic Progress Levels: Progress Level GPA Limits:	Academic
Academic Progress Level IV (75.1%-100%): Cumulative or Higher Ed GPA	1.950 Cal Poly
Academic Progress Level III (45.1%-75%): Cumulative or Higher Ed GPA	1.850 Cal Poly
Academic Progress Level II (20.1%-45%): Cumulative or Higher Ed GPA	1.700 Cal Poly
Academic Progress Level I (0%-20%): Cumulative or Higher Ed GPA	1.500 Cal Poly

New Student Success Clause: *To allow for an adjustment period, first-time freshmen and new transfer students will not be placed on academic disqualification status until the end of the first academic year even if their GPA falls below the designated academic progress level GPA limits.*

5-year programs: *Although the academic progress levels for the 5-year programs at Cal Poly differs from those of the 4-year programs, for the purposes of the academic disqualification policy, students in the 5-year programs are held to the same corresponding GPA levels as described above.*

III. Notice of Academic Disqualification

Students who fall into academic disqualification status will be notified via email from the Office of the Registrar before the beginning of the next quarter. Their academic status will also show on their student portal, in their Poly Profile. Failure to notify students does not create the right to continue enrollment.

Students will not be dismissed due to academic disqualification status at the end of the winter quarter. Those students who fall into academic disqualification status at the end of winter quarter will be placed on an academic success contract that, if successfully met, may result in permission to continue beyond spring quarter. However, students who are placed on an academic success contract at the end of fall quarter and

who fail to meet the conditions of their contract will be dismissed at the end of winter quarter.

IV. Appeal for Reinstatement

Students who are in academic disqualification status may appeal for reinstatement. If reinstated, students will be placed on an academic success contract. Students who do not appeal for reinstatement or whose appeal is not approved will be dismissed from the university.

V. Administrative-Academic Probation

Undergraduate students may be placed on administrative-academic probation status by action of the dean of the college in which the students' declared major resides for any of the following reasons:

1. Withdrawal from all or a substantial portion of courses in two successive terms or in any three terms. (Note: students who are on an approved leave of absence are not subject to administrative-academic probation status for such withdrawal.)
2. Repeated failure to make Expected Academic Progress (as defined in the Academic Standards (p. 45) section of the Cal Poly Catalog) toward the stated degree or program objective when such failure appears to be due to circumstances within the control of the student.
3. Failure to comply, after due notice, with an academic requirement or regulation which is routine for all students or a defined group of students (for example, failure to complete a required CSU or campus examination, failure to complete a required practicum, failure to comply with professional standards appropriate to the field of study, failure to complete a specified number of units as a condition for receiving student financial aid or making satisfactory progress in the academic program).

When such action is taken, students are notified via their Cal Poly email address and are provided with the conditions for removal from probation and the circumstances that would lead to disqualification, should probation not be removed.

VI. Administrative-Academic Disqualification

Undergraduate students who have been placed on administrative-academic probation status may be placed on disqualification status, by action of the dean of the college in which the students are enrolled, for any of the following reasons:

1. The conditions for removal of administrative-academic probation status are not met within the period specified.
2. The student goes on academic probation status while on administrative-academic probation status.
3. The student is placed on administrative-academic probation status more than once.

When such action is taken, the student is notified via their Cal Poly email address including an explanation of the basis for the action.

Academic Petitions

Academic petitions are handled through the Academic Affairs division of the University. Contact the appropriate office for specific academic petition procedures.

Petitions for course substitution, course and term withdrawal, course audits, and many others can be found at the Office of the Registrar Forms (https://registrar.calpoly.edu/registrar_forms/) page.

For Change of Major, reach out to the Mustang Success Center or to the advising center for the major to which you wish to change: Advising Centers (<https://advising.calpoly.edu/advising-centers/>).

For academic disqualification petition appeals, follow the steps as outlined in the email you received, or contact the advising center for your major/college: Advising Centers (<https://advising.calpoly.edu/advising-centers/>).

Issues of cheating, dishonesty, and plagiarism are addressed by the Office of Student Rights and Responsibilities (<https://osrr.calpoly.edu/>).

Academic Petition Appeals

Admission and re-admission appeals are reviewed in the Admissions Office, and the University's final decisions are made there. Information on the admissions appeal process may be found on the Admissions Decision Appeals (<https://www.calpoly.edu/admissions/not-selected/admission-decision-appeals/>) webpage.

Students wishing to appeal a grade may appeal to the Academic Senate Fairness Board (https://academicsenate.calpoly.edu/content/acadsen_comm/fairness/).

Other academic petition appeals are reviewed at the department or program level, the college level, or within the Office of the Registrar. Petitions that are refused must first be appealed at the level where the decision was made, and final appeals are made to the Academic Programs and Planning office. See the Academic Programs and Planning policy for more information on Academic Petition Appeals (<https://academicprograms.calpoly.edu/content/academic-petition-appeals/>).

Student Grievances

The University provides students with a variety of mechanisms to address student grievances or concerns. In all such matters, the University encourages students to attempt to resolve their grievances or concerns at the source of the issue (i.e., with the professor, department chair or administrator, or college associate dean). The Office of Student Rights & Responsibilities, at 805.756.2794, is available to any campus community member to assist with identifying and clarifying appropriate campus policies and procedures for addressing student grievances or concerns.

For general questions about grievances, contact the Office of Student Rights & Responsibilities, at 805.756.2794. The following list contains the offices or programs designated to address the more common student grievances at the University:

- **Grade Grievances** – The Fairness Board: Contact the Academic Senate Office, 805.756.1258 (See University Policies (p. 9) page for more detail on the functions of this Board)
- **Individual Student Misconduct** – Office of Student Rights and Responsibilities, 805.756.2794 (See Student Affairs (p. 453) page for more detail on the functions of this office)
- **Student Club Misconduct** – Office of Student Rights and Responsibilities, 805.756.2794 (See Student Affairs (p. 453) page for more detail on the functions of this office)

Eligibility for Intercollegiate Athletics

Eligibility for competition in intercollegiate athletics is regulated in general by the rules of the National Collegiate Athletic Association (NCAA), and specifically by current Conference and university regulations. The Director of Athletics is responsible for maintaining up-to-date intercollegiate athletics eligibility rules applicable to the University. The Faculty Athletic Representative has the responsibility for the interpretation of the NCAA, Conference, and university rules for determining student eligibility to represent the University in intercollegiate athletic events.

Eligibility for Student Activities

Students on either academic or disciplinary probation may not participate on intercollegiate teams nor may they hold positions of leadership in chartered student organizations or coded student government groups. Students on probation may participate in such student organizations and groups as members but they may not hold an office or represent the University or the Associated Students, Incorporated in any official capacity.

Student Conduct and Discipline

It is expected that all Cal Poly students are enrolled for serious educational pursuits and that they conduct themselves so as to preserve an appropriate atmosphere of learning. It is also expected that all students who enroll at Cal Poly are willing to assume the responsibilities of citizenship in the campus community. Association in such a community is voluntary, and students may withdraw from it at any time that they consider the obligations of membership disproportionate to the benefits. While enrolled, students are subject to campus authority that includes the prerogative of dismissing those whose conduct is inimical to the aims of an institution of higher education.

While enrolled, students are subject to the regulations governing discipline stated in *Education Code* Section 66017 and in Title 5 of the *California Code of Regulations*, Sections 41301–41302, and to such rules and regulations as have been approved and promulgated by authority of the President. Copies of Title 5 California Code of Regulations 41301 and 41302, which deal specifically with student disciplinary regulations, are available to all students in the "Appendix" of this catalog. Other applicable regulations are contained in this Catalog, in the *Campus Administrative Policies*, the Standards for Student Conduct, Student Rights & Responsibilities, and in other official University publications, including the Cal Poly website.

Evaluation of Transfer Credit

Transfer Credit

The Evaluations Unit in the Office of the Registrar will evaluate previous college work and test credit in relation to Cal Poly degree requirements. Newly admitted and matriculated transfer students will receive an email from Evaluations that their evaluation has been completed and that the results are available in their Degree Progress Report (<https://registrar.calpoly.edu/degreeprogressreport/>) via the Student Center on the Cal Poly Portal. New students cannot access their Degree Progress Report prior to matriculation, nor can Evaluations provide any specific information about credit prior to that time.

Every effort is made to provide a complete Degree Progress Report (DPR), with all transfer credit reflected, prior to the date of new transfer student registration in mid-August. The DPR serves as the basis for determining

remaining degree requirements and should be used frequently to track progress toward the degree. More information about the Degree Progress Report can be found here:

<https://registrar.calpoly.edu/degreeprogressreport> (<https://registrar.calpoly.edu/degreeprogressreport/>).

While every effort is made to complete the evaluation according to the timelines outlined above, it is important that new transfer students review their previous college work in relation to the degree requirements outlined in the catalog in order to make a tentative selection of courses for their first quarter of enrollment. Students should consult their college advising center or a faculty advisor in their major department for assistance in the selection of courses. They should also use the "By Major" agreements on www.assist.org (<http://www.assist.org/web-assist/welcome.html>) for assistance with work from California Community Colleges.

Sending transcripts as early as possible helps expedite the process of finalizing the transfer evaluation. A delay in receipt of final transcripts will postpone the finalization of the transfer evaluation.

Some major/support courses may need to be petitioned through the student's major department if articulation agreements are not in place in ASSIST, or if classes were taken at a private institution in California, a University of California campus, or an out-of-state school.

Note: Transfer students with Advanced Placement or International Baccalaureate credit must have their scores sent to Cal Poly directly from the College Board or IB; notation of AP or IB exams on a college transcript is not sufficient for Cal Poly to award credit. Students should do this as soon as possible, in order for the transfer evaluation to be complete and accurate, and in order to satisfy registration prerequisites.

Semester units transferred to Cal Poly are converted to quarter units by multiplying the semester units by 1.5; a 3-unit semester class will equate to 4.5 Cal Poly units. If the Cal Poly requirement is 4 units, the excess 0.5 unit will count toward free electives.

The evaluation remains valid provided that the student matriculates for the term they are admitted, remains in their declared major, and remains in continuous attendance.

While students may follow the specific major requirements for the catalog year on which their initial evaluation of transfer credit is based, they are responsible for complying with any and all changes in other regulations, policies, and procedures, which may appear in subsequent catalogs, or which are communicated to them via email from the Office of the Registrar. These include CSU-mandated changes and changes approved by Cal Poly's Academic Senate and/or administration.

Credit for Community College Courses

Course credit earned at regionally accredited community colleges inside and outside the state of California is evaluated by the Evaluations Unit in accordance with the following provisions:

- Community college credit is allowed up to a maximum of 105 quarter units (70 semester units) toward overall units for the degree. Credits earned above this allowable maximum may still be used to satisfy specific subject and grade point requirements, but may not be applied toward the total count of units required for graduation (Example: a student in a 180-unit program, who has 110 quarter units of community college credit, all of which satisfies subject requirements, must still complete 75 units of non-community college work [not 70 units]).

- Upper division credit is never granted for community college work.
- The 105-unit limit does not apply to work from four-year institutions; however, specific course requirements, as well as all Cal Poly residency requirements, must still be met regardless of the number of units transferred from four-year institutions (see "Academic Residence Requirements" under "Minimum Requirements for Graduation").

Cal Poly maintains articulation agreements at www.assist.org (<https://assist.org/>) with all California Community Colleges (CCC), the California State University (CSU) and University of California (UC) campuses. The CCC campuses publish the CSU General Education (GE), the Intersegmental General Education Transfer Core (IGETC) course lists, and the lists of CSU transferable courses on the ASSIST website.

Transfer credit for GE courses is accepted from California community colleges, as approved by the CSU Chancellor's office and listed on www.assist.org (<https://assist.org/>). For students on catalogs prior to the 2020-21 catalog, Cal Poly's GE Area letters and numbers can differ from other schools in Assist. For help in understanding these differences, please refer to <https://registrar.calpoly.edu/how-use-assist> (<https://registrar.calpoly.edu/how-use-assist/>). For GE coursework taken at a private institution in California, a University of California campus, or an out-of-state school, every effort is made to extend all appropriate credit, including honoring the GE pattern of the transfer institution whenever possible.

Note: GE certification, whereby transfer students can complete all lower-division GE at a CCC or CSU, does not exempt students from meeting the CSU requirement of 72 overall units of GE, nor from completing upper-division GE requirements. Many Cal Poly programs require specific GE courses in the Major and/or Support; these courses must be met with articulated equivalencies, regardless of the status of GE completion at the CCC. See the General Education (p. 30) page for General Education requirements.

Submitting a CSU GE certification form is not required; Evaluations will use assist.org and/or the catalog, to determine GE certification. Submitting an IGETC certification, if the student is IGETC certified, is highly encouraged. Note: if a CCC GE certification is incorrect, it will not be honored (i.e., if it applies AP credit or work from a previous institution in an inappropriate manner). As the institution granting the bachelor's degree, Cal Poly will make the final determination of GE certification.

Other Academic Credit

Advanced Placement (AP) Credit

Cal Poly grants credit for AP exams successfully completed through the College Board AP program. Official scores must be requested from College Board, using our AP school code of 4038. See the College Board site: <https://apscore.collegeboard.org/scores/score-reporting> (<https://apscore.collegeboard.org/scores/score-reporting/>) for details on Score Reporting Services. Admitted students should send their AP scores as soon as possible to ensure that credit is applied toward their fall schedule. Neither opened paper AP score reports nor Advanced Placement notation on high school transcripts are acceptable to determine credit awarded.

AP credit matrices, published annually in April, are available at: https://registrar.calpoly.edu/other_ac_credit (https://registrar.calpoly.edu/other_ac_credit/). Exams passed with a score of 3 or higher result in nine (9) quarter units of credit, except where otherwise noted on the credit matrix. All credit is given on a credit/no credit basis; AP units do

not calculate into the GPA. Credit may vary from year to year, as Cal Poly requirements and AP Exams change. Please refer to the credit matrix for the specific year the exam was taken; credit is always extended based on the year of the exam. To determine credit for combined exams, use the matrix for the year of the last exam taken.

International Baccalaureate (IB) Exam Credit

The International Baccalaureate Diploma shall be considered in lieu of a high school diploma for admission to the University.

The International Baccalaureate **transcript** is required to receive University credit; the diploma is not sufficient to receive credit. IB transcripts may be requested from IB North America by email: transcripts.ibna@ibo.org, or by phone: (212) 696-4464.

Credit is awarded for classes at the **Higher** level. No credit is extended for Standard level exams.

All credit is given on a credit/no credit basis; IB units do not calculate into the GPA.

For each Higher Level exam score of 5 or higher, a maximum of 8 units of credit is awarded.

IB credit matrices, published annually in April, are available at: https://registrar.calpoly.edu/other_ac_credit (https://registrar.calpoly.edu/other_ac_credit/). Please refer to the matrix for the **specific** year the exam was taken; credit is always extended based on the year of the exam.

Credit for Non-collegiate Instruction

Cal Poly grants undergraduate degree credit for successful completion of non-collegiate instruction, either military or civilian, appropriate to the baccalaureate degree, which has been recommended by the Commission on Educational Credit and Credentials of the American Council on Education. The number of units allowed are those recommended in the Guide to the Evaluation of Educational Experience in the Armed Services and the National Guide to Educational Credit for Training Programs.

Credit for Military Service

Nine quarter units of elective credit are allowed toward graduation to any student submitting evidence of satisfactory completion of basic training in the military service of the United States. 4 units satisfy GE Area E and 5 units are elective credit (Cal Poly requires the DD-214 form to extend credit). Credit is allowed in accordance with the recommendations by the Commission on Educational Credit and Credentials of the American Council on Education. The numbers of units allowed are those recommended in the *Guide to the Evaluation of Educational Experience in the Armed Services*. Credit is not given for college level General Educational Development Tests. Military Service credit does not calculate into the GPA. Military Service credit is not included in scholarship computations.

CLEP Exam Credit

As each campus in the CSU system determines how it will apply external examinations towards credit in the major, Cal Poly has established that the CLEP tests acceptable for credit are:

- College Algebra-Trigonometry with a passing score of 50;
- Pre-Calculus with a passing score of 50;
- General Chemistry with a passing score of 50;
- Calculus with Elementary Functions with a passing score of 51.

4.5 quarter units of credit may be earned with an assigned grade of credit (CR), which is not included in the GPA calculation.

Credit for CLEP and other externally developed examinations is *not* awarded if any of the following apply:

- equivalent degree credit or duplicate credit has already been granted;
- credit has been granted for previous coursework or for a previously completed more advanced or higher level examination.

Credit by Examination (Challenging Cal Poly Courses)

A student may challenge a course in which he or she is qualified through previous education by taking an examination developed at the campus. Credit shall be awarded to those who pass this examination successfully. A student may not petition for credit by examination if the student has ever been enrolled in the course. Credit shall not be awarded when credit has been granted at a level more advanced than that represented by the course being challenged.

The credit by examination option is only available to admitted Cal Poly students during a term in which they are officially enrolled. A fee is charged for each credit by exam petition.

The examination may include written, oral, or skills tests, or a combination of all three types, and is sufficiently comprehensive to determine that the student has essentially the same knowledge and skills as those students who successfully complete the course. The grade received is entered on the student's permanent record. The grade may not be Credit/No Credit (CR/NC), except for courses which have CR/NC grading only. The length of the examination is consistent with the unit value of the course.

Arrangements to obtain course credit by exam may be made with the head of the department in which the course is taught. The request for credit by exam must be approved by the instructor and head of the department. Not all Cal Poly courses are available or appropriate for credit by exam. Units of credit received through this procedure do not apply toward the residence requirements or the Cal Poly GPA for any of the degrees or credentials offered by the University. Detailed instruction for applying for credit by examination may be obtained from the Office of the Registrar.

Grading

A grade may be changed for the purpose of correcting clerical or administrative error, or to correct an error in the calculation or recording of a grade. A change of grade shall not occur as a result of additional work performed or reexamination beyond the established course requirements (Academic Senate Resolution AS-384-92).

Units Earned are all hours for which credit was earned (excludes grades of F, WU, and NC. F and WU grades affect the GPA; NC grades do not affect the GPA).

Units Graded carry grade point value (excludes grades of CR and NC, which have no effect on GPA).

Grade Points are awarded for each course unit and are determined by multiplying course unit(s) by the grade point value of the grade.

Grade Point Average (GPA) is determined by dividing Grade Points by Units Graded.

Higher Education GPA is the grade point average of all college level work, both Cal Poly and any transfer work.

Transcripts are the official record of academic history. Once a degree has been awarded, subsequent revision and alteration of any transcript entry is permitted only for correction of proven error as certified by the appropriate academic dean and the Registrar. No changes are made to the academic record after 60 days following the awarding of the degree.

Grading Symbols

Academic Grading Symbols Earned

Symbol	Definition	Grade Points Earned Per Unit
A	Superior Attainment of Course Objectives	4.0
A-	Superior Attainment of Course Objectives	3.7
B+	Good Attainment of Course Objectives	3.3
B	Good Attainment of Course Objectives	3.0
B-	Good Attainment of Course Objectives	2.7
C+	Acceptable Attainment of Course Objectives	2.3
C	Acceptable Attainment of Course Objectives	2.0
C*	Acceptable Attainment of Course Objectives	1.7
D+	Poor Attainment of Course Objectives	1.3
D	Poor Attainment of Course Objectives	1.0
D-	Poor Attainment of Course Objectives	0.7
F	Non-Attainment of Course Objectives	0.0
CR	Credit (No effect on GPA)	-
NC	No Credit (No effect on GPA)	-

* Certain sequenced courses may have a C– prerequisite for advancement.

Credit/No Credit Grading

Some courses, *as indicated in their catalog descriptions*, are offered on a Credit/No Credit grading basis only. The following conditions apply when a student *elects* to take for Credit/No Credit grading those courses that are *not* designated by the University as being graded on an exclusive Credit/No Credit basis.

1. Students desiring to elect a course on a Credit/No Credit grading basis must be currently enrolled in the course and must elect the Credit/No Credit grading option through the registration system. This request can be made through the 8th day of the quarter. Students may **not** change from one grading system to the other after the end of the 8th day of the term.
2. Undergraduate students are given a grade of CR for accomplishment equivalent to a grade of C– or better. No credit (NC) is given for D+ or lower grades. Graduate students receive a grade of CR that is based on an evaluated grade of B– or higher and NC for assigned grades of C+ or lower. Instructors submit conventional letter grades to the Registrar's Office where they are converted to Credit/No Credit grades. **NOTE: Some post-baccalaureate programs penalize students for a grade of CR; students should carefully consider the implications of selecting CR/NC grading.**

- The applicant for a Credit/No Credit grade must have at least a 2.0 grade point average in cumulative Cal Poly work. This requirement is waived for first-time students.
- No more than two courses may be selected for Credit/ No Credit grading in any term.
- Units earned in courses for which the grade was CR count toward satisfaction of all degree requirements, if the student is within the guidelines listed in Item 6.
- Undergraduate students may elect a maximum of 16 units of Credit/ No Credit grading. Up to 4 units of Credit/No Credit grading is allowed in major or support courses, if allowed by the student's major department (see the Degree Requirements and Curriculum for each major to determine if Credit/No Credit grading is allowed). Up to 4 units (or one course, if the course is a five-unit course, e.g., CHEM 111) of Credit/No Credit grading is allowed in General Education courses (those GE courses which are required for the bachelor's degree). The remainder can be taken as free electives. These unit maximums apply to the **selection** of credit/no credit grading basis, regardless whether a student earns a grade of CR or NC.
- Credit/No Credit grading is removed for courses not meeting the above guidelines; the grade is changed to the letter grade assigned by the instructor. Students are strongly encouraged to verify, before enrolling, whether they are allowed to select Credit/No Credit grading for a particular course or requirement.
- Non-matriculated students, including those in the Extension Program, Summer Session, and Workshops must meet the same requirements as matriculated students to elect courses on a Credit/No Credit grading basis. (The 2.0 GPA requirement is waived in the case of non-matriculated students having no previous coursework recorded at Cal Poly.)

An instructor is authorized to submit a change-of-grade form to change an AU to NC for students who audit a class but do not attend or do not meet agreed-upon criteria.

The student services fee and nonresident tuition fee are determined on the basis of the total units for which the student is enrolled including courses audited.

Incomplete (Authorized)

An Incomplete signifies that a portion of required coursework has not been completed and evaluated in the prescribed time period due to unforeseen but fully justified reasons and that there is still a possibility of earning credit. It is the student's responsibility to bring pertinent information to the instructor who determines the means by which the remaining course requirements are satisfied. A final grade is assigned when the work agreed upon has been completed and evaluated. The student is not permitted to re-enroll in the course to complete course requirements. If the student does re-enroll, the original grade of I is counted as an F (or NC) and the re-enrollment is processed as a repeated course.

The instructor designates terms of the contract and length of time allowed to complete work, not to exceed one year. Failure to complete the assigned work results in the I being counted as equivalent to an F (or NC) for grade point average computation. All remaining grades of I are changed to F (or NC) at the time the student's degree is awarded.

Withdrawal Unauthorized

The symbol "WU" indicates that an enrolled student did not withdraw from the course and also failed to complete course requirements. It is used when, in the opinion of the instructor, completed assignments or course activities or both were insufficient to make normal evaluation of academic performance possible. For purposes of grade point average and progress point computation, this symbol is equivalent to an "F".

Report In Progress

The "RP" symbol is used in connection with courses that extend beyond one academic term. It indicates that work is in progress but that assignment of a final grade must await completion of additional work. Work is to be completed within one year except for graduate degree theses, which have a seven-year time limit. Students should not re-enroll in the course to complete course requirements; they should instead work with the instructor to complete the additional work.

Re-enrollment is only permitted in instances of repeatable courses. Cumulative enrollment in units attempted may not exceed the total number applicable to the student's educational objective. Work is to be completed within a stipulated time period.

The RP symbol shall be replaced with the appropriate final grade within one year or the grade is converted to an F, except that grades of RP for graduate degree theses (courses numbered 539/596/598/599) convert to a grade of No Credit (NC) if a final grade has not been assigned within seven years. All remaining RP grade symbols are changed to F or NC at the time the student's degree is awarded.

Repeating a Course

Undergraduate students cannot repeat courses in which they have earned a C or better grade (C- can be repeated).

Administrative Grading Symbols

Symbol	Definition	Grade Points Earned Per Unit
AU	Audit	-
I	Incomplete (authorized)	-
RD	Report Delayed	-
RP	Report in Progress	-
W	Withdrawn	-
WU	Withdrawal Unauthorized	0

Audit

An auditor is a student who attends a course and receives no credit for the course. Enrollment as an auditor is subject to permission of the instructor. Enrollment in a course as an auditor shall be permitted only after students otherwise eligible to enroll on a credit basis have had an opportunity to do so.

Auditors are subject to the same fee structure as credit students, and regular class attendance is expected. Once enrolled as an auditor, a student may not change to credit status unless such a change is requested prior to the last day to add classes. Courses enrolled in with audit grades are not considered when determining enrollment status (for financial aid and other purposes).

Course Repeats with Grade Forgiveness

Undergraduate students may repeat a maximum of 16 units at Cal Poly for purposes of improving their GPA. Grades of C- or lower are eligible for grade forgiveness.

- If the second Cal Poly grade is equal to or higher than the first, then it replaces the first grade. The original grade is "forgiven" from the GPA computation, but both grades appear on the student's transcript.
- If a course that was originally taken for a letter grade is re-taken with *credit/no credit grading*, the original grade is not excluded from the GPA.
- Grade forgiveness does not apply if the second grade is lower than the first grade. In this case, both grades are averaged into the student's GPA.
- Effective Summer 2007, grade forgiveness can be applied to the same course only once. Any additional attempts will be averaged into the GPA.
- Courses subsequently repeated at another institution and transferred back to Cal Poly are not eligible for forgiveness.
- Grade forgiveness shall not be applicable to courses for which the original grade was the result of a finding of academic dishonesty.

With the exception of the reasons listed below, the repeat adjustment is made automatically at the end of the term in which the course is repeated. A Repeat Petition for Grade Forgiveness is required for the following reasons only:

- the course was originally taken at Cal Poly before Fall 1987
- the course was originally taken at another institution
- the course has changed prefix or number
- the courses are considered similar in content but are not identical (e.g., STAT 217/STAT 218)
- the same topic of a topics course is being repeated

Repeat Petitions for Grade Forgiveness for the situations listed above must be turned in to the Office of the Registrar by the end of the seventh week of the quarter in which the course is repeated.

Course Repeats with Grades Averaged

Students may repeat an additional 18 units in addition to the 16 units for which grade forgiveness is permitted. Once the 16 unit forgiveness limit is reached, the grade from the repeat attempt shall not replace the original grade; instead both grades shall be calculated into the overall GPA.

Once students accumulate 34 units (16 units with forgiveness + 18 units with averaging) of repeated courses, they will no longer be allowed to repeat any future courses.

Withdrawals / Renewal

The W grading symbol indicates that the student was permitted to withdraw from the course after the regular add/drop period with the approval of the appropriate campus officials. It carries no adverse connotation of quality of student performance and is not used in calculating grade point averages.

Between the end of the regular add/drop period and the end of the seventh week of instruction a student must request permission to withdraw from a course by processing a petition that is available at the Office of the Registrar. The petition is approved and withdrawal

authorized only if there are serious and compelling reasons for withdrawal in the judgment of the department head.

The withdrawal petition also requires the signature of the course instructor and the student's academic advisor.

Between the end of the 7th week of instruction and the last day of instruction, withdrawals are permitted only if the withdrawal is based on an emergency situation clearly beyond the control of the student. In such cases a final or incomplete grade may be assigned for courses in which sufficient work has been completed to permit an evaluation to be made. The student must request permission to withdraw as specified above, or request grade assignment, both of which are subject to approval by designated campus officials. Any student who fails to provide notification or who fails to obtain formal approval to withdraw is subject to failing grades (WU, F, or NC).

Undergraduate students may withdraw from no more than 28 quarter units.

Cancellation of Registration or Withdrawal from the Term

Students who find it necessary to cancel their registration or to withdraw from all classes after enrolling for any academic term are required to follow the University's official withdrawal procedures. Failure to follow formal University procedures may result in an obligation to pay fees as well as the assignment of failing grades in all courses and the need to apply for readmission before being permitted to enroll in another academic term.

Students may drop their classes on their Student Center all the way through the add/drop period, until the end of the 8th day of the term. Grades are not assigned for courses dropped during this period.

With the approval of campus officials, a student is permitted to withdraw from all classes for the quarter for serious and compelling reasons until the end of the 7th week of instruction. After the 7th week and through the last day of instruction, withdrawals for the term must be based on an emergency situation clearly beyond the control of the student, and approved by campus officials.

The student is required to initiate a request for a term withdrawal with the Registrar and to complete required exit procedures. If the student is unable to appear in person, he/she may write or call the Office of the Registrar, 805.756.2531, to request withdrawal. The request must specify reasons for leaving the institution and include the student's signature. The date of the withdrawal is established according to the guidelines contained in the institutional policies governing term withdrawals or as determined by the Registrar.

The student may be eligible for a full or partial refund of registration fees depending upon the time and circumstances of withdrawal. If eligible for a refund, the refund remains in the student's account on campus, unless the student files a written application for the refund to be sent to the student. Fee refund policy information is available at <https://afd.calpoly.edu/fees/>.

Students who receive financial aid funds must consult with the Financial Aid and Student Account Offices prior to withdrawing from the University regarding any refunds or repayments of grant or loan assistance received for that academic term. If a Title IV financial aid recipient withdraws from the University during a payment period, the grant or loan assistance received is subject to federal refund and repayment provisions.

Withdrawal from Previous Terms

A student may petition to have all grades retroactively changed to the administrative grade of "W" if he/she can demonstrate and document that there were serious and compelling reasons or circumstances that resulted in the unofficial withdrawal for the quarter in question. A student may not retroactively withdraw from selected courses during a particular quarter, but must petition to withdraw from the entire quarter. **The petition must be submitted within one year following the end of the term.** Refunds of registration fees are not available for withdrawals following the last day of instruction. For more information, contact the Office of the Registrar.

Academic Renewal

The Trustees of the California State University have established a program of Academic Renewal whereby students who are having difficulty meeting graduation requirements due to a grade point deficiency may petition to have up to two semesters or three quarters of previous undergraduate coursework discounted from all considerations associated with meeting requirements for the baccalaureate degree. None of the courses taken in such terms can be applied toward the degree.

Academic Renewal, as defined by campus policy, is processed only at the point of graduation. Academic Renewal is intended only to enable graduation from Cal Poly and is not available for individuals who already possess a baccalaureate degree or who meet graduation requirements without the approval of a petition for Academic Renewal.

Conditions: In order to qualify for Academic Renewal all of the following conditions established by the Trustees must be met:

1. Five years must have elapsed since the term or terms to be disregarded were completed. The terms to be disregarded may have been taken at any institution.
2. Since completion of the term(s) to be disregarded, the student must have completed coursework at Cal Poly of at least one of the following:
 - 22 units with a minimum GPA of 3.00,
 - 45 units with a minimum GPA of 2.50,
 - 67 units with a minimum GPA of 2.00
3. The student must present evidence that the coursework to be disregarded was substandard and not representative of the student's present scholastic ability and level of performance.

Final determination, that one or more terms shall be disregarded, shall be based on careful review of evidence by a committee appointed by the President, which shall include the designee of the chief academic officer and consist of at least three members (E.O. 1037).

For additional information about Academic Renewal, contact the Evaluations Unit of the Office of the Registrar.

Other Academic Policies

Academic Honors

The **Dean's Honors List** is compiled at the end of each quarter to honor undergraduate students who have completed 12 or more letter-graded units during the quarter with a 3.5 grade point average or better for that term. Units with a grade of CR do not count toward the 12-unit minimum, nor do units from Credit by Examination. **The President's Honors List** is compiled at the end of each university year to honor those

undergraduate students who have demonstrated consistent achievement, as represented by being named to the Dean's Honors List for any three of the four quarters of the university year. Note that the university year begins with summer quarter.

Candidates for bachelor's degrees with the following **Cal Poly cumulative grade point averages** are awarded honors at graduation. **Only courses taken at Cal Poly calculate into the Cal Poly grade point averages.** The GPA is officially calculated at the time the student has *completed* graduation requirements:

Summa cum laude – 3.850
 Magna cum laude – 3.700
 Cum laude – 3.500

These honors are noted on both the diploma and the transcript.

Academic Minors

A minor is an integrated, coherent group of courses (24 to 30 quarter units in most cases), which gives the student knowledge in an area that lies outside of the major field of study. Please see Programs A-Z (<https://catalog.calpoly.edu/programsaz/>) for the list of minors.

Requirements for the minor:

- At least half of the units must be from upper-division courses (300- or 400-level)
- At least half of the units must be taken at Cal Poly (in residence). For the French, German, Italian Studies, and Spanish minors, the requirement for students studying abroad is at least one third of the units must be taken at Cal Poly; this allowance is for study abroad programs only and does not apply to any domestic transfer credit.
- Not more than one-third of the courses in a minor can be graded with student-selected Credit/No Credit (CR/NC), except for courses that have mandatory CR/NC grading
- A minimum 2.0 GPA is required in all units counted for completion of the minor

The minor must be completed prior to, or at the same time as, the requirements for the bachelor's degree. A major and a minor may not be taken in the same degree program, and a minor is not required for a degree.

Students who wish to earn a minor should contact the department offering the academic minor as early as possible in the program and fill out the appropriate agreement form. Students may select a minor which has requirements from a catalog that is different from that of their major. The minor form must then be submitted to the Office of the Registrar. The completion of the minor is noted on the student's transcript, but is not shown on the diploma. In no case is a diploma awarded for the minor.

Blended BS+MS Programs

Blended programs can provide an accelerated route to a graduate professional degree, with simultaneous awarding of both bachelor's and master's degrees. See individual programs and the Graduate Education (p. 435) section for additional information.

Change of Major Policy Statement

Because of the impact of the campus and its programs, Cal Poly students must declare a major at the time of application. After making

this decision, some students may find that their interests and abilities lead them in a different direction. The university must then offer a transparent and timely process for students to change majors and successfully complete a degree program.

General Information

Entering students are encouraged to make careful and informed decisions about their majors. All majors at Cal Poly are impacted, and it may be difficult to change majors despite students' best efforts. If students decide to change majors, doing so early in their academic career will help students make degree progress in a timely manner. This is likely to be a greater challenge for upper-division students (more than 90 units completed), including transfer students, who have fewer remaining degree requirements. Furthermore, students need to be aware that not all departments can accommodate an upper-division change of major.

Policy Standards

I. Minimum Time at Cal Poly

Students must complete at least one quarter at Cal Poly before requesting a change of major. The major exploration process can begin in their first quarter, but no official change of major may be initiated at that time. To begin the exploration process, students should access the Change of Major portlet on the Academics tab of their Cal Poly Portal (see Requesting a Change of Major, below).

II. Basic Criteria

In determining standards for major changes, a department representative may consider the following criteria when considering students' requests:

- a. Eligibility for the proposed major at the time of admission.
- b. Academic record (e.g. GPA, coursework, etc.).
- c. Ability to complete degree requirements in the new major in a timely manner.

If students meet the basic criteria for the proposed major, an Individualized Change of Major Agreement (ICMA) may be initiated by a department representative of the proposed major.

III. One Request Per Major

Students who enter into a change of major agreement and do not complete the agreement's requirements, either by failing to complete the terms or by opting out due to a change of plan or interest, will *not* be eligible to request that same major again later in their career at Cal Poly.

IV. Academic Standing

A change of major agreement can be initiated while students are on Academic Probation (AP), if the department offering the intended major believes that the AP status is due to students being in a less suitable major and that the new major represents a viable path toward good academic standing. A change of major agreement will be void if the students are academically disqualified prior to the completion of the agreement.

V. Requesting a Change of Major

To begin the formal change of major process, students must log into the Change of Major portlet located on the Academics tab at my.calpoly.edu (<https://myportal.calpoly.edu/f/u1711s6/normal/render.uP>). More information is available at advising.calpoly.edu (<https://advising.calpoly.edu/>).

VI. Individualized Change of Major Agreement

a. The change of major may be approved immediately, completed within one quarter, or completed within a maximum of two quarters.

b. The ICMA includes the following conditions:

- i. Students cannot be required to take courses before the ICMA begins.
- ii. Students cannot be required to take courses that are outside of the ICMA.
- iii. Students cannot be required to enroll in more than three specified courses or 12 units in the new major curriculum during the ICMA process.
- iv. Students should balance their schedule with General Education (GE) or other courses that may apply to both majors.
- v. Students' GPA requirements may include minimum GPA in courses specified in the ICMA, Term GPA, Cal Poly SLO GPA, or Higher Ed GPA.
- vi. Students' GPA expectation(s) established by the department representative must be attainable.

Course Substitution

Although a curriculum is specified for each major, under certain conditions a student may be permitted some deviation from the established curriculum. See the major department for substitutions involving major or support courses.

All Cal Poly students are expected to complete the GE courses specified in their degree program. Cal Poly GE courses must be selected from the GE requirement list. Substitutions are not permitted except in extraordinary circumstances. Students requesting exceptions must follow petition procedures, outlined on the GE web site. This process may take several weeks.

Double Majors or Degrees

If a student has completed the requirements for two or more majors leading to the same baccalaureate degree (e.g., two BS degrees), those majors are acknowledged on a single diploma. The major which the student requests as her/his **primary** major will appear first on the diploma. If a student has completed the requirements for two or more majors leading to different baccalaureate degrees (e.g., a BS and a BA), those degrees and the completed major or majors leading to each degree are acknowledged on two separate diplomas. If a student has completed concurrently the requirements for two or more degrees, at least one of which is a graduate degree, Cal Poly issues a separate diploma for each degree earned.

A student who adds a second major to her/his degree objective is expected to fulfill all requirements for both majors, including General Education requirements. However, a student may be allowed to use one senior project to fulfill the requirements for two majors. The program in which the student seeks to replace the senior project must grant permission before the student begins the project. Permission must be obtained using a major/support substitution.

Students who have declared two majors will be awarded both degrees for the term in which all requirements are completed for both majors.

Final Examinations

Except in specific circumstances, final assessments are administered during the scheduled finals week. If the assessment is a final exam, faculty will include the date and time of the exam on the course syllabus and, whenever applicable, provide students with advance notice if the final exam date is not available at the start of the term or has been rescheduled with the written approval of the appropriate dean.

If a student has three or more final exams on the same day, faculty should make a reasonable effort to schedule an alternative final exam for that student during the finals week. It is the student's responsibility to notify an instructor to request to reschedule a final exam by the end of the seventh week of instruction.

Graduate Courses Taken by Undergraduates for Graduate Credit

Cal Poly undergraduates who have achieved senior standing may take courses in the 400 or 500 series for possible graduate credit while still undergraduates. If they subsequently enter a Cal Poly master's or credential program, they may petition to have up to 12 units of such course credit applied toward their master's degree or credential program, **if** the units were not used in any way for the baccalaureate degree. Such courses should be noted in the appropriate section of the Formal Study Plan.

Student Classification/Standing

Undergraduate students are assigned a classification level according to the number of quarter units earned:

Lower Division

Freshman fewer than 45 units
Sophomore..... 45 to 89 units

Upper Division

Junior 90 to 134 units
Senior..... 135 or more units

For the purposes of this calculation, earned units include transfer and Advanced Placement/International Baccalaureate credit, in addition to Cal Poly units. Note that Student Standing can differ from Academic Progress levels; the Academic Progress calculation takes into account only degree-applicable units, whereas Student Standing includes all earned units, whether they apply to the degree or not.

Registration

Students are required to enroll in courses through their Student Center. The courses selected should meet the requirements specified for each student's major course of study.

Credit for coursework completed is given only when the student is properly registered. A student is not properly registered until fee requirements have been met and enrollment in classes has been confirmed in their Student Center. **Students are strongly advised to print copies of their schedule for their records.** Individuals are not permitted to attend courses unless they are officially registered as regular students, as approved extension students, or as enrolled auditors (see Audit).

Information concerning registration for classes is available at <https://registrar.calpoly.edu/registration-overview> (<https://registrar.calpoly.edu/>

<https://afd.calpoly.edu/fees/>). Information concerning payment of fees is available at <https://afd.calpoly.edu/fees/>.

Enrollment Policy

State funding is allocated to the University based on student enrollment each term. Any attendance/participation in classes where the student is not officially enrolled during the term of participation (and where appropriate registration fees have not been paid) is against campus policy. This includes enrollment in Internship courses and acceptance of a position through the Cooperative Education program. All registration should be completed by the end of the Add Period, the 8th day of instruction for each term.

Official term enrollment requires the awarding of grades for classes attempted.

Class Attendance

Students are expected to attend class regularly to keep the quality and quantity of their work high. Absence from classes is regarded as serious. An excused absence can be allowed only by the instructor in charge of the class upon consideration of the evidence justifying the absence presented by the student. An excused absence merely gives the individual who missed the class an opportunity to make up the work and in no way excuses the student from the work required.

"Excusable" Reasons for Missing Class

It is strongly urged that instructors accept the following "excusable" reasons for allowing students to make up missed work:

- Illness with a doctor's statement
- Injury, illness, death, or any extenuating circumstances of close relatives (to include but not limited to natural, adopted, and/or in-law children, parents, legal guardians, siblings, grandparents, grandchildren as well as spouses or partners)
- Active participation in university events (an instructor may require a statement from the adviser involved certifying that the student was actively participating in a recognized university event)
- Field trips
- Religious holidays
- Selective service and military reasons
- NCAA athletic competitions
- Instructionally Related Activities (IRA)/competitions
- Jury duty or any other legally required court appearances
- Job or internship interviews

Any student seeking to make up missed work pursuant to the above listed "excusable" reasons must inform the instructor of their intent in a timely manner.

Holding of Records

Student records may be placed on a "Hold" status because of financial or other obligations to the University. The Hold authorizes the University to deny registration, prevent the release of transcripts (non-financial holds), and to withhold other services normally provided to the student. A student's records are held until the obligation is cleared to the satisfaction of the office or department placing the Hold.

Enrollment Status

Full-time undergraduate students are those enrolled in 12 or more units of coursework in any regular quarter. *Half-time undergraduate students* are those enrolled in 6 to 11 units, and part-time undergraduate students are those enrolled for 5 or less units. Verification of enrolled units is based on enrollment status at the time of the verification request. Full-time status for graduate students is defined in the "Graduate Studies" section of this catalog.

Maximum Unit Load

The maximum load for all students is 22 quarter units including audited courses. Exceptions may be made with the advance approval of the student's major department head or graduate advisor. Increase in maximum unit load is not available to students on academic probation. Maximum load requirements may be waived only on presentation of evidence of ability to carry successfully such a group of courses. A petition to carry an excess load is available from the Office of the Registrar.

Add/Drop

All changes to individual class registration or enrollments are the **responsibility of the student**. The add/drop period continues through initial registration cycles until the end of the 8th day of instruction of each term. During this period, the student has the opportunity to add or drop classes. See specific dates for completing these transactions at the Office of the Registrar Calendars and Deadlines webpage (https://registrar.calpoly.edu/acad_cal/). Students are responsible for knowing and adhering to these published timelines and for their enrollments.

Adding

Closed classes: If a class is full, students may use a permission number, issued by the instructor, during the first 8 days of instruction. See the Office of the Registrar Calendars and Deadlines webpage (https://registrar.calpoly.edu/acad_cal/) for details.

Time conflict: Students may not enroll in two classes that meet at the same time.

Eligibility: Students must meet prerequisite and Schedule of Classes footnote requirements and be in attendance at the first class meeting to remain enrolled in the class.

Late registration: Students registering late have until the end of the add/drop period to pay late registration fees and to register for classes through their Student Center with a permission number issued by the instructor of the class.

Dropping

Students have until the end of the 8th day of instruction to drop classes through their Student Center. No enrollment history appears on the academic record. At the end of the regular add/drop period the instructor must assume that any student who has not dropped voluntarily remains officially enrolled in the class. For information on withdrawing after the end of the regular add/drop period see Withdrawals from Courses.

First class meeting: An instructor **may** drop a student from a class if the student is not present at the end of the first class meeting.

Footnote requirement: An instructor **may** drop a student from a class if the footnote requirements, as stated in Schedule of Classes, are not met.

Prerequisite missing: An instructor **may** drop a student from a class if the prerequisite requirements, as stated in the catalog course description, have not been completed.

Canceled classes: If a class is canceled, students are automatically dropped and have no reporting responsibilities.

Leaves of Absence

Students are permitted to take a Leave of Absence with a written request and approval by campus officials. A student may not request a Leave of Absence their first term (their term of admission). Students may request up to 6 terms off for a leave of Absence (not including summer). There is an exception for U.S. Military.

ELIGIBILITY REQUIREMENTS:

To be eligible to apply for a leave of absence, students must:

- be eligible to enroll in the term the leave begins.
- have attended Cal Poly for at least one quarter for which they earned units or received 'W' grades.
- have dropped or withdrawn from all classes for the term the leave begins.

POLICIES

Students who meet the eligibility requirements:

- may apply for a leave of absence for up to three quarters, not including summer.
- may request one additional leave of absence, totaling a maximum of 6 quarters, not including summer. There is an exception for U.S. Military service.
- must have an initiated and approved leave of absence submitted before the leave begins. A leave of absence will not be granted retroactively.
- will be in continuous attendance with the purpose of returning to the same curriculum that was in effect when the leave began.
- must inform the Financial Aid Office, if applicable.
- will not be required to apply for readmission or pay an application fee provided that the student returns to the same major and within the time period agreed upon when the application was approved.

Any student on leave who fails to return and enroll within the time limits specified by the leave agreement will be required to reapply for admission, pay the reapplication fee, and may be held to any new curriculum requirements which may be in effect.

Returning Students

Matriculated students who have not enrolled in classes at Cal Poly for three consecutive quarters (excluding summer term) or have not been on an approved leave of absence will be discontinued and will be required to file an application for readmission. The application fee must accompany the application for readmission. See the Admission section for application deadlines for returning students.

IF YOU HAVE NOT ATTENDED ANY OF THESE CONSECUTIVE QUARTERS:	THEN THE NEXT QUARTER YOU HAVE TO ATTEND TO AVOID DISCONTINUATION IS:
Winter, Spring, Summer	Fall
Spring, Summer, Fall	Winter
Fall, Winter	Spring

Intersystem Enrollment Programs

Fully matriculated students enrolled at any CSU campus have access to courses at other CSU campuses on a space available basis unless those campuses/programs are impacted. This access is offered without students being required to be admitted formally to the host campus and sometimes without paying additional fees. Students should consult their home campus academic advisors to determine how such courses may apply to their specific degree programs before enrolling at the host campus.

Intersystem Cross Enrollment – matriculated CSU, UC, or community college students may enroll on a space available basis for one course per term at another CSU, UC, or community college and request that a transcript of record be sent to the home campus and recorded as transfer credit. Additional information available from the Office of the Registrar, Admin 222.

Health Screening

Immunization and Screening Requirements

The California State University (CSU) is committed to the protection of health and wellness of all students. To comply with this overarching goal, the CSU requires that students are current for the immunizations listed below. For details, please visit <https://chw.calpoly.edu/health/immunizations> (<https://chw.calpoly.edu/health/immunizations/>).

These requirements will have to be met by the first day of their first quarter; otherwise students will not be allowed to register for their second quarter until proof of full immunization has been provided to the campus.

CSU and Cal Poly students are REQUIRED to obtain the following vaccines and undergo screening/risk assessment for Tuberculosis:

Required Immunizations & Screenings	Required Dosage & Screening Information
Measles, Mumps and Rubella (MMR)	Two (2) doses with first dose on or after 1st birthday; OR positive titer (laboratory evidence of immunity to disease)
Varicella (Chickenpox)	Two (2) doses with first dose on or after 1st birthday; OR positive titer. History of contracting the disease does not meet compliance.
Tetanus, Diphtheria and Pertussis (Tdap)	One (1) dose after age 7
Meningococcal Conjugate (Serogroups A, C, Y, & W#135) New Row	One (1) dose between the age 16 and age 21 or younger.
Meningococcal B (Meningitis B)	Students age 16 to 23 after discussion with their healthcare provider.

Hepatitis B (Hep B)	Students age 18 and younger (CA Health & Safety Code, Sec. 120390.5)
Tuberculosis Risk Assessment	All incoming students must complete a Tuberculosis risk assessment. Incoming students who are at higher risk* for TB infection, as indicated by answering “yes” to any of the screening questions, should undergo either skin of blood testing for TB infection within 1 year of CSU entry. *Higher risk include travel to or living in South & Central America, Africa, Asia, Eastern Europe, and the Middle East; prior positive TB test; or exposure to someone with active TB disease.

CSU and Cal Poly students are STRONGLY ENCOURAGED to obtain the following immunizations (please discuss with your provider):

Recommended Immunizations	Recommended Groups
Hepatitis A (Hep A)	All students regardless of age
Hepatitis B (Hep B)	Students age 19 and older
Human papillomavirus (HPV)	For women and men through age 26
Influenza (Flu)	Annually; all students regardless of age
Meningococcal B (Meningitis B)	Students age 16 – 23 after discussion with their healthcare provider.
Meningococcal conjugate (Serogroups A, C, Y, & W#135)	Students between the age of 21 and up to age 23.
Pneumococcal	For students with certain medical conditions (e.g., severe asthma, diabetes, chronic liver or kidney disease)
Poliovirus (Polio)	Regardless of age, if the series was not completed as a child
Immunizations for international travel	Based on destination

Exemptions:

The California State University system allows for exemptions to immunization requirements based on a medical condition that may be a contraindication to vaccinations. Visit the CDPH website for explanation and requirements needed for medical exemptions: Vaccine Recommendations and Guidelines of the ACIP (<https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/contraindications.html>).

For more information, visit <https://chw.calpoly.edu/health/immunizations> (<https://chw.calpoly.edu/health/immunizations/>) or call Health Services at 805.756.1211.

COLLEGES AND PROGRAMS

College of Agriculture, Food and Environmental Sciences

Agricultural Sciences Bldg. (11), Room 211

Phone: 805.756.2161

<https://cafes.calpoly.edu>

Dean: Andrew J. Thulin

Associate Dean: Catherine Kleier

Associate Dean: Bill Hendricks

Associate Dean: James Prince

Academic Programs

Program name	Program type
Agribusiness	Minor
Agricultural Business	BS
Agricultural Communication	BS, Minor
Agricultural Education	MAGEd, Minor
Agricultural Leadership	Minor
Agricultural Science	BS
Agricultural Systems Management	BS
Agriculture	MS
Animal Science	BS
BioResource and Agricultural Engineering	BS
Crop Science	Minor
Dairy Industries	Minor
Dairy Science	BS
Environmental Earth and Soil Sciences	BS
Environmental Management and Protection	BS
Environmental Sciences and Management	MS
Environmental Soil Science	Minor
Equine Science	Minor
Event Planning and Experience Management	Minor
Fire Ecology and Wildfire Hazard Planning	Minor
Food Science	BS, Minor, MS
Forest and Fire Sciences	BS
Fruit Science	Minor
Geographic Information Systems for Agriculture	Minor
Indigenous Studies in Natural Resources and the Environment	Minor
Land Rehabilitation and Restoration Ecology	Minor
Landscape Horticulture	Minor
Meat Science and Processing	Minor
Military Science	Minor
Nutrition	BS, Minor, MS
Plant Protection	Minor
Plant Sciences	BS
Poultry Management	Minor
Rangeland Resources	Minor
Recreation, Parks and Tourism Administration	BS

Sustainable Agriculture	Minor
Water Engineering Specialization	MS
Water Science	Minor
Wine and Viticulture	BS

The College of Agriculture, Food and Environmental Sciences (CAFES) offers programs reflecting the growing diversity of choices available and skills required in modern agriculture, food, life and environmental sciences, and related professions.

Mission Statement

The College of Agriculture, Food and Environmental Sciences fosters teaching, scholarship and service in a Learn by Doing environment where students, faculty and staff are partners in discovery.

Learning Outcomes

All students who complete a program in CAFES should be able to:

- Demonstrate expertise in and the use of technology in their respective discipline.
- Demonstrate effective oral and written communication skills.
- Make choices based on an understanding of personal and professional ethics and respect for diversity of people and ideas.
- Recognize leadership principles and skills.
- Evaluate and solve problems using critical thinking.
- Demonstrate an appreciation for sustainability and global perspectives.

Student Life

Students take courses in their major field beginning with their first quarter of enrollment. This early exposure to their major provides them with specific knowledge to supplement that gained in other coursework in basic sciences, mathematics and the liberal arts. Moreover, it allows students to evaluate whether or not the curriculum selected is appropriate to their interests and abilities. Taking courses in the major throughout the academic program fosters personal contact with faculty and other students having common interests but varied backgrounds.

The students' early involvement in their major field, combined with the faculty's close contacts with schools, private industry, governmental agencies, and nonprofit organizations provide excellent opportunities for student internships during their junior or senior years. Other opportunities which enhance education, provide financial assistance, and help prepare students for the job market include enterprise projects, scholarships, study abroad, and work-study jobs.

CAFES faculty are experts in their disciplines, and are dedicated to teaching. They are eager to help students learn, are readily available for consultation and are proud of their close relationship with students.

College Advising

Academic Advising is provided to all students through the CAFES Advising Center and their major department in the college. This includes: Professional Academic Advisors, Faculty Advisors, and Peer Advisors. Academic Advising is designed to help students reach their educational and career goals; it is a shared task between an advisor and a student.

Students are encouraged to meet with their advisors quarterly to plan their schedule, review curriculum information, discuss career opportunities, and receive information on internships, enterprise projects

and cooperative learning. The CAFES Advising Center provides guidance on university and college policies and procedures including course transfers, substitutions and other general information.

Peer Academic Mentoring

The Multicultural Agriculture Program (MAP) is available to provide academic and personal support to undergraduate students of all cultural backgrounds in the College of Agriculture, Food, and Environmental Sciences with a peer-based structure that cultivates student achievement and a sense of community.

College Clubs and Organizations

Student clubs are active in every department. The College's 52 clubs, many of which are affiliated with national professional organizations, provide an excellent forum for student and faculty interactions. Active club members may practice leadership skills, and attend national, state and local professional meetings, as well as participate in a variety of professional and social events.

Agricultural Lands and Outdoor Laboratories

Nearly 6,000 acres of on-campus agricultural production, processing and research land and facilities are available for student use at Cal Poly. These facilities provide students with unique opportunities for hands-on experiences which augment classroom instruction.

The campus farm includes a dairy, beef center, horse, sheep, swine and poultry units, horse training and show arenas, an animal nutrition center, meat processing center, veterinary clinic and rodeo facilities. Also available are irrigated and dryland fields for annual crops, orchards and vineyards, an irrigation demonstration field, erosion research facility, large-scale composting operation, hoop houses, arboretum, wholesale and retail nurseries, a wine lab, and greenhouses. Eleven acres of certified organic farmland support our organic farming program.

Other Labs and Special Facilities

Special facilities include several microcomputer laboratories, laboratories with modern equipment for soil-plant-water testing, engineering testing and manufacturing shops, complete food processing units for dairy products, meats, fruit and vegetables, and four biotechnology and embryology laboratories.

Santa Cruz County Properties

The 3,200 acre Swanton Pacific Ranch in Santa Cruz County was generously donated by Al Smith, alumnus of Cal Poly's former Crop Science Department. This property provides students with an opportunity to live and work on a commercial farm with forestry, watershed management, cattle and organic crop production activities. The lands also support a wide range of research topics for undergraduate and graduate students.

Enterprise Projects/Experiential Learning

Cal Poly students have the unique opportunity to gain hands-on experience in business enterprises or through work experience on campus. These experiences serve to strengthen students' academic studies, while at the same time providing the knowledge and skills that lead to a better understanding and appreciation for important production, managerial and marketing challenges employees face in the workplace. Students participating in enterprise projects earn units that are reflected on their Cal Poly transcript.

Enterprise projects are available in various departments in the college.

In some projects, profits from enterprises will be shared among participating students, with a percentage also going to the department coordinating the activity. If an enterprise loses money, the department conducting the project absorbs the loss. This financial, risk-free opportunity provides students with great learning opportunities.

Research Programs

The college sponsors a 10-week Summer Undergraduate Research Program (SURP) to provide students the opportunity to experience undergraduate research projects on topics related to their programs or in which they have interest. Students work closely with faculty research leads and receive a stipend. The program is open to all undergraduate students in the college.

Courses

The courses offered in each undergraduate curriculum may be grouped into four areas:

Major

The major courses include a required cluster of courses in which the student expects to graduate. These courses constitute the core of specific preparation for the student's major field.

General Education

Courses are selected from the physical and life sciences, mathematics, communications, arts and humanities, and social, political, and economic institutions. These courses furnish the student with background and support for their academic program as well as providing cultural background for the students' intelligent participation in a complex world society.

Support

The support courses draw from courses in agriculture, life sciences, and closely allied fields which support and supplement the block of courses constituting the student's major.

Free Electives

Course selection from electives is designed to provide freedom for students to pursue interests of their choosing in any university department.

Recommended Preparation

In addition to pursuing the CSU mandated and Cal Poly recommended entrance requirements, high school and community college students are encouraged to participate in co-curricular activities as part of their preparation for admission to majors in Cal Poly's College of Agriculture, Food and Environmental Sciences. These activities could include, but are not limited to, FFA, 4-H, leadership roles in school clubs, meaningful work experience and community organizations.

Graduate Programs

Agricultural Sciences Bldg. 11, Room 211

Phone: 805.756.2161

<https://cafes.calpoly.edu/contact-graduate-programs> (<https://cafes.calpoly.edu/contact-graduate-programs/>)

Associate Dean: James P. Prince

jprince@calpoly.edu

Admission

File an application for Graduate Admission via <https://calstate.edu/apply> (https://calstate.edu/apply/) by the deadlines specified at <https://admissions.calpoly.edu/applicants> (https://www.calpoly.edu/admissions/) or <https://grad.calpoly.edu/applicant/prospective-student.html>

- Submit Graduate Record Exam (GRE) General Test scores electronically to Institution Code: R4038
- Three Letters of Recommendation

Admission Requirements

For consideration as a graduate student, an applicant will have met the following requirements:

- Completed a four-year college course of study and hold an acceptable baccalaureate degree from an accredited college/university.
- Must have attained a minimum grade point average of 2.75 in the last 90-quarter units attempted.
- An applicant not meeting these academic standards, but who meets the basic university standard of a grade point average of 2.5 in the last 90 quarter units attempted may be considered for admission as a conditionally classified graduate student.

All applicants who do not speak and write English as their primary language are required to complete the Test of English as a Foreign Language (TOEFL), with a minimum score of 550, and the Test of Written English (TWE) with a minimum score of 4.5. Those opting to take the Computer Based TOEFL must present a score of 213 or above. <https://admissions.calpoly.edu/applicants/international/checklist.html>

Each program may list additional requirements for admission to the specific program.

Degree Requirements

- Submit **Working Formal Study Plan (WFSP) & Advancement to Candidacy Form** for the degree with the CAFES Graduate Coordinator no later than the end of the first quarter in the program.
- All candidates must meet the current Graduation Writing Requirement (<https://writingandlearning.calpoly.edu/content/gwr-information-postbaccalaureate-students/>) before submission of the WFSP
- Candidates must determine anticipated graduation date and culminating experience before submission of WFSP
- Submit the e-form, Application for Graduation one quarter prior to the quarter that you plan to graduate.
- Submit the **Final Formal Study Plan (FFSP)** during the first 3 weeks of the quarter in which you plan to graduate.
- Submit either a **Master's Thesis Approval Form** or a **Master's Exam Approval Form** once you have completed your culminating experience. This must be submitted by the last day of the quarter in which you intend to graduate.

Thesis

A copy of the thesis or project report must be received and reviewed by the Thesis Editor in the Graduate Programs Office. Upon completion of any required corrections, the student submits the electronic thesis/

project report to the DigitalCommons@CalPoly, a digital archive for the University. These steps must be completed before the degree is awarded.

Graduate Student Continuous Enrollment Policy

Effective Fall Quarter 2009, graduate students are required to maintain continuous enrollment from the time of first enrollment in a graduate program until completion of the degree. Continuous enrollment is defined as being enrolled during Fall, Winter, and Spring quarters each year. This requirement is not retroactive to terms prior to Fall 2009.

- All graduate students must be enrolled the quarter they graduate.
- A student may be required to enroll in the Summer quarter if Summer is the quarter of degree completion.
- The continuous enrollment requirement for graduate students applies to all graduate programs unless a program exemption has been approved.
- Students who fail to fulfill this continuous enrollment requirement will not be permitted to graduate, even if all degree requirements have been completed, until payment has been made for all quarters of non-enrollment.

Enroll

Students can maintain continuous enrollment by one of the following:

- Enrolling as a regular student
- Obtaining approval for an education or medical leave prior to the quarter when such a leave would begin
- Registering in a special course designated for this purpose, during quarters in which they are not regularly are enrolled.

Special Courses

- GS 597 is listed in the University catalog and is taken through Cal Poly Extended Education. GS 597 is a one-unit course offered credit/no credit; credits in GS 597 do not count toward meeting degree requirements
- As of Fall 2018, the GS 597 fee will be \$349 per unit. This new fee applies to students who matriculate as graduate students for the first time in Fall 2018 or later.
- Students who are matriculated in a graduate degree program prior to Fall 2018 will be charged \$289 per unit.

MS in Agricultural Education

Agricultural Education & Communication

Coordinator: Ann DeLay

Phone: 805.756.2803

Email: adelay@calpoly.edu

The Master of Agricultural Education program provides student with the opportunity to focus their graduate study in agricultural education, with an emphasis on preparing candidates for positions as teachers of agricultural education in public schools. The non-thesis degree has two tracks: (1) to provide practitioners with opportunities for professional development, requiring at least one year of successful high school or community college teaching for completion, (2) to provide agriculture credential candidates an opportunity to simultaneously complete the degree. Working with their advisor and graduate committee, students generally complete project for coursework in the program to enhance their employment settings or assist them to become compliant with statewide standards in agricultural education. All students in the Master

of Agricultural Education degree program are required to pass a written and oral comprehensive examination, scheduled during the final quarter of the program of study.

Degree Requirements and Curriculum (p. 84)

MS in Environmental Sciences and Management

Natural Resources Management and Environmental Sciences

Coordinator: Chris Surfleet

Phone: 805.756.6392

Email: csurflee@calpoly.edu

The Master of Science degree program in Environmental Sciences and Management (MSES) offers advanced study in a range of environmental science and management disciplines.

The purpose of the Master of Science in Environmental Sciences and Management program is to provide advanced education in management of the environment and natural resources. Advanced study in environmental science, management of the environment, quantitative and qualitative analysis, and communication is the core of the degree. The degree allows an emphasis in environmental policy, forest sciences, hydrology, soil science, and sustainability. Through the emphasis of study, students have flexibility in creating elective coursework to suit their professional goals. The culminating experience of the degree is a professional project or thesis that allows students to explore, seek solutions, or provide research on environmental challenges.

Additional Requirements:

- Students must have at least a 3.0 GPA in the final 90 quarter units of their undergraduate degree.
- Completion of 3 quarters or two semesters of any combination of chemistry, biology, ecology, physics, earth science, or atmospheric Science.
- Completes one quarter or one semester of Statistics and Calculus
- An applicant who lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies (12 unit limit) before advancement to classified graduate standing.
- Must have at least 3 letters of reference that can attest to the academic capabilities of the applicant.

Degree Requirements and Curriculum (p. 137)

MS in Food Science

Food Science and Nutrition

Coordinator: Amanda Lathrop

Phone: 805.756.2660

Email: lathrop@calpoly.edu

General Characteristics

The MS Food Science program is designed to prepare graduates for advancement, specialization, and leadership in food science careers. In addition, graduates will be prepared for further education in doctoral studies in food science and related fields. The MS Food Science program integrates the disciplines of chemistry, microbiology, product development and processing/engineering, to prepare qualified graduates for food-related careers in industry, government and academia.

Additional Requirements:

- Statement of purpose
- Curriculum Vitae
- Three letters of academic and/or professional recommendation

Degree Requirements and Curriculum (p. 112)

MS in Nutrition

Food Science and Nutrition

Coordinator: Scott Reaves

Phone: 805.756.2660

Email: sreaves@calpoly.edu

General Characteristics

The MS Nutrition program is designed to prepare graduates for advancement, specialization, and leadership in nutrition or healthcare careers. In addition, graduates will be prepared for further education in dietetic internships, professional schools, allied health professions, or doctoral studies in a number of academic areas including nutrition, public health, animal science, or other health science-based disciplines.

The interdisciplinary Graduate Group in Nutrition (GGN) allows students to work with faculty from several departments and to choose a research topic from a broad range of themes including human nutrition, animal nutrition, kinesiology, public health, or business.

Students may follow a suggested area of emphasis. Examples may include: Molecular Nutrition, Public Health Nutrition, or Health and Wellness. These would be compatible with the students interests and career goals. Students will complete coursework and a research-based thesis conducted under the supervision of a committee chair who must be a member of the GGN.

Additional Requirements

- Statement of purpose
- Three letters of academic and/or professional recommendation
- Introductory chemistry series (one year), organic chemistry (min one course), biochemistry and an introductory biology course
- FSN 328 Nutrient Metabolism I or FSN 331 Macronutrient Metabolism
- FSN 329 Nutrient Metabolism II or FSN 332 Micronutrient Metabolism and FSN 333 Nutrient Metabolism Lab

Degree Requirements and Curriculum (p. 112)

MS Agriculture, Specialization in Animal Science

Animal Science

Coordinator: Vincent Yeung

Phone: 805.756.6154

Email: ckyeung@calpoly.edu

The program provides students with an interdisciplinary, science-based program, where students develop basic scientific knowledge, apply that knowledge to a research project, then write and defend a thesis. Under the guidance of the advisor and thesis committee, an individual's coursework and research project is based upon the student interests and goals in Animal Science.

Additional Requirements:

Prospective students are required to:

- Submit a cover letter identifying interests, goals and experience relevant to the MS program, and
- Submit a resume.

MS Agriculture, Specialization in BioResource and Agricultural Systems

BioResource & Agricultural Engineering

Coordinator: Greg Schwartz

Phone: 805.756.2378

Email: gschwa01@calpoly.edu

Students have the opportunity to focus their MS program on the application of bioresource and agricultural systems. Graduates will be prepared to enter a career in a variety of areas including production agriculture, consulting, regulatory compliance, equipment sales and technical support, etc.

Topics under the **bioresource** area may include:

- Agricultural and Food Processing Waste Management
- Renewable Energy

Topics under the **agricultural systems** area may include:

- California Production Agriculture and Food Systems
- Precision Agriculture
- Automation and Mechanization in Agriculture

The multidisciplinary nature of these programs will allow students to select electives in departments throughout the university with adviser approval.

MS Agriculture, Specialization in Crop Science

Horticulture and Crop Science

Coordinator: Benjamin Hoover

Phone: 805.756.6358

Email: bkhoover@calpoly.edu

For students with undergraduate preparation in plant agriculture and/or plant science. Current research is focused primarily in applied fruit crop physiology, vegetable breeding and physiology, sustainable fruit and vegetable production, viticulture, plant pathology, integrated pest management, and postharvest technology, including sustainable packaging and packaging safety. Thesis required.

MS Agriculture, Specialization in Dairy Products Technology

Animal Science

Coordinator: Vincent Yeung

Phone: 805.756.6154

Email: ckyeung@calpoly.edu

A program for students who wish to use their academic preparation in food science and nutrition, dairy science, microbiology, chemistry, engineering, biochemistry and related fields to address research questions that impact the field of dairy food science and technology. The program requires the demonstration of strong analytical thinking, effective oral and written communication, and project management. Coursework and thesis experience are designed with flexibility to enhance and increase proficiency in scientific methods while enriching students' overall preparation to enter the workforce. Graduates enter research and development positions with major food companies, leadership positions in dairy food processing and other allied areas, or further graduate study for the Ph.D. degree. Students have the opportunity to work on funded research projects within the Dairy Innovation Institute, and interact with multidisciplinary teams of scientists throughout the world. International students are encouraged to apply.

Additional prerequisites: Prospective students are required to:

- submit a cover letter identifying interests, goals and experience relevant to the MS program, and
- submit a résumé.

MS Agriculture, Specialization in Environmental Horticulture Science

Horticulture and Crop Science

Coordinator: Benjamin Hoover

Phone: 805.756.6358

Email: bkhoover@calpoly.edu

For students with undergraduate preparation in horticulture and/or plant science. Current research is focused primarily in applied plant physiology, nursery and potted plant production, sustainable landscape development and maintenance, and integrated pest management. Thesis required.

MS Agriculture, Specialization in Irrigation

BioResource & Agricultural Engineering

Coordinator: Daniel Howes

Phone: 805.756.2378

Email: djhowes@calpoly.edu

The program requires the demonstration of strong analytical thinking, effective oral and written communication, and project management.

Additional prerequisites:

- B.S. in a technical field of agriculture or a B.A. with proficiency in basic chemistry, advanced algebra and trigonometry.
- Students must have successfully completed at least one undergraduate class in general irrigation, soil science, and crop science, plus be familiar with computer spreadsheet usage.
- Students may complete prerequisite courses at Cal Poly if necessary.

MS Agriculture, Specialization in Plant Protection Science

Horticulture and Crop Science

Coordinator: Benjamin Hoover

Phone: 805.756.6358

Email: bkhoover@calpoly.edu

For students with undergraduate preparation in plant agriculture, plant science, biological sciences, and/or ecology. Current research is focused on pest biology, tritrophic interactions, invasive species, integrated pest management, biological control and plant disease management. Projects provide the opportunity to conduct field and/or laboratory experiments with corporate stakeholders for career enhancement. Curriculum and research allows students to develop more diverse or specialized skill sets for post-graduate employment and/or opportunity to obtain required coursework for state licensing. Thesis required.

MS Agriculture, Specialization in Water Engineering

BioResource & Agricultural Engineering

Coordinator: Daniel Howes

Phone: 805.756.2378

Email: djhowes@calpoly.edu

The purpose of this degree is to prepare water engineers who can manage water resources with an interdisciplinary approach for agriculture, industry, and municipalities. The program focuses on water, water distribution, and water resources management. Students may elect to take elective courses to reinforce these areas or examine other areas such as water treatment, urban water planning, hydrology, etc.

Additional prerequisites:

- Students must have successfully completed at least one undergraduate class in general irrigation, soil science, surveying, and organic chemistry

Interdisciplinary Minors

Descriptions of minors listed below are interdisciplinary in nature involving more than one department and/or college. For additional details on minors not listed below click here (<https://catalog.calpoly.edu/programsaz/#minors>).

Agricultural Communication Minor

Brock Center for Agricultural Communication

Agriculture Bldg. 10, Room 235

Phone: 805.756.2892

Coordinator: Megan Silcott

Completion of this interdisciplinary minor enhances students' ability to be successful in dynamic professions associated with the agricultural industry, including print journalism, broadcast journalism and public relations.

The minor is a cooperative effort between the College of Agriculture, Food and Environmental Sciences (CAFES) and the College of Liberal Arts (CLA). Students are advised by faculty members assigned to the Brock Center for Agricultural Communication. Student participation in the Cal Poly chapter of the national Agricultural Communicators of Tomorrow (ACT) is encouraged.

Agricultural Leadership Minor

Agricultural Education and Communication

Bldg. 10, Room 10-244

Phone: 805.756.2803

Coordinator: Department Head for Agricultural Education and Communication

This minor provides students with an opportunity to develop as leaders and individuals. The minor is designed for any student to become a more effective communicator, increase teamwork and leadership ability, and increase self-awareness. Courses provide opportunities for students to apply their leadership abilities in a "learn by doing" environment. Core classes provide an overview of leadership theory, followership, communication, teamwork, diversity, inclusion, and practical experiences.

Students will enhance their leadership abilities by participating in a practicum/experiential course that will challenge students to apply their leadership skills. Several degree programs at Cal Poly complement this minor by providing courses that will enhance any student's leadership capabilities.

Environmental Studies Minor

Please see the College of Science and Mathematics (p. 360) for more information on this interdisciplinary minor.

Geographic Information Systems for Agriculture Minor

BioResource and Agricultural Engineering

Bldg. 08, Room 101

Phone: 805.756.2378

Coordinators: Samantha Gill and Tom Mastin

An interdisciplinary program sponsored by three departments in CAFES: BioResource and Agricultural Engineering, Natural Resources Management and Environmental Sciences, and Horticulture and Crop Science. New technologies of geographic information systems (GIS), global positioning systems (GPS), and orthophotography (uniform scale aerial photographs) are revolutionizing the management of resources. There are great employment opportunities for those who understand these technologies. Students interested in this minor may come from the following majors: forestry and natural resources, crop science, soil science, landscape architecture, agricultural systems management, bioresource and agricultural engineering, animal science or earth sciences. Students from any major are welcome to take this minor.

Indigenous Studies in Natural Resources and the Environment Minor

An interdisciplinary minor sponsored by the departments of Natural Resources Management and Environmental Sciences and Ethnic Studies. For more information, see the Natural Resources Management and Environmental Sciences (p. 117) section.

Land Rehabilitation and Restoration Ecology Minor

Natural Resources Management & Environmental Resources Department
Bldg. 180, Room 516

Phone: 805.756.2971

Coordinator: Yamina Pressler

Students completing the minor gain skills in recognizing, assessing, and treating disturbed lands for numerous purposes, including erosion and sediment control, water quality improvement, habitat restoration, and aesthetic enhancement. They develop proficiency in plant identification and selection, soil properties and processes, and ecological principles, and also learn to set criteria and judge the feasibility, prudence, efficiency, and effectiveness of rehabilitation efforts.

Rangeland Resources Minor

Animal Science
Bldg. 10, Room 141
Phone: 805.756.2419
Coordinator: Marc R. Horney

This interdisciplinary minor prepares students for careers in the science and management of semi-arid grasslands, shrublands, and savannas. This is an entry point into a wide range of careers in extensive agriculture (range and pasture-based livestock production), and environmental conservation - including wildlife and natural resource management. Students will learn purposes for and methods of assessing the health and productivity of rangeland ecosystems, and how to manage the herbivorous animals that depend on them. Coursework in the minor will give students an understanding of the interactions of plants, animals, water, soil and landscape features in these ecosystems. This minor will help prepare students for careers with land and wildlife management agencies at the state and federal level, and conservation organizations, as scientists, resource specialists, and managers. It can also strengthen a graduate's opportunities in the private sector as agricultural or environmental consultants, ecologists, wildlife biologists, wildland managers, ranch managers, and other natural resource management specialists. Completion of this minor meets the basic educational requirements for California Certified Rangeland Manager (CRM) licensing program (<http://casrm.rangelands.org/HTML/certified.html>).

Sustainable Agriculture Minor

Horticulture and Crop Science
Bldg. 11, Room 238
Phone: 805.756.2870
Coordinator: Ashraf Tubeileh

Students approach modern agricultural problems from a holistic perspective, emphasizing agricultural planning integrated with ecological principles. Through experience in sustainable agricultural practices, students learn about a farm/ranch in the context of an agro-ecosystem: a system whose processes and relationships can be manipulated to allow production with fewer adverse environmental impacts and external inputs. Students develop knowledge and skills involving holistic management, crop production, and adaptive decision-making in a hands-on environment. The minor is available to all Cal Poly students.

Water Science Minor

BioResource and Agricultural Engineering
Bldg. 08, Room 101
Phone: 805.756.2378
Irrigation Emphasis Coordinator: Franklin Gaudi

Natural Resources Management and Environmental Sciences
Bldg. 180, Room 518

Phone: 805.756.2743
Water Policy/Watershed Management Emphasis Coordinator: Christopher G. Surfleet

The minor emphasizes one of three areas of study: irrigation, water policy, or watershed management. In California, approximately 45% of available water is used for crop irrigation, 45% for environmental purposes, and 10% for urban use (CA Water Plan). Irrigation water use and management have tremendous impacts upon ground water quality, power usage, crop yields, surface water supplies and quality, drainage problems, and water availability for transfer to urban uses. For students interested in environmental assessment and protection of water resources, the watershed management and policy areas provide land use planning and management skills for meeting water regulations and law. For students wanting background in water resources the Water Science minor provides marketable skills.

MS Agriculture, Specialization in Animal Science

Program Learning Objectives

1. Demonstrate expertise in their respective discipline.
2. Develop, test or select the appropriate technology in their respective discipline.
3. Demonstrate effective communication skills.
4. Formulate decisions utilizing professional ethics.
5. Value the diversity of people and ideas.
6. Investigate problems using critical thinking and derive appropriate solutions.

Required Courses

AG 581	Graduate Seminar	2
AG 599	Thesis	9
ESCI 501	Research Planning	4
STAT 511	Statistical Methods	4
STAT 513	Applied Experimental Design and Regression Models	4

Approved Electives ¹

Select from the following:		22
AG 500	Individual Study	
AGED 524	Instructional Processes in Agricultural Education	
ASCI 581	Graduate Seminar in Animal Science	
ASCI 403	Applied Biotechnology in Animal Science	
ASCI 405	Domestic Livestock Endocrinology	
ASCI 406	Applied Animal Embryology and Assisted Reproduction	
ASCI 415	HACCP for Meat and Poultry Operations	
ASCI 419	Animal Metabolism and Nutrition	
ASCI 438	Systemic Animal Physiology	
ASCI 440	Immunology and Diseases of Animals	
ASCI 450	Computer Applications in Animal Science: Spreadsheet Analysis	

ASCI 500	Individual Study in Animal Science
ASCI 583	Research Experience for Regenerative Medicine Students
ASCI 593	Regenerative Medicine Internship
BIO 501	Molecular & Cellular Biology
BIO 524	Developmental Biology Seminar
CHEM 428	Nutritional Biochemistry
NR 532	Applications in Biometrics and Econometrics

Any 400 and 500 level courses approved by the student's graduate committee¹

Total units **45**

¹ At least 60% of all units required by the committee as reflected on the formal study plan must be at the 500 level.

MS Agriculture, Specialization in BioResource and Agricultural Systems

Program Learning Objectives

1. Demonstrate expertise in their respective discipline.
2. Develop, test or select the appropriate technology in their respective discipline.
3. Demonstrate effective communication skills.
4. Formulate decisions utilizing professional ethics.
5. Value the diversity of people and ideas.
6. Investigate problems using critical thinking and derive appropriate solutions.

Required Courses

AG 581	Graduate Seminar	2
BRAE 599	Thesis in BioResource and Agricultural Engineering	9
ESCI 501	Research Planning	4
STAT 511	Statistical Methods	4
STAT 513	Applied Experimental Design and Regression Models	4

Approved Elective Options¹ 22

Students may be required to take undergraduate level prerequisites for selected electives. The final elective approval is at the discretion of the students' graduate committee

General

BRAE 418	Agricultural Systems Management I
BRAE 419	Agricultural Systems Management II

Agricultural and Food Processing Waste Management

BRAE 435	Drainage
BRAE 440	Agricultural Irrigation Systems
BRAE 532	Water Wells and Pumps
NR/CRP 404	Environmental Law
NR/CRP 408	Water Resource Law and Policy
NR 416	Environmental Impact Analysis and Management

NR 420 Watershed Assessment and Protection

NR 465 Senior Project - Ecosystem Management

Renewable Energy

BRAE 448 Bioconversion

EE 420 Sustainable Electric Energy Conversion

EE/PHYS 422 Polymer Electronics Laboratory

EE 520 Advanced Solar-Photovoltaic Systems Design

ENVE 542 Sustainable Environmental Engineering

California Production Agriculture and Food Systems

BRAE 432 Agricultural Buildings

IME 430 Quality Engineering

ITP 409 Packaging Machinery and Processes

PLSC 421 Postharvest Technology of Horticultural Crops

Precision Agriculture

BRAE 447 Advanced Surveying with GIS Applications

BRAE 481 Advanced Agricultural Mechanics

NR 418 Applied GIS

PLSC 406 Advanced Weed Management

PLSC 410 Crop Physiology

PLSC 445 Cropping Systems

SS 431 Digital Soil Mapping

Automation and Mechanization

BRAE 425 Computer Controls for Agriculture

IME 416 Automation of Industrial Systems

Any 400 and 500 level courses approved by the student's graduate committee¹

Total units **45**

¹ At least 60% of all units required by the committee as reflected on the formal study plan must be at the 500 level.

MS Agriculture, Specialization in Crop Science

Program Learning Objectives

1. Demonstrate expertise in their respective discipline.
2. Develop, test or select the appropriate technology in their respective discipline.
3. Demonstrate effective communication skills.
4. Formulate decisions utilizing professional ethics.
5. Value the diversity of people and ideas.
6. Investigate problems using critical thinking and derive appropriate solutions.

Required Courses

AG 581	Graduate Seminar	2
ESCI 501	Research Planning	4

PLSC 575	Applied Systematics for Agriculture	4
PLSC 596	Thesis in Crop Science	9
or PLSC 598	Thesis in Fruit Science	
STAT 511	Statistical Methods	4
STAT 513	Applied Experimental Design and Regression Models	4
Select from the following:		8
PLSC 410	Crop Physiology	
PLSC 421	Postharvest Technology of Horticultural Crops	
PLSC 445	Cropping Systems	
PLSC 470	Selected Advanced Topics	
or WVIT 470	Selected Advanced Topics	
Approved Electives		
Any 400 and 500 level courses, approved by the student's graduate committee ¹		10
Total units		45

¹ At least 60% of all units required by the committee as reflected on the formal study plan must be at the 500 level.

MS Agriculture, Specialization in Dairy Products Technology

Program Learning Objectives

1. Demonstrate expertise in their respective discipline.
2. Develop, test or select the appropriate technology in their respective discipline.
3. Demonstrate effective communication skills.
4. Formulate decisions utilizing professional ethics.
5. Value the diversity of people and ideas.
6. Investigate problems using critical thinking and derive appropriate solutions.

Required Courses

AG 581	Graduate Seminar	2
DSCI 401	Physical and Chemical Properties of Dairy Products	4
DSCI 444	Dairy Microbiology	4
or MCRO 421	Food Microbiology	
DSCI 599	Thesis in Dairy Science	9
ESCI 501	Research Planning	4
STAT 511	Statistical Methods	4
STAT 513	Applied Experimental Design and Regression Models	4

Approved Electives

Any 400 and 500 level courses that are approved by the graduate committee.¹

Total units **45**

¹ At least 60% of all units required by the committee as reflected on the formal study plan must be at the 500 level.

MS Agriculture, Specialization in Environmental Horticultural Science

Program Learning Objectives

1. Demonstrate expertise in their respective discipline.
2. Develop, test or select the appropriate technology in their respective discipline.
3. Demonstrate effective communication skills.
4. Formulate decisions utilizing professional ethics.
5. Value the diversity of people and ideas.
6. Investigate problems using critical thinking and derive appropriate solutions.

Required Courses

AG 581	Graduate Seminar	2
ESCI 501	Research Planning	4
PLSC 575	Applied Systematics for Agriculture	4
PLSC 597	Thesis in Environmental Horticulture Science	9
STAT 511	Statistical Methods	4
STAT 513	Applied Experimental Design and Regression Models	4

Select from the following: 8

PLSC 410	Crop Physiology	
PLSC 424	Nursery Crop Production	
PLSC 427	Disease and Pest Control Systems for Ornamental Plants	

Approved Electives

Any 400 and 500 level courses approved by the student's graduate committee¹

Total units **45**

¹ At least 60% of all units required by the committee as reflected on the formal study plan must be at the 500 level.

MS Agriculture, Specialization in Irrigation

Program Learning Objectives

1. Demonstrate expertise in their respective discipline.
2. Develop, test or select the appropriate technology in their respective discipline.
3. Demonstrate effective communication skills.
4. Formulate decisions utilizing professional ethics.
5. Value the diversity of people and ideas.
6. Investigate problems using critical thinking and derive appropriate solutions.

Required Courses

AG 581	Graduate Seminar	2
BRAE 438	Drip/Micro Irrigation	4
BRAE 440	Agricultural Irrigation Systems	4
BRAE 500	Individual Study	3
BRAE 533	Irrigation Project Design	4

BRAE 599	Thesis in BioResource and Agricultural Engineering	9
ESCI 501	Research Planning	4
STAT 511	Statistical Methods	4
STAT 513	Applied Experimental Design and Regression Models	4

Approved Electives

Any 400 and 500 level courses approved by the student's graduate committee ¹	7
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Total units	45
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¹ At least 60% of all units required by the committee as reflected on the formal study plan must be at the 500 level.

MS Agriculture, Specialization in Plant Protection Science

Program Learning Objectives

1. Demonstrate expertise in their respective discipline.
2. Develop, test or select the appropriate technology in their respective discipline.
3. Demonstrate effective communication skills.
4. Formulate decisions utilizing professional ethics.
5. Value the diversity of people and ideas.
6. Investigate problems using critical thinking and derive appropriate solutions.

Required Courses

AG 581	Graduate Seminar	2
ESCI 501	Research Planning	4
PLSC 575	Applied Systematics for Agriculture	4
PLSC 599	Thesis in Plant Protection Science	9
STAT 511	Statistical Methods	4
STAT 513	Applied Experimental Design and Regression Models	4

Select from the following: 8

PLSC 406	Advanced Weed Management	
PLSC 427	Disease and Pest Control Systems for Ornamental Plants	
PLSC 431	Insect Pest Management	
PLSC 441	Biological Control for Pest Management	

Approved Electives

Any 400 and 500 level courses approved by the graduate committee ¹	10
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Total units	45
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¹ At least 60% of all units required by the committee as reflected on the formal study plan must be at the 500 level.

MS Agriculture, Specialization in Water Engineering

Program Learning Objectives

Graduates are prepared to:

1. Demonstrate expertise and the use of technology in their respective discipline.
2. Demonstrate effective oral and written communication skills.
3. Make choices based on an understanding of personal and professional ethics and respect for diversity of people and ideas.
4. Recognize leadership principles and skills.
5. Evaluate and solve problems using critical thinking.
6. Demonstrate an appreciation for sustainability and global perspectives.

Required Courses

ESCI 501	Research Planning	4
STAT 511	Statistical Methods	4
STAT 513	Applied Experimental Design and Regression Models	4

Select from the Following: 2-3

AG 581	Graduate Seminar	
CE 591 & CE 592	Graduate Seminar I and Graduate Seminar II	
BRAE 414	Irrigation Engineering	4
BRAE 532	Water Wells and Pumps	4
BRAE 533	Irrigation Project Design	4
CE 533	Advanced Water Resources Engineering	4
BRAE 599	Thesis in BioResource and Agricultural Engineering (2, 2, 5)	9

Approved Electives

Select from the following: ¹ 6

BRAE 435	Drainage	
BRAE 440	Agricultural Irrigation Systems	
CE 434	Groundwater Hydraulics and Hydrology	
CE 435	Engineering Hydrology	
CE 440	Hydraulic Systems Engineering	
CE 536	Computer Applications in Water Resources with Geographic Info Systems (GIS)	
ENVE 436	Introduction to Hazardous Waste Management	
ENVE 438	Water and Wastewater Treatment Design	
ENVE 535	Physico-Chemical Water and Wastewater Treatment	
ENVE 542	Sustainable Environmental Engineering	
ECON 410	Public Finance and Cost-Benefit Analysis	

ECON 435	Economics of Land and Water	
Total units		45-46

¹ At least 60% of all units required by the committee as reflected on the formal study plan must be at the 500 level.

Agricultural Communication Minor

Required Courses

AGC 205	Agricultural Communications	4
AGC 207	Software Applications for Agricultural Publications	2
AGC 225	Digital Communication in Agriculture and Science	4
AGC 301	New Media Communication Strategies in Agriculture	4
AGC 404	Foundations of Agricultural Leadership	3

Approved Electives

Select from one of the following lists, based upon major (at least 8 units must be at the 300-400 level):

Majors in the College of Agriculture, Food and Environmental Sciences (at least 2 courses must be selected from COMS, ENGL, or JOUR)

AGB 405	Agribusiness Marketing Research Methods	
AGC 314	California Fairgrounds and Expositions	
AGC 318	Fairgrounds and Facility Management	
AGC 339	Internship in Agricultural Communications	
AGC 407	Agricultural Publications	
AGC 425	Multimedia Storytelling in Agriculture and Science	
AGC 426	Presentation Methods in Agricultural Communication	
AGC 475	Crisis Communication in Food and Agriculture	
AGC 490	Agricultural Communications Enterprise Management	
COMS 213	Organizational Communication	
COMS 217	Small Group Communication	
COMS 312	Quantitative Research Methods in Communication Studies	
COMS 322	Persuasion	
COMS 385	Media Criticism	
COMS 390	Environmental Communication	
COMS 413	Advanced Organizational Communication	
ENGL 310	Corporate Communication	
ENGL 317	Technical Editing	
JOUR 203	News Reporting and Writing	
JOUR 219	Multicultural Society and the Mass Media	
JOUR 228	Media, Self and Society	

JOUR 285	Introduction to Multimedia Journalism
JOUR 303	Web Audio and Video
JOUR 304	Public Affairs Reporting
JOUR 312	Public Relations
JOUR 331	Contemporary Advertising
JOUR 333	Broadcast News
JOUR 342	Public Relations Writing and Editing
JOUR 345	Social Media for Strategic Communication
JOUR 346	Broadcast Announcing and Production
JOUR 352	Advanced News Reporting Practicum
JOUR 390	Visual Communication for the Mass Media
JOUR 407	Feature Writing
JOUR 413	Public Relations Campaigns
RPTA 320	Strategic Event Planning

Majors in a college other than the College of Agriculture, Food and Environmental Sciences

AG/PLSC 315	Principles of Organic Crop Production
AGB 202	Introduction to Sales
AGB 318	Global Agricultural Marketing and Trade
AGB 406	Agribusiness Marketing Planning
AGC 207	Software Applications for Agricultural Publications
AGC 339	Internship in Agricultural Communications
AGC 407	Agricultural Publications
AGC 426	Presentation Methods in Agricultural Communication
ASCI 112	Principles of Animal Science
ASCI 221	Introduction to Beef Production
ASCI 225	Introduction to Poultry Management
BRAE 340	Irrigation Water Management
BRAE 348	Energy for a Sustainable Society
DSCI 229	General Dairy Manufacturing
DSCI 230	General Dairy Husbandry
FSN 202	Introduction to Human Nutrition
FSN 230	Elements of Food Processing
FSN 275	Elements of Food Safety
GRC 201	Digital Publishing Systems
NR 141	Introduction to Forest Ecosystem Management
NR 142	Environmental Management
NR 306	Natural Resource Ecology and Habitat Management
NR/ES 308	Fire and Society
NR 321	Water Resources Technology and Society
NR 323	Human Dimensions in Natural Resources Management
NR/CRP 408	Water Resource Law and Policy

PLSC 150	Forage Crops
PLSC 203	Organic Enterprise Project
PLSC 230	Environmental Horticulture
SS 120	Introductory Soil Science
or SS 130	Soils in Environmental and Agricultural Systems
Total units	30

Agricultural Leadership Minor

Required Courses

AGC 254	Introduction to Agricultural Leadership	2
AGC 404	Foundations of Agricultural Leadership	3
AGC 454	Agricultural Leadership - Self Assessment & Reflection	2
COMS 211	Interpersonal Communication	4
or RPTA 255	Leadership and Diverse Groups	
MSL 103	Basic Leadership	1-2
or MSL 201	Foundations of Leadership I	
or MSL 202	Foundations of Leadership II	
or MSL 203	Foundations of Leadership III	
MSL/RPTA 275	Facilitation and Teambuilding	2

Experiential Courses

Select from the following:		2-3
AG 410	Advanced Agricultural Leadership Experience	
AG 412	Advanced Leadership Practice: Poly Royal Rodeo	
AG 413	Committee Management: Poly Royal Rodeo	
AGC 412	Advanced Agricultural Leadership Development Practicum	
ASCI 412	Advanced Livestock Event Planning	
ASCI 490	Advanced Animal Production and Management Enterprise	
MSL 401	Developmental Leadership I	
NR/RPTA 472	Leadership Practice	

Approved Electives

Select from the following:		8
AG 452	Issues Affecting California Agriculture	
AGC 314	California Fairgrounds and Expositions	
AGC 318	Fairgrounds and Facility Management	
AGC 426	Presentation Methods in Agricultural Communication	
AGC 452	Current Trends and Issues in Agricultural Communication	
AGED 303	Agricultural Youth Leadership Development	
COMS 301	Business and Professional Communication	
COMS 420	Nonverbal Communication	

ENGL 310	Corporate Communication
ENGL 311	Advanced Rhetorical Inquiry and Composing
ENGL 317	Technical Editing
PHIL 323	Ethics, Science and Technology
PSY 301	Psychology of Personal Development
PSY 302	Behavior in Organizations
PSY 305	Personality
PSY 350	Teamwork
PSY 352	Conflict Resolution: Violent and Nonviolent
RPTA 325	Leadership in Outdoor Experiences

Total units **24-25**

Geographic Information Systems for Agriculture Minor

Required Courses

BRAE 150	Design Graphics and CAD for Agricultural Engineering	2
BRAE 239	Engineering Surveying	4
BRAE 345	Aerial Photogrammetry and Remote Sensing	3-4
or GEOG 328	Applications in Remote Sensing and GIS	
NR/LA 218	Introduction to Geographic Information Systems (GIS)	3-4
or GEOG 218	Applications in GIS	
NR 418	Applied GIS	3-4
or GEOG 441	Advanced Applications in Geospatial Technologies	

Emphasis areas

Select one of the following emphasis areas: 12

Environmental Information Emphasis

BRAE/NR 355	Drone Assisted Surveying
BRAE 447	Advanced Surveying with GIS Applications
NR 304	Agroecology
or NR 305	Forest Ecology and Silvics
or NR 306	Natural Resource Ecology and Habitat Management
NR 416	Environmental Impact Analysis and Management
or CRP 336	Introduction to Environmental Planning
SS 431	Digital Soil Mapping

Precision Agriculture Emphasis

BRAE/PLSC 244	Precision Farming
Select two of the following:	
BRAE/NR 355	Drone Assisted Surveying
BRAE 447	Advanced Surveying with GIS Applications
PLSC 406	Advanced Weed Management
PLSC 410	Crop Physiology
PLSC 431	Insect Pest Management

PLSC 445 Cropping Systems

Total units 27-30

Land Rehabilitation and Restoration Ecology Minor

Before being admitted to the minor, students must have successfully completed the following courses: BOT 121 or BIO 114, SS 120, MATH 118 or MATH 161.

At least one-half of the units must be at the 300-400 level. Generally, courses required for the student's major degree cannot be counted toward the minor, except that courses selected in the required core may count in both the major and minor programs. This and other course exceptions must be approved by the minor coordinator. As a guideline, students should take at least 20 units from outside their major degree program.

Required Courses

Plant area:

PLSC 381	Native Plants for California Landscapes	4
or BOT 313	Taxonomy of Vascular Plants	

Soils area:

SS 321	Soil Morphology	4
SS 421	Wetlands	4
or SS 431	Digital Soil Mapping	
or SS 440	Forest and Range Soils	

Ecological Principles:

AG 360	Holistic Management	4
or BIO 327	Wildlife Ecology	
or BOT 326	Plant Ecology	
NR 306	Natural Resource Ecology and Habitat Management	4
or NR 304	Agroecology	
or NR 305	Forest Ecology and Silvics	

Approved Electives

Select from the following: 6-8

ASCI 239	Principles of Rangeland Management	
BOT 433	Field Botany: California Plant Diversity	
BRAE 340	Irrigation Water Management	
ERSC 223	Rocks and Minerals	
ERSC 303	Soil Erosion and Water Conservation	
PLSC 124	Plant Propagation	
PLSC 321	Weed Biology and Management	
PLSC 327	Vertebrate Pest Management	
NR/LA 218	Introduction to Geographic Information Systems (GIS)	
or GEOG 218	Applications in GIS	
NR 307	Fire Ecology	
NR 320	Watershed Processes and Management	
NR/CRP 404	Environmental Law	
NR/CRP 408	Water Resource Law and Policy	

NR 445 Systems Thinking in Environmental Management

SS 221 Soil Health and Plant Nutrition

SS 322 Soil Plant Relationships

Total units 26-28

Rangeland Resources Minor

Required Courses

Range Resource Area

ASCI 239	Principles of Rangeland Management	4
ASCI 370	Rangeland Improvements	3

Rangeland Animal Management Area

Select from the following:		4
ASCI 223	Systems of Small Ruminant Management	
ASCI 311	Advanced Beef Cattle System Management	
BIO 427	Wildlife Management	

Rangeland Plant Physiology Area

Select from the following:		4
BIO 435	Plant Physiology	
PLSC 410	Crop Physiology	

Rangeland Ecology Area

Select from the following:		4
BOT 326	Plant Ecology	
BOT 433	Field Botany: California Plant Diversity	
NR 306	Natural Resource Ecology and Habitat Management	
PLSC 321	Weed Biology and Management	

Rangeland Measurements Area

Select from the following:		4
ASCI 465	Applied Practices for Monitoring California Rangelands	
SS 321	Soil Morphology	
SS 440	Forest and Range Soils	

Rangeland Policy/Planning Area

Select from the following:		3-4
AG/ASCI 360	Holistic Management	
ASCI 372	California Rangeland & Ranch Resource Management	
ASCI 460	Rangeland Assessment and Planning	
CRP 342	Environmental Planning Methods	
GEOG 218	Applications in GIS	
NR/LA 218	Introduction to Geographic Information Systems (GIS)	
NR/CRP 404	Environmental Law	
NR/CRP 408	Water Resource Law and Policy	
NR 435	Environmental Policy Analysis	

Total units 26-27

Sustainable Agriculture Minor

Required Courses

AG/ASCI 360	Holistic Management	4
NR 304	Agroecology	4
or NR 310	Global Climate Change	
NR 324	Social Dimensions of Sustainable Food and Fiber Systems	4
PLSC 203	Organic Enterprise Project	2
PLSC/AG 315	Principles of Organic Crop Production	4
or PLSC 420	Organic Crop Production Systems	

Area Studies ¹

Select minimum of one course from three of the following Areas:	12
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Agriculture and Society Area

AG 350	The Global Environment
AGB 312	Agricultural Policy
GEOG/ERSC 333	Human Impact on the Earth
NR 142	Environmental Management
POLS 332	World Food Systems
SOC 309	The World System and Its Problems
UNIV/PSC/HNRS 391	Appropriate Technology for the World's People: Development

Production Agriculture Area

AGB 212	Agricultural Economics
ASCI 221	Introduction to Beef Production
ASCI 223	Systems of Small Ruminant Management
ASCI 311	Advanced Beef Cattle System Management
BRAE 340	Irrigation Water Management
BUS 212	Financial Accounting for Nonbusiness Majors
PLSC 321	Weed Biology and Management
PLSC 323	Plant Pathology
PLSC 431	Insect Pest Management
PLSC 441	Biological Control for Pest Management
PLSC 445	Cropping Systems
SS 221	Soil Health and Plant Nutrition
or SS 322	Soil Plant Relationships

Agroecology Area

NR 306	Natural Resource Ecology and Habitat Management
NR 323	Human Dimensions in Natural Resources Management
SS 321	Soil Morphology
SS 440	Forest and Range Soils

Environmental Design Area

EDES 406	Sustainable Environments
LA 202	Design Fundamentals I
LA 221	California Plants and Plant Communities

PLSC 381	Native Plants for California Landscapes
UNIV/PSC/HNRS 392	Appropriate Technology for the World's People: Design

Total units **30**

¹ Minimum 4 units at 300-400 level.

Water Science Minor

Required Courses

BRAE 340	Irrigation Water Management	4
NR/CRP 408	Water Resource Law and Policy	4
SS 120	Introductory Soil Science	4

Emphasis Area

Select one emphasis area: 13-16

Irrigation Emphasis

Select 13 units from the following:

BRAE 237	Introduction to Engineering Surveying
or BRAE 239	Engineering Surveying
BRAE 337	Landscape Irrigation
BRAE/NR 349	Water for a Sustainable Society
BRAE 405	Chemigation
BRAE 435	Drainage
BRAE 438	Drip/Micro Irrigation
BRAE 440	Agricultural Irrigation Systems
BRAE 532	Water Wells and Pumps
BRAE 533	Irrigation Project Design

Water Policy Emphasis

Select 15 units from the following:

AGB 312	Agricultural Policy
AGB 412	Advanced Agricultural Policy
BIO/NR/SS 421	Wetlands
BRAE/NR 349	Water for a Sustainable Society
CRP/NR 404	Environmental Law
NR 320	Watershed Processes and Management
NR 435	Environmental Policy Analysis
POLS 332	World Food Systems
POLS 351	Public Policy and Administration

Watershed Management Emphasis

Select 16 units from the following:

BIO/NR/SS 421	Wetlands
ERSC 303	Soil Erosion and Water Conservation
ERSC 442	Applied Environmental Groundwater Hydrology
ERSC 443	Applied Environmental Contaminant Transport
NR 306	Natural Resource Ecology and Habitat Management
NR 320	Watershed Processes and Management
NR 420	Watershed Assessment and Protection

SS 440	Forest and Range Soils
Total units	25-28

Agribusiness

Agriculture Bldg. (10), Room 210
Phone: 805.756.5000; Fax: 805.756.5040
<https://agb.calpoly.edu>

Department Chair: Bryan Lohmar

Academic Programs

Program name	Program type
Agricultural Business	BS
Agribusiness	Minor

A Bachelor of Science in Agricultural Business prepares students for exciting and satisfying careers in the dynamic global food and fiber supply chain. The program provides a course of study that develops the requisite critical thinking, problems solving and business skills that are required to have a successful career in firms and organizations that span and support industries and organizations across the entire food and fiber supply chain.

Career opportunities for Cal Poly Agribusiness graduates range from food and fiber production, logistics and transportation, marketing and finance to agricultural support organizations and government agencies, providing a wide range of choices for any graduate.

Undergraduate Programs

BS Agricultural Business

The Agricultural Business curriculum has been developed to allow for a flexible course of study. Students can choose to emphasize their upper-division coursework a specific industry area such as Food Retail Management, Finance and Appraisal, Supply Chain Management, and Sales and Marketing or generalize their studies, all while being provided with an industry recognized, business-ready set of skills. Students are encouraged to get involved with academic clubs and teams, which provide additional opportunities for the Learn-by-Doing leadership experience.

Agribusiness Minor

In today's ever more complex, technology-driven world, it is necessary for any graduate in agriculture to have some exposure to marketing, personnel management, financial management, budgeting, and economics if they are to succeed. The minor is designed to give students in the College of Agriculture, Food and Environmental Sciences this opportunity. Interested students must apply for acceptance into the minor through the Agribusiness Department.

Agribusiness Minor

Note: One course in the minor may be graded credit/no credit.

Required Courses

AGB 212	Agricultural Economics	4
AGB 214	Agribusiness Financial Accounting	4
or BUS 212	Financial Accounting for Nonbusiness Majors	
AGB 301	Food and Fiber Marketing	4
AGB 308	Introduction to Agribusiness Finance	4
or AGB 310	Agribusiness Credit and Finance	

AGB 369	Agricultural Personnel Management	4
Approved Electives ¹		
Select from the following:		8
Any AGB course except AGB 101 (at least 2 units must be at the 300-400 level)		
Total units		28

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

BS Agricultural Business

Program Learning Objectives

1. Exhibit critical thinking and complex problem-solving skills leading to lifelong learning.
2. Demonstrate strong interpersonal and teamwork skills, as well as the ability to work independently.
3. Develop technical competency while learning to think in a broader global context.
4. Act with professionalism, high ethical standards, and respect for diversity and sustainability.
5. Possess oral and written communication skills that are effective with diverse audiences (employers, employees, industry, and government).
6. Industry-ready with skills and knowledge that employers value.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: Up to 4 units of credit/no credit grading may be selected for Major or Support courses.

MAJOR COURSES

AGB 101	Introduction to Agribusiness	4
AGB 202	Introduction to Sales	4
AGB 212	Agricultural Economics	4
AGB 214	Agribusiness Financial Accounting	4
AGB 260	Agribusiness Data Literacy	4
AGB 301	Food and Fiber Marketing	4
AGB 308	Introduction to Agribusiness Finance	4
AGB 312	Agricultural Policy	4
AGB 313	Agriculture Economic Analysis	4
AGB 323	Decision Making with Agribusiness Accounting Information	4
AGB 327	Agribusiness Data Analysis	4
AGB 328	Decision Tools for Agribusiness	4
AGB 369	Agricultural Personnel Management	4
AGB 462	Senior Project - Applied Agribusiness Problems	4

or AGB 463	Senior Project - Agribusiness Consulting	
Agribusiness General Electives		
Select one 4 unit AGB course at the 400 level		4
Select from the following: ^{1,2}		16
Any AGB courses at the 300 or 400 levels		
AGC 314	California Fairgrounds and Expositions	
AGC 452	Current Trends and Issues in Agricultural Communication	
AGC 475	Crisis Communication in Food and Agriculture	
NR 326	Natural Resources Economics and Valuation	
NR 408	Water Resource Law and Policy	
NR 413	Agricultural Law	
WVIT 343	Branded Wine Marketing	
WVIT 423	Wine Law and Compliance	
WVIT 450	Wine Business Plan Development	
SUPPORT COURSES		
BUS 207	Legal Responsibilities of Business	4
ECON 222	Macroeconomics (D2) ³	4
MATH 221	Calculus for Business and Economics (B4) ^{3,4}	4
STAT 251	Statistical Inference for Management I (GE Electives) ³	4
Agricultural Electives		
Select from the following: ⁵		4
ASCI 112	Principles of Animal Science	
ASCI 211	Meat Science	
ASCI 215	Safe Handling of Animal-Based Foods for Consumers	
ASCI 239	Principles of Rangeland Management	
DSCI 229	General Dairy Manufacturing	
FSN 275	Elements of Food Safety	
PLSC 120	Principles of Horticulture and Crop Science	
PLSC 150	Forage Crops	
PLSC 230	Environmental Horticulture	
SS 120	Introductory Soil Science	
SS 130	Soils in Environmental and Agricultural Systems	
Select from the following CAFES prefixes: ⁵		12
AG, AGC, AGED, ASCI, BRAE, DSCI, ERSC, ESCI, FSN, NR, PLSC, RPTA, SS, or WVIT		
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		60
FREE ELECTIVES		
Free Electives ⁵		12
Total units		180

¹ At least 8 units must be from AGB courses

² Non-Agribusiness courses used here will not double count as Agricultural Electives

³ Required in Major or Support; also satisfies General Education (GE) requirement.

⁴ Prerequisite: Appropriate Math Placement Level; or MATH 117; or MATH 118.

⁵ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required, 12 of which are specified in Major and/or Support.
- If any of the remaining 60 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Support) ¹	0
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4

GE Electives in Areas B, C, and D

Select courses from two different areas; may be lower-division or upper-division courses.	
GE Electives (4 units in Support plus 4 units in GE) ¹	4
Total units	60

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Agricultural Education & Communication

Agriculture Bldg. (10), Room 244
Phone: 805.756.2803
<https://aged.calpoly.edu>

Department Head: Ben Swan

Academic Programs

Program name	Program type
Agricultural Communication	BS, Minor
Agricultural Education	Master of, Minor
Agricultural Science	BS

The Cal Poly Agricultural Education and Communication Department's contribution to the agriculture industry is unparalleled in preparing passionate leaders to advance agricultural education and communication.

Graduates are prepared to effectively organize, communicate, and lead. Whether teaching the students of California about the application of science and management in the food fiber and natural resource systems — or sharing the compelling story and science of agriculture — our graduates help shape the public opinion of the multibillion dollar agricultural industry.

Students studying agricultural science are exposed to a wide variety of coursework in the various disciplines featured in the College of Agriculture, Food, and Environmental Sciences. The degree provides the flexibility to explore careers leading to teaching, animal and plant production, the food and fiber service industry, and various management and leadership positions in agriculture. Graduates leave Cal Poly with the technical and professional skills needed to lead in a variety of occupations and with a comprehensive understanding of how the various sectors contribute to overall industry success.

In addition to the department's long history of leadership and service to the state's agricultural education profession, it also boasts California's only agricultural communication major, widely considered one of the country's premier undergraduate programs. Through a partnership with the university's Brock Center for Agricultural Communication, plus unique Learn by Doing opportunities, students gain the necessary knowledge to be effective communicators who are fully equipped to promote agriculture and serve the needs of the industry.

Undergraduate Programs

BS Agricultural Communication

The BS Agricultural Communication program prepares students to become professional communicators in the agriculture industry and related fields. Graduates of the program are effective oral and written communicators with an applied knowledge of emerging new media. All students within the major take a common series of courses. The Brock Center for Agricultural Communication provides students the opportunity for industry linkages and professional preparation in this rapidly growing career area.

BS Agricultural Science

The BS Agricultural Science program is a flexible program in agriculture, allowing students multiple options and opportunities to select courses according to their areas of interest.

The major was developed to provide students with direction as they consider career options in the agricultural industry. Students complete coursework deemed broad and general to ensure a systems perspective in agriculture. Foundation courses are meant to help students identify an area of emphasis.

The six **emphasis areas** are:

- Agricultural Engineering Technology
- Agribusiness
- Animal Science
- Crop and Soil Science
- Forestry and Natural Resources
- Ornamental Horticulture

Many of the emphasis areas have courses embedded within them that lead to the completion of a minor. Students should consult with their academic advisor when considering a minor or minors.

Teaching Credential

Students can declare their candidacy for teaching while pursuing the undergraduate degree. The minor in Agricultural Education should be declared early during the student's academic career to ensure requirements for obtaining certification to teach are met. Early field experiences are a part of the minor and are required for entrance into the credential program.

Teacher candidates are required to enroll in post-baccalaureate work to obtain the Single Subject in Agriculture and Agricultural Specialist credentials. Candidates must complete a minimum of 45 units of post-baccalaureate coursework. The Single Subject Content Advisor in Agricultural Education can provide more information. It is to the advantage of the post-baccalaureate teaching candidates to be simultaneously enrolled in the Master of Agricultural Education degree program.

Agricultural Education Minor

The Agricultural Education minor addresses subject matter competency requirements for the Single Subject-Agriculture and the Agriculture Specialist teaching credentials. Students must obtain prior program approval from the Single Subject Content Advisor for Agriculture Education in selecting approved electives courses. This is based on the student's prior agricultural background and the completion of major-specific courses. Students are encouraged to express interest in this minor early in the academic program in order to get proper advisement relative to all requirements for teaching in the public schools.

Additional Minors

Agricultural Communication Minor

In association with the Brock Center for Agricultural Communication, selected interdisciplinary courses in Journalism, Graphic Communications, English, Communication Studies and Agriculture make up the Agricultural Communication minor. Career preparation includes a breadth and depth in agriculture along with a foundation in journalism,

and an industry internship. For more information about the minor, see College of Agriculture, Food and Environmental Sciences (p. 60).

Agricultural Leadership Minor

For more information about the minor, see College of Agriculture, Food and Environmental Sciences (p. 60).

Graduate Program Master of Agricultural Education

The Master of Agricultural Education program provides student with the opportunity to focus their graduate study in agricultural education, with an emphasis on preparing candidates for positions as teachers of agricultural education in public schools. The non-thesis degree has two tracks: (1) to provide practitioners with opportunities for professional development, requiring at least one year of successful high school or community college teaching for completion, (2) to provide agriculture credential candidates an opportunity to simultaneously complete the degree. Working with their advisor and graduate committee, students generally complete project for coursework in the program to enhance their employment settings or assist them to become compliant with statewide standards in agricultural education. All students in the Master of Agricultural Education degree program are required to pass a written and oral comprehensive examination, scheduled during the final quarter of the program of study.

BS Agricultural Communication

Program Learning Objectives

1. Demonstrate and apply excellent written, verbal, listening and visual communication skills through class and public presentations.
2. Demonstrate knowledge of both standard and modern communications practices, including effective writing, layout and design, photography, computer skills, and oral communication through collected portfolio work.
3. Demonstrate the ability to work in a professional communications setting through experiential-learning (i.e. internships, work experience, student organizations).
4. Analyze and communicate effectively about major issues in agriculture by developing and sharing educational scientific media and materials.
5. Understand the importance of effective communication in the agriculture industry by studying agriculture in the media.
6. Use and evaluate technologies that enhance the communication process through software training and media analytics.
7. Apply ethical journalism practices in daily work and recognize media and corporate roles and responsibilities in society by studying public relations, government regulation and sustainability.
8. Demonstrate awareness and sensitivity to cultural demographics of an increasingly global agriculture industry by studying agricultural trade.
9. Develop a high degree of agricultural literacy, a reservoir of skills and knowledge in agricultural subjects to meet the needs of the agricultural communication profession and the industry through capstone courses and experiences.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 2.0 GPA
- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major courses may be selected as credit/no credit.

MAJOR COURSES

AGC 102	Orientation to Agricultural Communication & Agricultural Science	2
AGC 205	Agricultural Communications	4
AGC 207	Software Applications for Agricultural Publications	2
AGC 225	Digital Communication in Agriculture and Science	4
AGC 301	New Media Communication Strategies in Agriculture	4
AGC 339	Internship in Agricultural Communications	4
or AG 339	Internship in Agriculture	
or AGED 339	Internship in Agricultural Education	
AGC 404	Foundations of Agricultural Leadership	3
AGC 407	Agricultural Publications	4
AGC 425	Multimedia Storytelling in Agriculture and Science	4
or JOUR 390	Visual Communication for the Mass Media	
AGC 426	Presentation Methods in Agricultural Communication	4
AGC 463	Senior Project	3
AGC 475	Crisis Communication in Food and Agriculture	4
BIO 111	General Biology (B2 & B3) ¹	4
or BIO 161	Introduction to Cell and Molecular Biology	
CHEM 110	World of Chemistry (B1 & B3) ¹	4
COMS 316	Intercultural Communication (GE Electives) (USCP) ¹	4
ECON 222	Macroeconomics (D2) ¹	4
ENGL 310	Corporate Communication	4
JOUR 203	News Reporting and Writing	4
JOUR 312	Public Relations	4
MATH 118	Precalculus Algebra (B4) ^{1, 2}	4
STAT 217	Introduction to Statistical Concepts and Methods (GE Electives) ¹	4
or STAT 218	Applied Statistics for the Life Sciences	
Agricultural Business and Economics		
AGB 212	Agricultural Economics	4
AGB 260	Agribusiness Data Literacy	4
AGB 301	Food and Fiber Marketing	4

AGB 312	Agricultural Policy	4
Agricultural Systems Technology		
BRAE 121 or BRAE 141	Agricultural Mechanics Agricultural Machinery Safety	2-3
Animal Science		
ASCI 112	Principles of Animal Science	4
Select from the following:		4
ASCI 221	Introduction to Beef Production	
ASCI 222	Systems of Swine Production	
ASCI 223	Systems of Small Ruminant Management	
ASCI 224	Equine Science	
ASCI 225	Introduction to Poultry Management	
DSCI 230	General Dairy Husbandry	
Environment and Natural Resources		
BRAE 340	Irrigation Water Management (Upper-Division B) ¹	4
NR/ES 308 or NR 323	Fire and Society (Upper-Division D) ¹ Human Dimensions in Natural Resources Management	4
SS 120 or SS 130	Introductory Soil Science Soils in Environmental and Agricultural Systems	4
Food Science		
FSN 230	Elements of Food Processing	4
FSN 275	Elements of Food Safety	4
Plant Science		
PLSC 120	Principles of Horticulture and Crop Science	4
Agricultural Issues		
Select from the following:		4
AG 452	Issues Affecting California Agriculture	
AGC 452	Current Trends and Issues in Agricultural Communication	
PLSC 329	Plants, Biotechnology, and the Media	
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		40
FREE ELECTIVES		
Free Electives		7-8
Total units		180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² MATH 116 and MATH 117 substitute.

General Education (GE) Requirements

- 72 units required, 32 of which are specified in Major and/or Support.
- If any of the remaining 40 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written

Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A		English Language Communication and Critical Thinking
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B		Scientific Inquiry and Quantitative Reasoning
B1	Physical Science (4 units in Major) ¹	0
B2	Life Science (4 units in Major) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C		Arts and Humanities
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D		Social Sciences - Select courses in Area D from at least two different prefixes
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Major) ¹	0
Upper-Division D (4 units in Major) ¹		0
Area E		Lifelong Learning and Self-Development
Lower-Division E		4
Area F		Ethnic Studies
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (8 units in Major) ¹		0
Total units		40

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

BS Agricultural Science Program Learning Objectives

1. Achieve a high degree of agricultural literacy.
2. Lead and direct individuals and groups in thought and action.
3. Analyze and communicate effectively the major issues in agriculture.

4. Demonstrate cultural competencies in an increasingly global agricultural industry and society.
5. Demonstrate critical thinking and problem solving skills.
6. Seamlessly and professionally integrate technology into practices.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, student must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

AGC 102	Orientation to Agricultural Communication & Agricultural Science	2
AGC 404	Foundations of Agricultural Leadership	3
AGC 452	Current Trends and Issues in Agricultural Communication	4
or AG 360	Holistic Management	
or AG 452	Issues Affecting California Agriculture	
AGC 463	Senior Project	3
AGED 410	Computer Applications in Agricultural Education	2-4
or AGC 314	California Fairgrounds and Expositions	

Foundation in Agriculture Courses

Agribusiness

AGB 202	Introduction to Sales	4
AGB 212	Agricultural Economics	4
AGB 301	Food and Fiber Marketing	4
or WVIT 343	Branded Wine Marketing	

Animal Science

ASCI 112	Principles of Animal Science (B2) ¹	4
Select from the following		8
ASCI 221	Introduction to Beef Production	
ASCI 222	Systems of Swine Production	
ASCI 223	Systems of Small Ruminant Management	
ASCI 224	Equine Science	
ASCI 225	Introduction to Poultry Management	
DSCI 230	General Dairy Husbandry	

Ag Systems Technology

BRAE 121	Agricultural Mechanics	2
BRAE 141	Agricultural Machinery Safety	3
BRAE 321	Agricultural Safety	3
BRAE 340	Irrigation Water Management (Upper-Division B) ¹	4

Plant Science

PLSC 120	Principles of Horticulture and Crop Science	4
PLSC 190	California Vegetable Production	4
or PLSC 230	Environmental Horticulture	
or PLSC 240	Commercial Seed Production	
or PLSC 245	Horticultural Production Techniques	

Natural Resources

NR/ES 308	Fire and Society (Upper-Division D) ¹	4
or NR 323	Human Dimensions in Natural Resources Management	
SS 120	Introductory Soil Science (GE Electives) ¹	4
or SS 130	Soils in Environmental and Agricultural Systems	

Safe Practices in Handling Food Products

DSCI 229	General Dairy Manufacturing	4
or FSN 230	Elements of Food Processing	
FSN 275	Elements of Food Safety	4

Approved Electives in Emphasis Area

Select courses from the Guide to Approved Agricultural Electives - Emphasis Areas. At least 29 units in the combination of Approved Electives and Free Electives must be at the 300-400 level.

SUPPORT COURSES

Foundation Science and Mathematics

BOT 121	General Botany	4
or MCRO 221	Microbiology	
or PHYS 121	College Physics I	
CHEM 110	World of Chemistry (B1 & B3) ¹	4
or CHEM 127	General Chemistry for Agriculture and Life Science I	
MATH 118	Precalculus Algebra (B4) ^{1,2}	4
or MATH 119	Precalculus Trigonometry	
or MATH 141	Calculus I	
or MATH 161	Calculus for the Life Sciences I	
or MATH 221	Calculus for Business and Economics	

GENERAL EDUCATION (GE)

(See GE program requirements below.) 48

FREE ELECTIVES

Free Electives³ 22

Total units 180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² MATH 116 and MATH 117 substitute.

³ At least 29 units of Approved Electives and Free Electives must be at the 300-400 level. Students are encouraged to consult with the academic advisor in developing a plan for fulfilling degree requirements.

Guide to Approved Agricultural Electives - Emphasis Areas

Approved Agricultural Electives have been categorized by Emphasis Area to guide students. Advisor approval of Agricultural Electives is not required, but consultation with an advisor is recommended to ensure that the required number of upper-division units is met. Also, bear in mind that

selection may impact pursuit of post-baccalaureate studies and/or goals. It is imperative for students seeking a teaching credential to select one Emphasis Area and adhere to the approved list of courses.

Emphasis Areas

Select Emphasis Area of choice: 22-24

Agricultural Engineering Technology

BRAE 142	Agricultural Power and Machinery Management
BRAE 150	Design Graphics and CAD for Agricultural Engineering
BRAE 152	3-D Solids Modeling
BRAE 240	Agricultural Engineering Laboratory
BRAE 244	Precision Farming
BRAE 333	Aquacultural Engineering
BRAE 335	Internal Combustion Engines
BRAE 337	Landscape Irrigation
BRAE 348	Energy for a Sustainable Society
BRAE 438	Drip/Micro Irrigation
BRAE 440	Agricultural Irrigation Systems
BRAE 481	Advanced Agricultural Mechanics

Agribusiness

AGB 214	Agribusiness Financial Accounting
AGB 260	Agribusiness Data Literacy
AGB 304	Innovation and Entrepreneurship in Agriculture
AGB 309	Advanced Sales Techniques
AGB 310	Agribusiness Credit and Finance
AGB 312	Agricultural Policy
AGB 313	Agriculture Economic Analysis
AGB 322	Principles of Agribusiness Management
AGB 323	Decision Making with Agribusiness Accounting Information
AGB 369	Agricultural Personnel Management
AGB 370	World Food Economy
AGB 404	Food Retail Management
AGB 440	Field Studies in Agribusiness
AGB 445	Produce Marketing
AGC 314	California Fairgrounds and Expositions
AGC 318	Fairgrounds and Facility Management
AGC 475	Crisis Communication in Food and Agriculture

Animal Science

ASCI 211	Meat Science
ASCI 212	Livestock Show Management
ASCI 220	Introductory Animal Nutrition and Feeding
ASCI 221	Introduction to Beef Production
ASCI 222	Systems of Swine Production
ASCI 223	Systems of Small Ruminant Management
ASCI 225	Introduction to Poultry Management

ASCI 226	Livestock Evaluation
ASCI 232	General Animal Science Laboratory
ASCI 239	Principles of Rangeland Management
ASCI 311	Advanced Beef Cattle System Management
ASCI 321	Zoonoses and Veterinary Public Health Concerns
ASCI 325	Egg Production, Processing and Distribution
ASCI 330	Poultry Meat Production and Processing
ASCI 342	Poultry Business Management
ASCI 350	Nonruminant Nutrition
ASCI 425	Meat Industry Study Tour
DSCI 230	General Dairy Husbandry
DSCI 241	Dairy Cattle Selection, Breeds, Fitting and Showing
DSCI 301	Dairy Cattle Nutrition
DSCI 330	Artificial Insemination and Embryo Biotechnology
DSCI 333	Dairy Animal Health, Safety and Applied Technology

Crop and Soil Science

PLSC 150	Forage Crops
PLSC 190	California Vegetable Production
PLSC 240	Commercial Seed Production
PLSC 245	Horticultural Production Techniques
PLSC 321	Weed Biology and Management
PLSC 355	Citrus and Avocado Fruit Production
PLSC 421	Postharvest Technology of Horticultural Crops
SS 221	Soil Health and Plant Nutrition
SS 322	Soil Plant Relationships
SS 444	Soil Judging

Forestry and Natural Resources

BIO 227	Wildlife Conservation Biology
NR 142	Environmental Management
NR 208	Dendrology
NR 306	Natural Resource Ecology and Habitat Management
NR/ES 308	Fire and Society
NR 312	Technology of Wildland Fire Management
NR/LA 317	The World of Spatial Data and Geographic Information Technology
NR 321	Water Resources Technology and Society
NR 323	Human Dimensions in Natural Resources Management
NR/ES 360	Ethnicity and the Land
NR 402	Forest Health
NR/CRP 404	Environmental Law
NR/CRP 408	Water Resource Law and Policy

Ornamental Horticulture

BOT 121	General Botany	
BRAE 337	Landscape Irrigation	
PLSC 123	Landscape Installation and Maintenance	
PLSC 124	Plant Propagation	
PLSC 341	Cut Flower Production	
PLSC 342	Potted Plant Production	
PLSC 343	Turfgrass Management	
PLSC 381	Native Plants for California Landscapes	
PLSC 424	Nursery Crop Production	
PLSC 432	Specialized Operations for Golf Courses and Athletic Fields	
PLSC 437	Park and Public Space Management	

D2	Lower-Division D	4
Upper-Division D (4 units in Major) ¹		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		48

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Major) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4

Agricultural Education Minor

Required Courses

AGED 303	Agricultural Youth Leadership Development	4
AGED 350	Early Field Experience in Agriculture Education	2
AGED 410	Computer Applications in Agricultural Education	2
BIO 111	General Biology	4
or BIO 114	Plant Diversity and Ecology	
or BIO 161	Introduction to Cell and Molecular Biology	
HLTH 250	Healthy Living ¹	4
or HLTH 443	Health Education for Teachers	

Approved Electives ^{1, 2}

Select from the following:			8
AG 360	Holistic Management		
or AG 452	Issues Affecting California Agriculture		
or AGC 452	Current Trends and Issues in Agricultural Communication		
or NR 308	Fire and Society		
AGB 214	Agribusiness Financial Accounting		
AGB 301	Food and Fiber Marketing		
AGC 314	California Fairgrounds and Expositions		
AGC 318	Fairgrounds and Facility Management		
ASCI 112	Principles of Animal Science		
ASCI 225	Introduction to Poultry Management		
BRAE 121	Agricultural Mechanics		
BRAE 141	Agricultural Machinery Safety		
BRAE 340	Irrigation Water Management		
or BRAE 348	Energy for a Sustainable Society		
BRAE 481	Advanced Agricultural Mechanics		
DSCI 230	General Dairy Husbandry		
DSCI 330	Artificial Insemination and Embryo Biotechnology		
IME 142	Manufacturing Processes: Materials Joining		

PLSC 120	Principles of Horticulture and Crop Science	
or PLSC 150	Forage Crops	
or PLSC 230	Environmental Horticulture	
PLSC 190	California Vegetable Production	
SS 120	Introductory Soil Science	
Total units		24

¹ If HLTH 250 is taken, at least 4 units of 300-400 level coursework must be taken in Approved Electives in order to meet the Upper-Division requirement for the minor.

² Consultation with advisor is recommended prior to selecting approved electives; keep in mind that course selections may impact pursuit of post-baccalaureate studies and/or goals.

¹ Students are required to complete or be enrolled in AGED 539 (or AGED 524 and AGED 540) to be eligible to complete the comprehensive written and oral examinations.

² Up to 8 units can be taken outside of Agriculture.

³ At least 60% of all units required by the committee as reflected on the formal study plan must be at the 500 level.

Master of Agricultural Education

Program Learning Objectives

1. Apply knowledge of philosophical and historical foundations of agricultural education to develop personal philosophy statements which guide components of the agricultural education programs.

2. Create relevant, challenging and integrative agricultural curriculum.

3. Adapt curriculum to meet curricular goals and objectives using a variety of educational theories and models.

4. Demonstrate effective teaching characteristics while utilizing a wide variety of teaching and learning strategies.

5. Select appropriate practices to teach essential agricultural concepts, problem solving, skills of inquiry, communication and collaboration.

6. Develop, administer and analyze formal, informal and performance assessment techniques to monitor and evaluate student learning and guide modification.

7. Develop as reflective practitioners by collecting feedback, evaluating learning segments, and supporting artifacts.

Required Courses

AGED 520	Program Development in Agricultural Education	3
AGED 522	Laboratory Pedagogy in Agricultural Technology	3
or AGED 523	Laboratory Organization and Management in Agricultural Education	
AGED 539	Graduate Internship in Agricultural Education and Communication ¹	6
or AGED 524 & AGED 540	Instructional Processes in Agricultural Education and Instructional Planning in Agriculture	

Approved Agricultural Electives ²

Any 400-500 level courses with the following prefixes: AGB, AGC, AGED, ASCI, BRAE, DSCI, ERSC, ESCI, FSN, NR, PLSC, SS, WVIT	33
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At least 15 units must be taken at the 500 level. ³

Total units	45
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Animal Science

Agriculture Bldg. (10), Room 141
Phone: 805.756.2419; Fax: 805.756.7403
<https://animalscience.calpoly.edu>

Department Head: Jaymie Noland

Academic Programs

Program name	Program type
Animal Science	BS
Dairy Industries	Minor
Dairy Science	BS
Equine Science	Minor
Meat Science and Processing	Minor
Poultry Management	Minor
Rangeland Resources	Minor

Animal Science offers programs in both Animal and Dairy Sciences. Students have the opportunity to apply the principles of animal biology, husbandry and behavior, with molecular biology and other life sciences to a variety of species. Students can apply these principles to farm animals, exotic animals, laboratory animals, and to their own pets. The curriculum is very flexible, which allows students to work with their faculty advisor to plan an individual curriculum in line with their interests and career goals. This is a comprehensive “hands-on, learn-by-doing” program, so students work with animals of several species on a regular basis. Students learn the science and practical applications to be effective problem-solvers and leaders as they move on to professional and graduate schools, animal production and management, animal and dairy food processing, or numerous other career opportunities.

Students may select coursework in one of the following areas: pre-veterinary medicine, food animal production, dairy science, equine science, poultry management, agribusiness, biotechnology, comparative animal biology studies, rangeland resource management, dairy products technology and meat science.

The department offers a wide assortment of co-curricular activities including five different student clubs, competitive livestock and horse judging teams and intercollegiate dressage and equestrian teams. Students participate in organizing and conducting service meetings, seminars and field days sponsored by the department.

In addition, students are involved with faculty in research and development of new technologies related to animal health, production, and processing, using state-of-the-art equipment, facilities and technologies. Through extensive undergraduate research opportunities, students are prepared for careers in discovery, science and innovation.

Experiential Learning

The Animal Science Department has extensive modern animal facilities for hands-on experience. The department is supported by state-of-the-art biotechnology labs, a new beef center, beef cattle evaluation center, new animal nutrition center for animal food manufacturing, and an extensive equine center with breeding barn, labs, new stalls and training arenas. Additionally, students are able to use nearly 6,000 acres of rangeland, a swine center, sheep center, a state-of-the-art poultry center, an on-campus veterinary clinic for student learning and a new meat processing center. The modern dairy facility includes the Dairy Cattle Instructional Building, containing the milking parlor, meetings rooms and classrooms,

a nutrition and physiology lab, a microbiology lab, and a computer lab dedicated to dairy management and application software. The campus creamery is well-equipped with modern processing equipment. Students are employed on a part-time basis to work in both the production and processing areas.

The department maintains beef cattle, a dairy herd, horses, sheep, swine, and poultry. The dairy herd includes 110 each of milking-age registered Jerseys and Holsteins, located on a well-planned unit where feeding, milking, calf raising, artificial insemination, and management are carried out. Both herds are recognized for their high production and outstanding type. Animal operations are supported by an on-campus veterinary clinic, dairy processing and meat processing facilities, and an animal nutrition center. By actively participating in the management of the herds and flocks, students simulate the larger commercial operations of the industry. The enterprise system is another valuable experience for students, and industry internships are strongly encouraged.

Swanton-Pacific Ranch

The department has an active role in the management of the Swanton-Pacific Ranch and is developing environmentally sound resource management practices including intensive controlled grazing, multiple species grazing, and using the grazing animal as a tool to enhance the total environment of the ranch. Cal Poly's Animal Science major provides the knowledge and understanding to apply new technologies for the fast-changing, technology-driven world in which we live. The department's focus is to help students build a plan for personal and professional growth. Students develop the ability to apply and manage technology, and they also learn how to be team players, with the ability to solve problems utilizing leadership and professional communication skills. Most importantly, students are taught how to learn so they can adapt to the future.

Leprino Foods Dairy Innovation Institute

The Leprino Foods Dairy Innovation Institute houses the Cal Poly Creamery and the Dairy Products Technology Center (DPTC). The DPTC focuses on multidisciplinary dairy foods research and training activities designed to support the dairy industry and consumers of dairy products. Current research areas are: cheese chemistry and technology, bioseparation processes, and new product and process development. The Center has state-of-the-art research and development as well as technology transfer facilities. Students may conduct dairy foods related research projects under the guidance of Dairy Science faculty. Opportunities also exist to work on joint projects with other institutions.

Undergraduate Programs

BS Animal Science

Students in the Animal Science Department study a variety of disciplines including pre-veterinary medicine, animal biotechnology, animal welfare, food animal production in beef and dairy cattle, goats, sheep, and swine, comparative animal biology, equine science, poultry management, range resources management, and meat science.

Through the use of Cal Poly's extensive rangelands, irrigated pastures, housing and handling structures, as well as laboratory and research facilities, students learn the different areas of study in an experiential environment. This learn-by-doing approach gives students opportunities to work closely with animals and their professors. The animal science major incorporates an assortment of interests with a flexible curriculum that integrates well with students' career goals.

BS Dairy Science

The Bachelor of Science degree in Dairy Science is designed to prepare students for employment in the various phases of the dairy industry, as well as related fields. All students within the major take a common core of courses and select additional courses in an area of interest, which may include: dairy farm or plant management, processing technology, agriculture communication, management, preparation for graduate or veterinary school, and agriculture teaching.

Dairy Industries Minor

The purpose of this science-based minor is to help students from other disciplines gain a basic understanding of the terminology and practices used within the two segments of the dairy industry. Two specialization areas are available within the Dairy Industries minor: Dairy Husbandry and Dairy Foods. Students may choose to pursue either specialization. After completion of the minor, students should have a basic understanding of cattle, dairy nutrition, milk production and management or dairy food processing, food quality and regulatory control. Prospective students should understand that completion of a basic level of introductory biology, chemistry, and statistics is assumed for this minor. In addition, some upper division courses may also require microbiology, organic/biochemistry and/or anatomy and physiology.

Equine Science Minor

The Equine Science minor is designed for students interested in developing a knowledge of, and competency in, the areas of equine training, nutrition and reproduction. This science-based program exposes students to various aspects of the horse industry, including basic equine management, training, and breeding farm management. By completing this minor, students gain an understanding of the principles and practices used within the equine industry. Not open to Animal Science majors.

Meat Science and Processing Minor

The minor incorporates knowledge of general food science, basic meat science and the principles and practices of adding value to raw materials through livestock harvesting, carcass fabrication and the manufacture of further processed meat and poultry products. Opportunities for business and management training are available. The minor meets the requirements needed to become eligible for jobs with the government or commercial meat processing firms and other businesses associated with the production of food products containing meat or poultry. In addition to the required courses, selected courses address basic principles of microbiology, food science, food sanitation and safety, food chemistry and process control procedures, and other optional courses are offered in agribusiness. Not open to Animal Science majors.

Poultry Management Minor

The Poultry Management minor prepares students for a wide variety of positions in the commercial poultry industry and in many allied services related directly to the industry. Career opportunities are many and varied.

Students have an opportunity to conduct enterprise projects in the production of market eggs, hatching eggs, meat birds, replacement pullets, turkey, and game birds, which give them valuable experience

in production techniques as well as exposure to a number of business activities related to production. Advanced students may have opportunities to study special topics related to problems in management of commercial poultry flocks.

The program is supported by a state-of-the-art poultry production facility. Cal Poly's Poultry Unit is now considered one of the best in the Western United States; it accommodates commercial laying hen operation, egg processing facility, hatching, meat processing facility and battery and floor pen research facilities. These production facilities allow students to gain hands-on learning which complements their formal class work, and provides real-world experience.

Rangeland Resources Minor

The department participates in offering an interdisciplinary minor in Rangeland Resources. Please see College of Agriculture, Food and Environmental Sciences (p. 60) section for more information.

Graduate Programs

Cal Poly offers Master of Science degrees in Agriculture with specialization in Animal Science. Please refer to the MS Agriculture (p. 61) section of the College of Agriculture, Food and Environmental Sciences.

BS Animal Science

Program Learning Objectives

1. Demonstrate problem solving skills.
2. Demonstrate a proficiency in working as a leader and as a part of a team to achieve common goals.
3. Integrate and apply technical and conceptual knowledge.
4. Exhibit an understanding of their professional and ethical responsibilities as animal scientists, including a respect for diversity.
5. Communicate effectively in a professional manner.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

ASCI 101	Introduction to the Animal Sciences	2
ASCI 112	Principles of Animal Science	4
ASCI 211	Meat Science	4
ASCI 220	Introductory Animal Nutrition and Feeding	4
ASCI 229	Anatomy and Physiology of Farm Animals	4
ASCI 290	Animal Production and Management Enterprise	4

or ASCI 490	Advanced Animal Production and Management Enterprise	
ASCI 302	Animal Genetics	4
ASCI 304	Animal Genomics	3
ASCI 340	Animal Welfare and Ethics	4
ASCI 351	Reproductive Physiology	4
ASCI 363	Undergraduate Seminar	2
ASCI 477	Senior Project - Research Experience in Animal Science	3
or ASCI 478	Senior Project - Advanced Internship Experience in Animal Science	
or ASCI 479	Senior Project - Current Topics in Animal Science	

Production Courses

Select one from each of the three categories: 12

Ruminants

ASCI 221	Introduction to Beef Production	
or ASCI 223	Systems of Small Ruminant Management	
or DSCI 230	General Dairy Husbandry	

Nonruminants

ASCI 222	Systems of Swine Production	
or ASCI 225	Introduction to Poultry Management	

Companion Animals or Range Management

ASCI 224	Equine Science	
or ASCI 227	Companion Animal Science	
or ASCI 239	Principles of Rangeland Management	

Biochemistry/Chemistry

Select from the following: 4-5

ASCI 319	Physiological Chemistry of Animals (Upper-division B) ¹	
CHEM 314	Biochemistry: Fundamentals and Applications (Upper-division B) ¹	
CHEM 369	Biochemical Principles (Upper-division B) ¹	

Nutrition

Select from the following: 4

ASCI 346	Equine Nutrition	
ASCI 350	Nonruminant Nutrition	
ASCI 355	Ruminant Nutrition	
ASCI 419	Animal Metabolism and Nutrition	
DSCI 301	Dairy Cattle Nutrition	

Physiology

Select from the following: 4-5

ASCI 333	Equine Reproduction	
ASCI 366	Veterinary Pharmacology	
ASCI 405	Domestic Livestock Endocrinology	
ASCI 406	Applied Animal Embryology and Assisted Reproduction	
ASCI 438	Systemic Animal Physiology	
ASCI 440	Immunology and Diseases of Animals	
ASCI 455	Advanced Equine Reproductive Technologies	
DSCI 321	Lactation Physiology	

DSCI 330	Artificial Insemination and Embryo Biotechnology	
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Approved Electives ^{2,3}

Select 16 units of any course with an ASCI or DSCI prefix at the 300-500 level. 16

SUPPORT COURSES

BIO 111	General Biology (B2 & B3) ¹	4
or BIO 161	Introduction to Cell and Molecular Biology	
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ¹	4
CHEM 128	General Chemistry for Agriculture and Life Science II	4
CHEM 216	Organic Chemistry I ⁴	5
or CHEM 312	Organic Chemistry: Fundamentals and Applications	
MATH 118	Precalculus Algebra (B4) ^{1,5}	4
or MATH 161	Calculus for the Life Sciences I	
STAT 218	Applied Statistics for the Life Sciences (GE Electives) ¹	4

GENERAL EDUCATION (GE)

(see GE program requirements below.) 52

FREE ELECTIVES

Free Electives ⁶ 19-21

4 units of free electives must be at the 300-500 level to ensure completion of the required minimum of 60 units of upper-division courses.

Total units 180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² If a course is taken to meet a Major or Support requirement, it cannot be double-counted in the Approved Elective category.
- ³ The Approved Elective category may include a maximum of 6 units between ASCI 339 or ASCI 490.
- ⁴ CHEM 212 accepted in lieu of CHEM 312, but not for upper-division credit.
- ⁵ MATH 115 or MATH 116, and MATH 117 substitute for MATH 118.
- ⁶ Students should consult a faculty advisor before electing Credit/No Credit grading for any course. Courses elected for Credit/No Credit grading may not be recognized by post-graduate academic programs. If a 500-level course is used to satisfy their free elective requirements it cannot be used towards a graduate program.

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4

A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		52

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

BS Dairy Science

Program Learning Objectives

1. Technical competency within the disciplines of Dairy Science (Dairy Husbandry and Dairy Products Technology), with particular emphasis on the science, industry and practice.
2. Effective communication skills and leadership.
3. An advanced level of critical thinking skills and problem solving capability.
4. The capability of maintaining consistent, professional behavior and performance in a rapidly changing work environment.

5. Strong awareness of society as a whole and of agriculture's place in society.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

ASCI 101	Introduction to the Animal Sciences	2
ASCI 220	Introductory Animal Nutrition and Feeding	4
ASCI 340	Animal Welfare and Ethics	4
ASCI 363	Undergraduate Seminar	2
DSCI 102	Dairy Operations and Safety	2
or ASCI 339	Internship in Animal Science	
DSCI 202	Dairy Promotion and Marketing	4
DSCI 229	General Dairy Manufacturing	4
DSCI 230	General Dairy Husbandry	4
DSCI 233	Milk Processing and Inspection	4
DSCI 241	Dairy Cattle Selection, Breeds, Fitting and Showing	4
DSCI 301	Dairy Cattle Nutrition	4
DSCI 321	Lactation Physiology	4
DSCI 330	Artificial Insemination and Embryo Biotechnology	4
DSCI 333	Dairy Animal Health, Safety and Applied Technology	4
DSCI 422	Breeding and Genetics of Dairy Cattle	4
DSCI 432	Advanced Dairy Herd Management	4
ASCI 477	Senior Project - Research Experience in Animal Science	3
or ASCI 479	Senior Project - Current Topics in Animal Science	

Upper Division Designated Electives

Select from the following:		8
DSCI 401	Physical and Chemical Properties of Dairy Products	
DSCI 402	Quality Assurance and Control of Dairy Products	
DSCI 410	Advanced Dairy Nutrition	
DSCI 412	Dairy Farm Consultation	
DSCI 444	Dairy Microbiology	

SUPPORT COURSES

BIO 111	General Biology (B2 & B3) ^{1,2}	4
or BIO 161	Introduction to Cell and Molecular Biology	
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ¹	4
MATH 118	Precalculus Algebra (B4) ^{1,3}	4

MCRO 221	Microbiology	4
STAT 218	Applied Statistics for the Life Sciences (GE Electives) ¹	4

Approved Electives

At least 7 units must be 300-400 level⁴

Consult with academic advisor regarding career tracks⁵

Select from the following: 30

AGB 212	Agricultural Economics
AGB 214	Agribusiness Financial Accounting
AGB 301	Food and Fiber Marketing
AGB 310	Agribusiness Credit and Finance
AGB 369	Agricultural Personnel Management
AGC 102	Orientation to Agricultural Communication & Agricultural Science
AGC 205	Agricultural Communications
AGC 404	Foundations of Agricultural Leadership
ASCI 112	Principles of Animal Science
ASCI 221	Introduction to Beef Production
ASCI 226	Livestock Evaluation
ASCI 229	Anatomy and Physiology of Farm Animals
ASCI 290	Animal Production and Management Enterprise
ASCI 304	Animal Genomics
ASCI 310	Technical Veterinary Skills
ASCI 311	Advanced Beef Cattle System Management
ASCI 312	Production Medicine
ASCI 319	Physiological Chemistry of Animals
ASCI 351	Reproductive Physiology
ASCI 366	Veterinary Pharmacology
ASCI 405	Domestic Livestock Endocrinology
ASCI 406	Applied Animal Embryology and Assisted Reproduction
ASCI 407	Assisted Reproduction Technologies of Gametes and Embryos Laboratory
ASCI 410	Applied Animal Behavior Science
ASCI 419	Animal Metabolism and Nutrition
ASCI 438	Systemic Animal Physiology
ASCI 440	Immunology and Diseases of Animals
ASCI 490	Advanced Animal Production and Management Enterprise
BIO 150	Diversity and History of Life
BIO 162	Introduction to Organismal Form and Function
BIO 303	Survey of Genetics
BRAE 121	Agricultural Mechanics
BRAE 141	Agricultural Machinery Safety
BUS 212	Financial Accounting for Nonbusiness Majors

CHEM 128	General Chemistry for Agriculture and Life Science II
CHEM 129	General Chemistry for Agriculture and Life Science III
CHEM 216	Organic Chemistry I
CHEM 217	Organic Chemistry II
CHEM 218	Organic Chemistry III
CHEM 220	Organic Chemistry Laboratory For Life Sciences II
CHEM 223	Organic Chemistry Laboratory for Life Sciences III
CHEM 312	Organic Chemistry: Fundamentals and Applications
CHEM 314	Biochemistry: Fundamentals and Applications
CHEM 369	Biochemical Principles
COMS 301	Business and Professional Communication

Any DSCI course

FSN 125	Introduction to Food Science
FSN 204	Food Processing Operations
FSN 230	Elements of Food Processing
FSN 275	Elements of Food Safety
FSN 311	Sensory Evaluation of Food
FSN 330	Principles of Food Engineering
FSN 335	Food Quality Assurance
FSN 370	Food Plant Sanitation and Prerequisite Programs
JOUR 203	News Reporting and Writing
MCRO 342	Public Health Microbiology
MCRO 421	Food Microbiology
NR 141	Introduction to Forest Ecosystem Management
PHYS 121	College Physics I
PHYS 122	College Physics II
PHYS 125	College Physics I Laboratory
PLSC 150	Forage Crops
PLSC 230	Environmental Horticulture
STAT 313	Applied Experimental Design and Regression Models

Any courses used in the following minors:

Agribusiness
Agricultural Communication
Agricultural Education
Agricultural Leadership
Biotechnology
Crop Science
Environmental Soil Science
Equine Science
Food Science
Meat Science and Processing
Poultry Management
Rangeland Resources
Spanish

Water Science	
GENERAL EDUCATION (GE)	
(See GE program requirements below.)	56
FREE ELECTIVES	
Free Electives	5
Total units	180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Students focusing on Dairy Foods should take BIO 161.
- ³ MATH 116 and MATH 117 substitute.
- ⁴ If a course is taken to meet a Major or Support requirement, it cannot be double-counted as an Approved Elective.
- ⁵ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	

D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		56

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Dairy Industries Minor

Required Courses

DSCI 229	General Dairy Manufacturing	4
DSCI 230	General Dairy Husbandry	4

Approved Electives

Select one of the following emphasis areas (at least 13 units must be at the 300-400 level):¹ 18

Dairy Husbandry Area

ASCI 220	Introductory Animal Nutrition and Feeding	
DSCI 102	Dairy Operations and Safety	
DSCI 202	Dairy Promotion and Marketing	
DSCI 241	Dairy Cattle Selection, Breeds, Fitting and Showing	
DSCI 270	Selected Topics	
DSCI 301	Dairy Cattle Nutrition	
DSCI 321	Lactation Physiology	
DSCI 330	Artificial Insemination and Embryo Biotechnology	
DSCI 333	Dairy Animal Health, Safety and Applied Technology	
DSCI 410	Advanced Dairy Nutrition	
DSCI 412	Dairy Farm Consultation	
DSCI 422	Breeding and Genetics of Dairy Cattle	
DSCI 432	Advanced Dairy Herd Management	
DSCI 470	Selected Advanced Topics	

Dairy Foods Area

CHEM 312	Organic Chemistry: Fundamentals and Applications	
CHEM 314	Biochemistry: Fundamentals and Applications	
DSCI 202	Dairy Promotion and Marketing	
DSCI 233	Milk Processing and Inspection	
DSCI 401	Physical and Chemical Properties of Dairy Products	

DSCI 402	Quality Assurance and Control of Dairy Products	
DSCI 444 or MCRO 421	Dairy Microbiology Food Microbiology	
FSN 275 or FSN 375	Elements of Food Safety Food Safety	
MCRO 221	Microbiology	
Total units		26

¹ As a science-based minor, it is assumed that students have completed college introductory courses in biology, chemistry and statistics. In addition, some upper division courses may require microbiology, organic chemistry and/or biochemistry.

Equine Science Minor

Required Courses

ASCI 220	Introductory Animal Nutrition and Feeding	4
ASCI 224	Equine Science	4
ASCI 315 or ASCI 347	Equine Biomechanics Equine Exercise Physiology	3-4
ASCI 333	Equine Reproduction	5
ASCI 346	Equine Nutrition	4
Select from the following:		7
(May not include courses taken as required courses)		
ASCI 214	Equine Management	
ASCI 228	Equine Evaluation	
ASCI 239	Principles of Rangeland Management	
ASCI 315	Equine Biomechanics	
ASCI 324	Advanced Equine Evaluation	
ASCI 339	Internship in Animal Science	
ASCI 344	Equine and Human Communication	
ASCI 345	Equine Behavior Modification	
ASCI 347	Equine Exercise Physiology	
ASCI 490	Advanced Animal Production and Management Enterprise	
Total units		27-28

Meat Science and Processing Minor

Prerequisite: One quarter of chemistry.

Required Courses

ASCI 211	Meat Science	4
ASCI 484 or ASCI 330	Processed Meat Products Poultry Meat Production and Processing	4
ASCI 415	HACCP for Meat and Poultry Operations	3
MCRO 221	Microbiology	4

Selected Courses

Select from the following:		12-15
7 units must be at upper-division level		
ASCI 112	Principles of Animal Science	
ASCI 226	Livestock Evaluation	

ASCI 290	Animal Production and Management Enterprise	
ASCI 339	Internship in Animal Science	
ASCI 450	Computer Applications in Animal Science: Spreadsheet Analysis	
ASCI 479	Senior Project - Current Topics in Animal Science	
ASCI 490	Advanced Animal Production and Management Enterprise	
AG/ASCI 360	Holistic Management	
DSCI 444	Dairy Microbiology	
FSN 125 or FSN 230	Introduction to Food Science Elements of Food Processing	
FSN 370	Food Plant Sanitation and Prerequisite Programs	
MCRO 421	Food Microbiology	
Any upper-division AGB course		
Total units		27-30

Poultry Management Minor

Required Courses

ASCI 225	Introduction to Poultry Management	4
ASCI 325	Egg Production, Processing and Distribution	4
ASCI 330	Poultry Meat Production and Processing	4
ASCI 342	Poultry Business Management	4
ASCI 350	Nonruminant Nutrition	4
ASCI 415	HACCP for Meat and Poultry Operations	3

Approved Electives

Select from the following:		4
AGB 310	Agribusiness Credit and Finance	
ASCI 290 or ASCI 490	Animal Production and Management Enterprise Advanced Animal Production and Management Enterprise	
ASCI 339	Internship in Animal Science	
BUS 212	Financial Accounting for Nonbusiness Majors	
BUS 346	Principles of Marketing	
ENGL 310	Corporate Communication	
FSN 275	Elements of Food Safety	
FSN 334	Food Packaging	
FSN 335	Food Quality Assurance	
FSN 370	Food Plant Sanitation and Prerequisite Programs	

Total units **27**

BioResource & Agricultural Engineering

BioResource & Agricultural Engineering Bldg. (08), Room 101
Phone: 805.756.2378; Fax: 805.756.2626
<https://brae.calpoly.edu>

Department Head: Peter Livingston

Academic Programs

Program name	Program type
Agricultural Systems Management	BS
BioResource and Agricultural Engineering	BS

The department offers two programs leading to a Bachelor of Science degree: BioResource and Agricultural Engineering and Agricultural Systems Management.

The BioResource and Agricultural Engineering Department is an engineering-based educational organization consisting of professionals whose mission is the study, teaching, and practice of engineering and systems management support for agriculture. The department is nationally recognized as a leader in this field, and for balancing theory with application and principle with practice.

Department facilities include well-equipped laboratories for hydraulic systems, evaluation and testing of power units, fabrication of agricultural machinery, agricultural electrical systems, design and construction of agricultural structures, photogrammetry, microcomputers and controllers.

Outdoor facilities include a water resources center with multiple pumping systems and operational canals, a field for evaluation of various irrigation systems including an operating linear move and land for experience in the mechanical production of farm products and safe operation of agricultural machinery.

Students are encouraged to participate in the student clubs of the department. The Agricultural Engineering Society is involved in a broad range of activities and services including Open House displays. The student branch of the American Society of Agricultural and Biological Engineers offers professional and co-curricular activities.

Undergraduate Programs

BS Agricultural Systems Management

The mission of the Agricultural Systems Management (ASM) program is to provide a "learn by doing" undergraduate educational experience that prepares students for systems management practice in support of agriculture and related industries throughout the West. The ASM program is ABET accredited by the Engineering Technology Accreditation Commission.

Students receive broad agricultural training with a business and management emphasis in one of the following areas: project management, construction management, plant production, livestock production, food and fiber processing, environmental information management, water/irrigation, and processing and manufacturing. Students have the opportunity to develop management expertise through interdisciplinary experiences in agricultural technology and business-oriented coursework.

The objectives of the ASM program are to produce graduates who, in 3-5 years after graduation, are successful as one of the following:

- Individuals that are successful in technical, business, or management positions within agriculture or related industries
- Adapting to new challenges and opportunities through the application of acquire knowledge in agricultural systems management
- Actively pursuing professional development such as a degree in an advanced degree program, professional license, or technical certification

Agricultural Systems Management graduates demonstrate a knowledge and understanding of basic agricultural technologies and agribusiness principles necessary for technical operations and business management careers in agriculture and related industries; an understanding of modern science and practice within a specialized agricultural area of interest; and ability to apply quantitative, analytical processes for developing solutions to technological, business or management problems associated with production, processing, or the distribution of products and support services in agriculture and related industries; an understanding of the interconnected "systems" of agriculture; and ability to safely and properly handle the materials, machines, sensors, tools and techniques of modern agricultural or technical operations; and an ability to communicate and perform as effective agricultural systems management professionals in the solution of problems crossing discipline or cultural boundaries.

Career opportunities are available in the manufacturing, sales, service of agricultural equipment and machinery; construction management, management and production of animals and crops; processing of food and fiber; and management of water/irrigation facilities. The program is recognized by the American Society of Agricultural and Biological Engineers and is ABET accredited.

BS BioResource and Agricultural Engineering

The bioresource and agricultural engineering program develops one of the most versatile types of engineer, adept at utilizing electrical and mechanical energy sources, water resources, and designing structural units. The curriculum features a unique combination of engineering and applied science coursework, with a focus on preparing graduates for practice in professional engineering.

The mission of the BioResource and Agricultural Engineering program is to provide a "learn by doing" undergraduate educational experience that prepares students for engineering practice in support of agriculture and related industries throughout the West.

The objectives of the BioResource and Agricultural Engineering program are to produce graduates who, in 3-5 years after graduation, are successful as one of the following:

- Engineers in positions of professional responsibility and leadership in a modern multi-disciplinary, system-oriented environment that emphasizes problem solving
- Actively pursuing professional development such as a degree in an advanced degree program, professional license, or technical certification

- Applying unique engineering problem-solving skills and principles within a career outside traditional engineering environments, such as management, teaching, research, or other professional fields

BioResource and Agricultural Engineering graduates demonstrate a knowledge and understanding of the basic mathematics, physical and engineering sciences necessary for modern agricultural engineering practice; the ability to design components, systems or processes to meet specified objectives, including prudent use of resources; an understanding of their professional and ethical responsibilities as agricultural engineers, including the societal impact of engineering solutions and the need to engage in life-long learning; the ability to plan, design, execute and evaluate engineering solutions to problems/projects that are real, practical and of a complexity representative of projects encountered in beginning professional practice; and the ability to communicate and perform as effective engineering professionals in both individual and team-based project environments.

Cal Poly's "learn by doing" philosophy is emphasized by the numerous design-centered laboratories and the senior project. In the senior design project, which is completed in a three-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

Consistent with program accreditation requirements regarding a graduate's ability to function on teams, the BioResource and Agricultural Engineering program has adopted an explicit graduation requirement in this area. This provides students an opportunity to practice team skills. Such experience is important for practicing engineers given the ever-increasing diversity of engineering science and applications. Methods to fulfill this requirement include items such as:

- Team design project
- CO-OP or internship employment
- Certain club activities
- Working with faculty on a sponsored project
- Project embedded in curriculum
- Taking certain technical electives
- Service learning project

Career opportunities exist in the design, evaluation and management of systems – water resources, irrigation, drainage, groundwater, pumps, soil conservation; agricultural power and machinery; food processing; energy; and agricultural environments. The program is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

Minors

The department participates in offering interdisciplinary minors in Water Science and Geographic Information Systems. Please see College of Agriculture, Food and Environmental Sciences (p. 60) section for more information.

Graduate Program

Cal Poly offers the MS in Agriculture with specializations in BioResource and Agricultural Systems and in Irrigation, and Water Engineering. Please see College of Agriculture, Food and Environmental Sciences (p. 60) section for more information.

BS Agricultural Systems Management

Program Learning Objectives

1. An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline;
2. An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
3. An ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
4. An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and
5. An ability to function effectively as a member or leader on a technical team.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

BRAE 128	Careers in Bioresource and Agricultural Engineering	2
BRAE 129	Laboratory Skills and Safety	1
BRAE 142	Agricultural Power and Machinery Management	4
BRAE 150	Design Graphics and CAD for Agricultural Engineering	2
BRAE 152	3-D Solids Modeling	1
BRAE 203	Agricultural Systems Analysis	4
BRAE 237 or BRAE 239	Introduction to Engineering Surveying Engineering Surveying	2-4
BRAE 301	Hydraulic and Mechanical Power Systems	4
BRAE 317	Agricultural Systems Management Theory	4
BRAE 321	Agricultural Safety	3
BRAE 324	Principles of Agricultural Electrification	4
BRAE 340	Irrigation Water Management	4
BRAE 342	Agricultural Materials	4
BRAE 343	Mechanical Systems Analysis	4
BRAE 348	Energy for a Sustainable Society (Upper-Division B) ¹	4
BRAE 418	Agricultural Systems Management I	4
BRAE 419	Agricultural Systems Management II	4

BRAE 425	Computer Controls for Agriculture	3
BRAE 432	Agricultural Buildings	4
BRAE 438	Drip/Micro Irrigation ²	4
or BRAE 440	Agricultural Irrigation Systems	
BRAE 460	Senior Project Organization	1
BRAE 465	Senior Project Operation, Testing, and Safety	2
Approved Electives^{2, 3}		
See Approved Electives below		12
SUPPORT COURSES		
AGB 212	Agricultural Economics	4
AGB 260	Agribusiness Data Literacy	4
AGB 310	Agribusiness Credit and Finance	4
AGB 369	Agricultural Personnel Management	4
BUS 212	Financial Accounting for Nonbusiness Majors	4
or AGB 214	Agribusiness Financial Accounting	
CHEM 110	World of Chemistry (B1 & B3) ¹	4
or CHEM 127	General Chemistry for Agriculture and Life Science I	
ENGL 147	Writing Arguments about STEM (A3) ¹	4
Select from the following:		4
MATH 119	Precalculus Trigonometry (B4) ¹	
STAT 217	Introduction to Statistical Concepts and Methods (B4) ¹	
STAT 218	Applied Statistics for the Life Sciences (B4) ¹	
MATH 221	Calculus for Business and Economics (GE Electives) ¹	4
PHYS 121	College Physics I	4
SS 120	Introductory Soil Science	4
Animal or Plant Production Course		
Any ASCI, DSCI, PLSC course except for internship or enterprise courses.		3
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		52
FREE ELECTIVES		
Free Electives		0
Total units		180-182

Approved Electives

Minimum of 9 units must be upper division

No more than 4 units of internship or enterprise may be used

Select from the following:		12
Any AGB course eligible for the Agribusiness minor		
AGC 102	Orientation to Agricultural Communication & Agricultural Science	
BRAE 200	Special Problems for Undergraduates (4 units maximum)	
BRAE 236	Principles of Irrigation	
BRAE 302	Servo Hydraulics	
BRAE 331	Irrigation Theory	

BRAE 333	Aquacultural Engineering
BRAE 335	Internal Combustion Engines
BRAE 337	Landscape Irrigation
BRAE 344	Fabrication Systems
BRAE 345	Aerial Photogrammetry and Remote Sensing
BRAE/NR 349	Water for a Sustainable Society
BRAE 400	Special Problems (4 units maximum)
BRAE 405	Chemigation
BRAE/EE 434	Automotive Engineering for a Sustainable Future
BRAE 435	Drainage
BRAE 436	Food and Agriculture Process Water Engineering
BRAE 438	Drip/Micro Irrigation
or BRAE 440	Agricultural Irrigation Systems
BRAE 447	Advanced Surveying with GIS Applications
BRAE 448	Bioconversion
BRAE 450	Solar Photovoltaic System Engineering
BRAE 532	Water Wells and Pumps
BRAE 533	Irrigation Project Design
CHEM 212	Introduction to Organic Chemistry
FSN 125	Introduction to Food Science
FSN 204	Food Processing Operations
FSN 230	Elements of Food Processing
FSN 275	Elements of Food Safety
FSN 330	Principles of Food Engineering
FSN 334	Food Packaging
FSN 340	Fermented Foods
FSN 354	Packaging Function in Food Processing
FSN 370	Food Plant Sanitation and Prerequisite Programs
FSN 375	Food Safety
FSN 444	Food Engineering
IME 141	Manufacturing Processes: Net Shape
IME 142	Manufacturing Processes: Materials Joining
IME 143	Manufacturing Processes: Material Removal
IME 144	Introduction to Design and Manufacturing
IME 319	Human Factors Engineering
IME 320	Human Factors and Technology
ITP 330	Packaging Fundamentals
ITP 341	Packaging Polymers and Processing
NR/LA 218	Introduction to Geographic Information Systems (GIS)
NR 306	Natural Resource Ecology and Habitat Management
NR/CRP 408	Water Resource Law and Policy

NR 416	Environmental Impact Analysis and Management
SS 221	Soil Health and Plant Nutrition
Animal or Plant Production Course	
Any ASCI, DSCI, PLSC course except for internship or enterprise courses	

Total units 12

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² If a course is taken to meet a Major requirement, it cannot be double-counted as an Approved Elective.
- ³ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking (4 units in Support) ¹	0
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	

D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		52

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

BS BioResource and Agricultural Engineering

Program Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

BRAE 128	Careers in Bioresource and Agricultural Engineering	2
BRAE 129	Laboratory Skills and Safety	1
BRAE 150	Design Graphics and CAD for Agricultural Engineering	2
BRAE 152	3-D Solids Modeling	1
BRAE 216	Fundamentals of Electricity	4
BRAE 232	Agricultural Structures Planning	4
BRAE 234	Introduction to Mechanical Systems in Agriculture	4
BRAE 236	Principles of Irrigation	4
BRAE 239	Engineering Surveying	4
BRAE 312	Hydraulics	4
BRAE 320	Principles of Bioresource Engineering	4
BRAE 328	Measurements and Computer Interfacing	4
BRAE 331	Irrigation Theory	3
BRAE 332	Environmental Controls for Agricultural Structures	4
BRAE 403	Agricultural Systems Engineering	4
BRAE 414	Irrigation Engineering	4
BRAE 421	Equipment Engineering I	4
BRAE 422	Equipment Engineering II	4
BRAE 428	Agricultural Robotics and Automation	4
BRAE 433	Agricultural Structures Design	4
BRAE 460	Senior Project Organization	1
BRAE 465	Senior Project Operation, Testing, and Safety	2
Approved Electives ¹		
Select from the following:		6-8
BRAE 302	Servo Hydraulics	
BRAE 333	Aquacultural Engineering	
BRAE 335	Internal Combustion Engines	
BRAE 345	Aerial Photogrammetry and Remote Sensing	
BRAE 348	Energy for a Sustainable Society	
BRAE/NR 349	Water for a Sustainable Society	
BRAE 400	Special Problems (4 units maximum)	
BRAE 405	Chemigation	
BRAE/EE 434	Automotive Engineering for a Sustainable Future	
BRAE 435	Drainage	
BRAE 436	Food and Agriculture Process Water Engineering	
BRAE 447	Advanced Surveying with GIS Applications	
BRAE 448	Bioconversion	
BRAE 450	Solar Photovoltaic System Engineering	
BRAE 532	Water Wells and Pumps	
BRAE 533	Irrigation Project Design	
CHEM 312	Organic Chemistry: Fundamentals and Applications	

IME 319	Human Factors Engineering	
MCRO 421	Food Microbiology	
any upper-division CE course		
any upper-division EE course		
any upper-division ENVE course		
any upper-division ME course		
SUPPORT COURSES		
BRAE 220	Introduction to Biological Systems (B2) ²	4
or MCRO 221	Microbiology	
CE 204	Mechanics of Materials I	3
CE 207	Mechanics of Materials II	2
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ²	4
CHEM 125	General Chemistry for Physical Science and Engineering II (Area B Electives) ²	4
Select from the following:		2-3
CSC 231	Programming for Engineering Students	
or CSC 232	Computer Programming for Scientists and Engineers	
or CSC 234	C and Unix	
ECON 201	Survey of Economics (Area D Elective) ²	4
or ECON 222	Macroeconomics	
EE 321 & EE 361	Electronics and Electronics Laboratory	4
ENGL 147	Writing Arguments about STEM (A3) ²	4
MATH 141	Calculus I (B4) ²	4
MATH 142	Calculus II (B4) ²	4
MATH 143	Calculus III (Area B Electives) ²	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
ME 211	Engineering Statics	3
ME 212	Engineering Dynamics	3
PHYS 141	General Physics I	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
STAT 312	Statistical Methods for Engineers (Upper-Division B) ²	4
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		36
FREE ELECTIVES		
Free Electives		0
Total units		187-190

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² Required in Major or Support; also satisfies General Education (GE) requirement.

General Education (GE) Requirements

- 72 units required, 36 of which are specified in Major and/or Support.
- If any of the remaining 36 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking (4 units in Support) ¹	0
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
	Upper-Division B (4 units in Support) ¹	0
	Area B Electives (8 units in Support) ¹	0
Area C	Arts and Humanities	
	Lower-division courses in Area C must come from three different subject prefixes.	
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
	Lower-Division C Elective - Select a course from either C1 or C2.	4
	Upper-Division C	4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
	Area D Elective - Select either a lower-division D2 or upper-division D course. (4 units in Support) ¹	0
Area E	Lifelong Learning and Self-Development	
	Lower-Division E	4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		36

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Experience Industry Management

Agricultural Sciences Bldg. (11), Room 261

Phone: 805.756.1288

<https://eim.calpoly.edu>

Department Head: Joey Gray

ACADEMIC PROGRAMS

Program name	Program type
Event Planning and Experience Management	Minor
Recreation, Parks, & Tourism Administration	BS

The Experience Industry is a cornerstone of American culture and critical to both the United States and global economies. Globally, the experience industry sees approximately \$980 billion in spending; in the United States, international tourism generates approximately \$250 billion and the US is consistently ranked as one of the top tourism earners in the world. The experience industry includes (but is not limited to) event planning, sport management, travel, hospitality, tourism, destination management, leisure, and parks and recreation, providing structured and co-created experiences that contribute to quality of life, economic vitality, sustainability, and social equity. The industry offers numerous experience management employment opportunities, both in the United States and abroad.

Students are prepared for professional employment in destination management and marketing, corporate, mega, and social event planning, sport promotion and game-day operations, experiential marketing, hospitality management, tourism operations, park management, community recreation, employee experiences, outdoor recreation leadership, and convention and meeting management. Students select a concentration in event planning and experience management; tourism, hospitality, and destination management; and sport and recreation management.

To prepare students for their professional careers, the major includes a required 400-hour internship (one quarter) with an organization within the experience industry management umbrella. Students must also complete 1,000 hours of paid or volunteer experience prior to the internship.

Graduates employed nationally and internationally strategize, design, create, plan, organize, execute and evaluate experience industry programs and services for visitors, guests, customers, and clients in a variety of settings. Management, marketing, and planning skills, developed through coursework and through practical, hands-on applications, allow for career progress into executive management positions within the experience industry.

Students develop those competencies through a myriad of partnerships developed by the department with local, state, national, and international organizations. These partnerships allow students, both in and out of the classroom, to gain valuable Learn by Doing experiences that set them apart from other entry-level professionals in the global market.

Undergraduate Programs

BS Recreation, Parks, and Tourism Administration

The Experience Industry Management (EIM) department prepares students to be leaders in an industry that promotes healthy lifestyles,

protects memorable places, and facilitates life-enhancing experiences for individuals, communities, and the global society. The program is accredited by the Council on Accreditation of Parks, Recreation, Tourism and Related Professions (COAPRT).

In addition to major requirements, the curriculum provides a full range of general education and support courses. These courses are designed to fully educate and prepare students for culturally diverse and inclusive environments, community engagement, and international understanding in a global society.

Concentrations

Event Planning & Experience Management

Prepares students for a professional career in experience design, event planning, leadership, and management for a variety of structured and co-created experiences, including festivals, celebrations, conventions, meetings, and expositions, social life-cycle events, mega and hallmark events, sporting, international, and non-profit events. Courses focus on strategic event planning, marketing, structured experience and co-created experience design, implementation, and management.

Sport & Recreation Management

Prepares students for management positions with sport and recreation entities ranging from professional sport franchises to community nonprofit organizations to adventure recreation outlets and intercollegiate athletic programs. Career elective tracks include: Professional Sport and Intercollegiate Athletics, Adventure Sport and Outdoor Recreation, Coaching and Sports-Based Youth Development, and Community and Nonprofit Recreation. Areas of study include: sport marketing and promotions, sport and environmental ethics, leadership and facilitation, special event planning, sports-based youth development, community relations, grant funding and development, and coaching.

Tourism, Hospitality & Destination Management

Prepares students for a professional career with organizations that provide experience industry products or services for national and international tourists. Students may choose to emphasize in areas such as resort and lodging experience management, tourism planning and destination management, food and beverage experience management, tour operations, tourism, hospitality, and destination marketing, and entrepreneurship.

Event Planning & Experience Management Minor

This minor prepares students for a professional career in experience design, event planning, leadership, and management for a variety of event genres including corporate events, conventions, festivals, meetings, exhibitions, mega and hallmark events, sporting, international, and non-profit events. Principles of experience design, structured and co-created experiences will be explored. Courses focus on strategic event design, planning, implementation, and management. Not open to RPTA majors. See department head to apply.

BS Recreation, Parks, and Tourism Administration

Program Learning Objectives

At the completion of this degree program, EIM students will be able to:

1. Think critically and creatively.
2. Communicate effectively.
3. Demonstrate their expertise in the Experience Industry and its associated industries in relation to the larger world of arts, sciences, and technology.
4. Work productively as individuals and in groups.
5. Use their knowledge and skills to make a positive contribution to society.
6. Make reasoned decisions based on an understanding of ethics, a respect for diversity, and an awareness related to sustainability.
7. Engage in lifelong learning.
8. Demonstrate the following entry-level knowledge in the Experience Industry Management field: a) the nature and scope of the experience industry; b) techniques and processes used by professionals and workers in the experience industry; and c) the foundations of the profession in history, science, and philosophy (COAPRT Standard 7.01).
9. Demonstrate the ability to design, implement, and evaluate services that facilitate targeted human experiences and that embrace personal and cultural dimensions of diversity (COAPRT Standard 7.02).
10. Demonstrate entry-level knowledge about operations and strategic management/administration in the experience industry (COAPRT Standard 7.03).
11. Demonstrate, through a comprehensive internship of not less than 400 clock hours and no fewer than 10 weeks, the potential to succeed as professionals at supervisory or higher levels in the experience industry (COAPRT Standard 7.04).

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

RPTA 101	Introduction to the Experience Industry	4
RPTA 110	Orientation and College Success in Experience Industry Management	1
RPTA 121	Theories and Frameworks of Experience Design	4
RPTA 210	Experience Design	4
RPTA 255	Leadership and Diverse Groups (E) ¹	4
RPTA 313	Sustainability in the Experience Industry	4
or RPTA 413	Tourism and Protected Area Management	
RPTA 342	Risk Management for the Experience Industry	4
RPTA 360	Assessment and Evaluation of Experience Industry Management	4

RPTA 370	Experiential Marketing Strategies for Experience Industry Management	4
RPTA 405	Principles of Experience Industry Management	4
RPTA 416	Interpreting Experience Industry Data Analytics	4
RPTA 424	Financial Management in the Experience Industry	4
RPTA 460	Senior Project in Experience Industry Management	4
RPTA 463	Pre-Internship Seminar	1
RPTA 465	Internship	12
Concentration or Individualized Course of Study courses (see below)		24

SUPPORT COURSES

BUS 212	Financial Accounting for Nonbusiness Majors ²	4
or AGB 214	Agribusiness Financial Accounting	
BUS 215	Managerial Accounting	4
or AGB 323	Decision Making with Agribusiness Accounting Information	
BUS 346	Principles of Marketing	4
ECON 201	Survey of Economics (D2) ¹	4
or ECON 222	Macroeconomics	
ENGL 310	Corporate Communication	4
MATH 118	Precalculus Algebra (B4) ^{1,3}	4
or MATH 119	Precalculus Trigonometry	
or MATH 221	Calculus for Business and Economics	
STAT 217	Introduction to Statistical Concepts and Methods (GE Electives) ¹	4
or STAT 251	Statistical Inference for Management I	

GENERAL EDUCATION (GE)

(See GE program requirements below.) 56

FREE ELECTIVES

Free Electives ⁴ 10

Total units 180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Choose either BUS or AGB route. BUS 212 is a prerequisite for BUS 215 and AGB 214 is a prerequisite for AGB 323.
- ³ MATH 116 and MATH 117 substitute.
- ⁴ If a General Education (GE) course is used to satisfy a Major, Support, or Concentration requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentrations (Select one)

- Event Planning and Experience Management (p. 100)
- Sport & Recreation Management (p. 101)
- Tourism, Hospitality and Destination Management (p. 102)

Individualized Course of Study

A minimum of 24 units of coursework, of which a minimum of 12 units must have a RPTA prefix, and a minimum of 4 units must be upper-division. Courses are selected by the student in consultation with the

student's academic advisor, and the Individualized Course of Study must be approved by the academic advisor. If choosing a minor, the Minor Agreement form must be completed and submitted, and the required 12 units of RPTA prefix coursework may be waived.

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Support) ¹	0
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Major) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		

GE Electives (4 units in Support plus 4 units in GE) ¹	4
Total units	56

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Event Planning and Experience Management Concentration

RPTA 114	Introduction to Hospitality and Travel	4
RPTA 317	Hospitality, Convention and Meeting Management	4
RPTA 320	Strategic Event Planning	4
RPTA 420	Strategic Event Implementation	4
Approved Electives ^{1, 2}		
Select from the following, with a minimum of 4 units upper-division:		8
BUS 207	Legal Responsibilities of Business	
BUS 418	Listening to the Customer	
BUS 419	Strategic Marketing Measurement	
BUS 421	Marketing Analytics and Business Intelligence	
COMS 211	Interpersonal Communication	
COMS 301	Business and Professional Communication	
COMS 384	Media Effects	
FSN 121	Fundamentals of Food	
FSN 202	Introduction to Human Nutrition	
FSN 250	Food and Nutrition: Culture and Customs (USCP)	
FSN 275	Elements of Food Safety	
FSN 319	The Science of Food for the Consumer	
FSN 321	Contemporary Issues in Food Choice and Preparation	
FSN 340	Fermented Foods	
FSN 343	Foodservice Operations I	
FSN 344	Foodservice Operations II	
GRC 376	Web and Print Publishing	
JOUR 312	Public Relations	
JOUR 331	Contemporary Advertising	
JOUR 342	Public Relations Writing and Editing	
KINE 181	Responding to Emergencies: Comprehensive First Aid, CPR, AED	
MSL/RPTA 275	Facilitation and Teambuilding	
PLSC 215	Floral Design I	
PLSC 225	Floral Design II	
RPTA 216	Resort and Lodging Operations	
RPTA 314	Sustainable Travel and Tourism Planning	
RPTA 318	Destination Marketing & Management	
RPTA 321	Visitor Services in Experience Industry Management	

RPTA 323	Sport Marketing and the Fan Experience	
RPTA 330	Directed Field Experience ³	
RPTA 350	Sport and Event Venue Management	
RPTA 400	Special Problems for Advanced Undergraduates	
RPTA 412	Advanced Experience Industry Management Applications	
RPTA 450	Resource and Grant Development	
RPTA/NR 472	Leadership Practice	
STAT 252	Statistical Inference for Management II	
TH 230 or TH 330	Stagecraft I Stagecraft II	
WVIT 102	Global Wine and Viticulture	
WVIT 343	Branded Wine Marketing	
WVIT 344	Direct to Consumer Wine Sales	
WVIT 345	Wine Marketing Research and Market Analysis	
WVIT 433	Wine Sales and E-Commerce	

Total units **24**

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² If any of these courses are taken to meet a Support Elective area requirement, they cannot be double-counted as a concentration advisor approved elective.

³ A maximum of 4 units of RPTA 330 may be applied to Approved Electives.

Sport & Recreation Management Concentration

RPTA 160 or RPTA 112	Introduction to Sport Management Introduction to Parks and Outdoor Recreation	4
RPTA 260 or RPTA 275	Community Relations and Sports-Based Youth Development Facilitation and Teambuilding	2-4
RPTA 323 or RPTA 325	Sport Marketing and the Fan Experience Leadership in Outdoor Experiences	4

Approved Electives ^{1, 2, 3}

Select from the following, with a minimum of 4 units upper-division: 12-14

Professional Sports & Intercollegiate Athletics

BUS 207	Legal Responsibilities of Business	
BUS 302	International and Cross Cultural Management	
BUS 310	Introduction to Entrepreneurship	
BUS 382	Leadership and Organizations	
BUS 384	Human Resources Management	
BUS 387	Organizational Behavior	
BUS 418	Listening to the Customer	
BUS 419	Strategic Marketing Measurement	

BUS 421	Marketing Analytics and Business Intelligence	
BUS 446	International Marketing	
COMS 213	Organizational Communication	
COMS 301	Business and Professional Communication	
ECON 221	Microeconomics	
GRC 376	Web and Print Publishing	
JOUR 331	Contemporary Advertising	
JOUR 342	Public Relations Writing and Editing	
KINE 266	Sport and Exercise Psychology	
KINE 323	Sport and Gender (USCP)	
KINE 324	Sports, Media and American Popular Culture (USCP)	
PLSC 343	Turfgrass Management	
PLSC 432	Specialized Operations for Golf Courses and Athletic Fields	
RPTA 313	Sustainability in the Experience Industry	
RPTA 320	Strategic Event Planning	
RPTA 321	Visitor Services in Experience Industry Management	
RPTA 323	Sport Marketing and the Fan Experience	
RPTA 330	Directed Field Experience ⁴	
RPTA 350	Sport and Event Venue Management	
RPTA 400	Special Problems for Advanced Undergraduates	
RPTA 412	Advanced Experience Industry Management Applications	
RPTA 420	Strategic Event Implementation	
RPTA/NR 472	Leadership Practice	

Adventure Sport & Outdoor Recreation

KINE 181	Responding to Emergencies: Comprehensive First Aid, CPR, AED	
MSL 111	Orienteering	
PLSC 437	Park and Public Space Management	
NR 141	Introduction to Forest Ecosystem Management	
NR 142	Environmental Management	
NR/LA 218	Introduction to Geographic Information Systems (GIS)	
NR/RPTA 328	Environmental Leadership and Community Engagement	
RPTA 112	Introduction to Parks and Outdoor Recreation	
RPTA 114	Introduction to Hospitality and Travel	
RPTA/NR 203	Resource Law Enforcement	
RPTA 302	Environmental and Wilderness Education	
RPTA 313	Sustainability in the Experience Industry	
RPTA 314	Sustainable Travel and Tourism Planning	

RPTA 318	Destination Marketing & Management
RPTA 320	Strategic Event Planning
RPTA 321	Visitor Services in Experience Industry Management
RPTA 325	Leadership in Outdoor Experiences
RPTA 330	Directed Field Experience ⁴
RPTA 400	Special Problems for Advanced Undergraduates
RPTA 412	Advanced Experience Industry Management Applications
RPTA/NR 472	Leadership Practice
UNIV 350	The Global Environment
UNIV 391	Appropriate Technology for the World's People: Development

Coaching & Sports-Based Youth Development

CD/PSY 256	Developmental Psychology
KINE 181	Responding to Emergencies: Comprehensive First Aid, CPR, AED
KINE 266	Sport and Exercise Psychology
KINE 323	Sport and Gender
KINE 324	Sports, Media and American Popular Culture
RPTA 320	Strategic Event Planning
RPTA 321	Visitor Services in Experience Industry Management
RPTA 323	Sport Marketing and the Fan Experience
RPTA 330	Directed Field Experience ⁴
RPTA 350	Sport and Event Venue Management
RPTA 400	Special Problems for Advanced Undergraduates
RPTA 412	Advanced Experience Industry Management Applications
RPTA 420	Strategic Event Implementation
RPTA/NR 472	Leadership Practice

Community & Nonprofit Recreation

CD/PSY 256	Developmental Psychology
COMS 213	Organizational Communication
COMS 301	Business and Professional Communication
CRP 211	Cities: Form, Culture and Evolution
CRP 212	Introduction to Urban Planning
ECON 221	Microeconomics
GRC 376	Web and Print Publishing
JOUR 331	Contemporary Advertising
JOUR 342	Public Relations Writing and Editing
KINE 181	Responding to Emergencies: Comprehensive First Aid, CPR, AED
PLSC 343	Turfgrass Management
PLSC 432	Specialized Operations for Golf Courses and Athletic Fields
PLSC 437	Park and Public Space Management
POLS 112	American and California Government

POLS 351	Public Policy and Administration
RPTA 320	Strategic Event Planning
RPTA 321	Visitor Services in Experience Industry Management
RPTA 330	Directed Field Experience ⁴
RPTA 350	Sport and Event Venue Management
RPTA 400	Special Problems for Advanced Undergraduates
RPTA 412	Advanced Experience Industry Management Applications
RPTA 420	Strategic Event Implementation
RPTA 450	Resource and Grant Development
RPTA/NR 472	Leadership Practice

Total units **24**

- ¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ² If any of these courses are taken to meet a support elective area requirement, they cannot be double-counted as an Approved Elective.
- ³ Students interested in any of the sport/community career elective areas will take RPTA 160, RPTA 260 and RPTA 323, and 12 units of Advisor Approved Electives. Students interested in any of the outdoor recreation career elective areas will take RPTA 112, RPTA 275 and RPTA 325, and 14 units of Advisor Approved Electives.
- ⁴ A maximum of 4 units of RPTA 330 may be applied to Approved Electives.

Tourism, Hospitality, and Destination Management Concentration

RPTA 114	Introduction to Hospitality and Travel	4
RPTA 216	Resort and Lodging Operations	4
RPTA 317	Hospitality, Convention and Meeting Management	4
RPTA 318	Destination Marketing & Management	4

Approved Electives ^{1, 2}Select from the following, with a minimum of 4 units upper-division: **8****Resort & Lodging Experience Management**

AGB 260	Agribusiness Data Literacy
AGB 327	Agribusiness Data Analysis
AGC 301	New Media Communication Strategies in Agriculture
BUS 207	Legal Responsibilities of Business
BUS 302	International and Cross Cultural Management
BUS 382	Leadership and Organizations
BUS 418	Listening to the Customer
BUS 419	Strategic Marketing Measurement
BUS 421	Marketing Analytics and Business Intelligence
BUS 446	International Marketing
ECON 221	Microeconomics

GRC 376	Web and Print Publishing
JOUR 312	Public Relations
PSC/UNIV 391	Appropriate Technology for the World's People: Development
RPTA 314	Sustainable Travel and Tourism Planning
RPTA 321	Visitor Services in Experience Industry Management
RPTA 330	Directed Field Experience ³
RPTA 350	Sport and Event Venue Management
RPTA 393	Hospitality Sales and Service
RPTA 400	Special Problems for Advanced Undergraduates
RPTA 412	Advanced Experience Industry Management Applications
RPTA 450	Resource and Grant Development
RPTA/NR 472	Leadership Practice
STAT 252	Statistical Inference for Management II
WVIT 343	Branded Wine Marketing
WVIT 433	Wine Sales and E-Commerce
Tourism Planning & Destination Management	
BUS 207	Legal Responsibilities of Business
BUS 302	International and Cross Cultural Management
BUS 310	Introduction to Entrepreneurship
BUS 418	Listening to the Customer
COMS 201	Advanced Public Speaking
COMS 211	Interpersonal Communication
CRP 212	Introduction to Urban Planning
CRP 214	Land Use and Transportation Studies
CRP/ES 215	Planning for and with Multiple Publics
CRP 334	Cities in a Global World
ECON 221	Microeconomics
GEOG 308	Global Geography
GRC 376	Web and Print Publishing
JOUR 312	Public Relations
JOUR 331	Contemporary Advertising
JOUR 342	Public Relations Writing and Editing
PSY 201	General Psychology
PSY 252	Social Psychology
RPTA 314	Sustainable Travel and Tourism Planning
RPTA 320	Strategic Event Planning
RPTA 321	Visitor Services in Experience Industry Management
RPTA 330	Directed Field Experience ³
RPTA 350	Sport and Event Venue Management
RPTA 400	Special Problems for Advanced Undergraduates
RPTA 412	Advanced Experience Industry Management Applications
RPTA 420	Strategic Event Implementation
RPTA 450	Resource and Grant Development
RPTA/NR 472	Leadership Practice
WVIT 102	Global Wine and Viticulture
WVIT 343	Branded Wine Marketing
WVIT 344	Direct to Consumer Wine Sales
WVIT 345	Wine Marketing Research and Market Analysis
WVIT 433	Wine Sales and E-Commerce
RPTA 420	Strategic Event Implementation

RPTA 450	Resource and Grant Development
RPTA/NR 472	Leadership Practice
WVIT 343	Branded Wine Marketing
WVIT 345	Wine Marketing Research and Market Analysis
WVIT 433	Wine Sales and E-Commerce
Food & Beverage Experience Management	
BUS 207	Legal Responsibilities of Business
BUS 302	International and Cross Cultural Management
BUS 310	Introduction to Entrepreneurship
BUS 418	Listening to the Customer
BUS 446	International Marketing
COMS 201	Advanced Public Speaking
ECON 221	Microeconomics
FSN 121	Fundamentals of Food
FSN 202	Introduction to Human Nutrition
FSN 250	Food and Nutrition: Culture and Customs (USCP)
FSN 275	Elements of Food Safety
FSN 319	The Science of Food for the Consumer
FSN 321	Contemporary Issues in Food Choice and Preparation
FSN 340	Fermented Foods
FSN 343	Foodservice Operations I
FSN 344	Foodservice Operations II
GRC 376	Web and Print Publishing
JOUR 312	Public Relations
JOUR 331	Contemporary Advertising
JOUR 342	Public Relations Writing and Editing
RPTA 314	Sustainable Travel and Tourism Planning
RPTA 320	Strategic Event Planning
RPTA 321	Visitor Services in Experience Industry Management
RPTA 330	Directed Field Experience ³
RPTA 350	Sport and Event Venue Management
RPTA 400	Special Problems for Advanced Undergraduates
RPTA 412	Advanced Experience Industry Management Applications
RPTA 420	Strategic Event Implementation
RPTA 450	Resource and Grant Development
RPTA/NR 472	Leadership Practice
WVIT 102	Global Wine and Viticulture
WVIT 343	Branded Wine Marketing
WVIT 344	Direct to Consumer Wine Sales
WVIT 345	Wine Marketing Research and Market Analysis
WVIT 433	Wine Sales and E-Commerce

Total units**24**

- ¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ² If any of these courses is taken to meet a support elective area requirement, it cannot be double-counted as an Approved Elective.
- ³ A maximum of 4 units of RPTA 330 may be applied to Approved Electives.

Event Planning and Experience Management Minor

Required Courses

RPTA 317	Hospitality, Convention and Meeting Management	4
RPTA 320	Strategic Event Planning	4
RPTA 370	Experiential Marketing Strategies for Experience Industry Management	4
RPTA 420	Strategic Event Implementation	4

Approved Electives

Select from the following:		8
RPTA 114	Introduction to Hospitality and Travel	
RPTA 121	Theories and Frameworks of Experience Design	
RPTA 160	Introduction to Sport Management	
RPTA 216	Resort and Lodging Operations	
RPTA 221	Professionalism and Customer Experiences	
RPTA 275	Facilitation and Teambuilding	
RPTA 318	Destination Marketing & Management	
RPTA 321	Visitor Services in Experience Industry Management	
RPTA 323	Sport Marketing and the Fan Experience	
RPTA 350	Sport and Event Venue Management	
RPTA 393	Hospitality Sales and Service	
RPTA 412	Advanced Experience Industry Management Applications	
RPTA 450	Resource and Grant Development	

Total units **24**

Food Science & Nutrition

Agricultural Sciences Bldg. (11), Room 244
Phone: 805.756.2660
<https://fsn.calpoly.edu>

Department Head: Stephanie Jung

Academic Programs

Program name	Program type
Food Science	BS, Minor, MS
Nutrition	BS, Minor, MS

The department offers two bachelor's degrees and two master's degrees. The bachelor's degrees are designed to prepare graduates for employment in the general areas of food science and human nutrition. The master's degree in Nutrition is designed to prepare graduates for advancement, specialization, and leadership in nutrition or healthcare careers. The master's degree in Food Science is designed to prepare graduates for pursuing a PhD and/or to enter the food industry at a higher level position. Students pursuing a bachelor's degree in Food Science may apply for the Blended 4+1 master's degree in Food Science program.

Graduates with a bachelor of science in Food Science enjoy rewarding careers in food processing and product development, sales, research, quality assurance and government regulation. Graduates with a bachelor of science in Nutrition enjoy rewarding careers in dietetics and clinical nutrition, healthcare (medicine, dentistry, nursing, physician assistant, and chiropractic), public health, food industry, food systems management and education. Opportunities for private consulting and entrepreneurship are available to graduates in both majors. The department also offers minors in Food Science and Nutrition.

Students are involved in a number of clubs and teams, including the Food Science Club and Nutrition Club. Club activities involve a wide range of social, professional and service projects. Clubs provide opportunity for leadership training and participation in professional societies and organizations. Our students compete on teams in regional and national scholastic competitions such as Food Product Development teams and Nutrition and Food Science or Nutrition Quiz Bowl teams.

Learn by Doing in Food Science and Nutrition

The department is equipped with a food processing pilot plant, and laboratories for food safety, food chemistry, nutritional science, metabolism, and culinary science. These facilities are designed for teaching courses in nutrition, foodservice management, sensory evaluation of foods, food chemistry, food product development, food processing and quality control. Students get hands-on experience with pilot scale commercial processing equipment.

Students can manufacture and market various food products, which are sold throughout the community. Projects are designed to simulate industry and business practices. Classroom learning in nutrition is complemented with opportunities for service, outreach and research in the community. Students are encouraged to gain valuable experience by working during the summer or by participating in internship programs.

Dietetic Internship

Cal Poly's post-baccalaureate dietetic internship is accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) of the Academy of Nutrition and Dietetics. This competitive

program consists of at least 1,000 hours of supervised practice and at least 200 hours of class, seminars, and professional meetings. Upon completion, interns must pass a national examination administered by the Commission of Dietetic Registration to qualify as a Registered Dietitian (R.D.). Applications for fall quarter are due mid-February.

Undergraduate Programs

BS Food Science

The program is designed to prepare students for employment in the food industry, government and for graduate study. Principal areas of instruction are food engineering, food processing, food safety and sanitation, quality assurance, food microbiology, food chemistry and analysis, product development, and sensory evaluation. Employment opportunities are strong in each of these areas.

Concentrations

Advanced Food Science

The Advanced Food Science Concentration is BS Food Science is the curriculum approved by the Institute of Food Technologists (IFT.org (<http://www.ift.org/>)), the key international professional society for food scientists. Students are strongly advised to follow this concentration if they anticipate graduate study following completion of the BS. Students enrolled in this concentration are eligible for IFT scholarships.

Culinology

Culinology® is designed for students who want to blend culinary arts and food science principles in ingredient development, food product development, or in entrepreneurial pursuits. Successful completion of courses in this concentration fulfill the requirements for the Research Chefs Association Culinology® program.

BS Nutrition

The program offers a broad preparation in nutritional science. In addition to preparatory science courses such as chemistry and biology, the program offers coursework in nutrient metabolism, clinical nutrition, community nutrition, and lifecycle nutrition, foods and food system management.

Concentrations

Applied Nutrition

Applied Nutrition prepares students for careers in various areas of nutrition, including dietetics, food systems management, nutrition communications, and community nutrition. This concentration is a Didactic Program in Dietetics (DPD), accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND), of the Academy of Nutrition and Dietetics, 120 Riverside Plaza, Suite 2000, Chicago, IL 60606-6995, (800) 877-1600 Ext. 5400. Students in this concentration who graduate with a minimum higher education overall GPA of 2.75 and receive a Verification Statement are eligible to apply for admission to an accredited dietetic internship, upon completion of which the graduate must pass a national examination administered by the Commission on Dietetic Registration to qualify as a registered dietitian (RD). Graduates also are prepared to pursue advanced degrees in foods and nutrition, public health, and food systems management.

Nutrition Science

Nutrition Science emphasizes a strong background in basic sciences and human nutrition for students planning further study in graduate school or a health-related profession such as medicine, dentistry, nursing,

pharmacy or physical therapy. Students need to check with their advisors for specific requirements for various health-related professions.

Minors

The department offers minors in either food science or nutrition to qualified students from across campus. Specific criteria apply to entering into the minor program and interested students should see either of the minor advisors.

Food Science Minor

The minor is principally designed for students majoring in related academic disciplines who desire employment in the food industry. Students acquire the fundamental technical skills necessary to understand basic issues and concepts in food science such as food processing, food safety, and quality assurance. See the department Food Science minor coordinator for criteria for admission into the Food Science minor.

Nutrition Minor

The minor is designed for students majoring in science disciplines (Chemistry, Biological Sciences, Kinesiology), Agribusiness or Agricultural Communications, and other interested majors such as Business or Psychology. Students can enhance career opportunities or qualification for admission into graduate programs or allied health fields. See the department Nutrition minor coordinator for criteria for admission into the Nutrition minor.

Interdisciplinary Minors

The department participates in offering interdisciplinary minors in Packaging (see Orfalea College of Business (p. 174) section).

Graduate Programs

MS Food Science

General Characteristics

The MS Food Science program is designed to prepare graduates for advancement, specialization, and leadership in food science careers. In addition, graduates will be prepared for further education in doctoral studies in food science and related fields. The MS Food Science program integrates the disciplines of chemistry, microbiology, product development and processing/engineering, to prepare qualified graduates for food-related careers in industry, government and academia.

Additional Requirements:

- Statement of purpose
- Curriculum Vitae
- Three letters of academic and/or professional recommendation

MS Nutrition

General Characteristics

The MS Nutrition program is designed to prepare graduates for advancement, specialization, and leadership in nutrition or healthcare careers. In addition, graduates will be prepared for further education in dietetic internships, professional schools, allied health professions, or

doctoral studies in a number of academic areas including nutrition, public health, animal science, or other health science-based disciplines.

The interdisciplinary Graduate Group in Nutrition (GGN) allows students to work with faculty from several departments and to choose a research topic from a broad range of themes including human nutrition, animal nutrition, kinesiology, public health, or business.

Students may follow a suggested area of emphasis. Examples may include: Molecular Nutrition, Public Health Nutrition, or Health and Wellness. These would be compatible with the students interests and career goals. Students will complete coursework and a research-based thesis conducted under the supervision of a committee chair who must be a member of the GGN.

Additional Requirements

- Statement of purpose
- Three letters of academic and/or professional recommendation
- Introductory chemistry series (one year), organic chemistry (min one course), biochemistry and an introductory biology course
- FSN 328 Nutrient Metabolism I or FSN 331 Macronutrient Metabolism
- FSN 329 Nutrient Metabolism II or FSN 332 Micronutrient Metabolism and FSN 333 Nutrient Metabolism Lab

Blended BS + MS Food Science Program

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

A blended program is available for MS Food Science.

Eligibility

Students majoring in BS Food Science with a concentration in Advanced Food Science are eligible for the blended program in MS Food Science.

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Food Science Graduate Program Coordinator in the Food Science and Nutrition department for any additional eligibility criteria.

BS Food Science

Program Learning Objectives

1. Graduates demonstrate critical thinking skills in addressing food science issues.
2. Graduates demonstrate the knowledge, ethics, and technical skills needed to succeed in food science fields and post-graduate studies.
3. Graduates demonstrate effective written and oral communication skills.
4. Graduates demonstrate the ability to work effectively as part of a problem-solving team.
5. Graduates demonstrate cultural competence with interacting diverse populations.

Program Educational Outcomes

- Food Science program graduates can integrate and apply principles of food chemistry, analysis, microbiology, processing, and engineering to assure food quality and safety.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

FSN 102	Orientation to the Food Science Major	1
FSN 125 or FSN 230	Introduction to Food Science Elements of Food Processing	4
FSN 202	Introduction to Human Nutrition	4
FSN 204	Food Processing Operations	4
FSN 250	Food and Nutrition: Culture and Customs (USCP) (E) ¹	4
FSN 311	Sensory Evaluation of Food	4
FSN 330	Principles of Food Engineering	4
FSN 334	Food Packaging	3
FSN 335	Food Quality Assurance	4
FSN 364	Food Chemistry	4
FSN 368	Food Analysis	4
FSN 370	Food Plant Sanitation and Prerequisite Programs	4
FSN 374	Food Laws and Regulations	4
FSN 375	Food Safety	4
FSN 407	Food Ingredient Functionality	3
FSN 408 & FSN 469	Food Product Development and Food Science Exit Exam	4
Concentration courses (see below)		23

SUPPORT COURSES

BIO 111	General Biology (B2 & B3) ¹	4
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ¹	4
CHEM 128	General Chemistry for Agriculture and Life Science II	4
CHEM 312	Organic Chemistry: Fundamentals and Applications	5
CHEM 314	Biochemistry: Fundamentals and Applications (Upper-Division B) ¹	5
MATH 161 or MATH 141	Calculus for the Life Sciences I (B4) ¹ Calculus I	4
MCRO 221	Microbiology	4
MCRO 421	Food Microbiology	4

PHYS 121	College Physics I	4
STAT 218	Applied Statistics for the Life Sciences (GE Electives) ¹	4
STAT 314	Statistical Methods for Food Science	4

GENERAL EDUCATION (GE)

(See GE program requirements below.) 48

FREE ELECTIVES

Free Electives 4

Total units 180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Concentrations

- Advanced Food Science (p. 108)
- Culinology (p. 108)

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	

D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Major) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		48

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Advanced Food Science Concentration

FSN 444	Food Engineering	4
FSN 457	Food Science Senior Project - Scientific and Technical Writing Course	3
or FSN 458	Food Science Senior Project - Research	
or FSN 459	Food Science Senior Project - Internship	
FSN 474	Advanced Food Processing	4
MATH 162	Calculus for the Life Sciences II	4

Approved Electives

Select from the following:		8
AGB 212	Agricultural Economics	
ASCI 211	Meat Science	
ASCI 415	HACCP for Meat and Poultry Operations	
ASCI 484	Processed Meat Products	
BUS 207	Legal Responsibilities of Business	
BUS 384	Human Resources Management	
CHEM 129	General Chemistry for Agriculture and Life Science III	
CHEM 217	Organic Chemistry II	
CHEM 218	Organic Chemistry III	
DSCI 229	General Dairy Manufacturing	
DSCI 230	General Dairy Husbandry	
DSCI 401	Physical and Chemical Properties of Dairy Products	
DSCI 444	Dairy Microbiology	
FSN 121	Fundamentals of Food	
FSN 201	Enterprise Project	
FSN 244	Cereal and Bakery Science	
FSN 304	Advanced Culinary Principles and Practice	
FSN 321	Contemporary Issues in Food Choice and Preparation	

FSN 340	Fermented Foods	
FSN 342	Brewing Science	
FSN 343	Foodservice Operations I	
FSN 346	Brewing Methods	
FSN 410	Nutritional Implications of Food Industry Practices	
FSN 426	Nutrition and Foodservice Systems Management	
FSN 490	Food Safety Modernization Act: Human Food Safety	
FSN 491	Food Safety Modernization Act: Produce Safety	
ITP 330	Packaging Fundamentals	
ITP 341	Packaging Polymers and Processing	
MCRO 320	Emerging Infectious Diseases	
MCRO 342	Public Health Microbiology	
PLSC 421	Postharvest Technology of Horticultural Crops	
PSY 201	General Psychology	
or PSY 202	General Psychology	
One quarter of foreign language		
Total units		23

Culinology Concentration

FSN 121	Fundamentals of Food	4
FSN 304	Advanced Culinary Principles and Practice	4
FSN 321	Contemporary Issues in Food Choice and Preparation	4
FSN 323	Culinary Internship	1
FSN 343	Foodservice Operations I	3
FSN 344	Foodservice Operations II	4
FSN 459	Food Science Senior Project - Internship	3
Total units		23

BS Nutrition

Program Learning Objectives

1. Graduates demonstrate critical thinking skills in addressing nutrition issues.
2. Graduates demonstrate the knowledge, ethics, and technical skills needed to succeed in nutrition-related fields and post-graduate studies.
3. Graduates demonstrate effective written and oral communication skills.
4. Graduates demonstrate the ability to work effectively as part of a problem-solving team.
5. Graduates demonstrate cultural competence interacting with diverse populations.

Program Educational Outcomes

- Graduates can apply the knowledge of nutrients and foods to meet the nutritional and health needs of individuals and groups throughout the life cycle.
- Graduates can apply the principles of social, physical and biological sciences to address human nutrition issues.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

FSN 101	Orientation to the Nutrition Major	1
FSN 121	Fundamentals of Food	4
FSN 202	Introduction to Human Nutrition	4
FSN 250	Food and Nutrition: Culture and Customs (USCP) (E) ¹	4
FSN 281	Writing in Nutrition Science	2
FSN 310	Maternal and Child Nutrition	4
FSN 315	Nutrition in Aging	4
FSN 319	The Science of Food for the Consumer (Upper-Division B) ¹	4
FSN 331 & FSN 332 & FSN 333	Macronutrient Metabolism and Micronutrient Metabolism and Nutrient Metabolism Lab	9
FSN 381	Critical Evaluation of Nutrition Research	4
FSN 415	Nutrition Education and Communications	4
FSN 416	Community Nutrition	4
FSN 431	Medical Nutrition Therapy I	2
FSN 432	Medical Nutrition Therapy II	4
FSN 433	Medical Nutrition Therapy III	4
FSN 461	Senior Project I ²	3
or FSN 478 & FSN 481	Senior Project Experiential Learning in Nutrition and Advanced Nutrition Senior Project Scientific Writing	
or FSN 479 & FSN 481	Senior Project Advanced Topics and Advanced Nutrition Senior Project Scientific Writing	
BIO 161	Introduction to Cell and Molecular Biology (B2 & B3) ¹	4
BIO 231	Human Anatomy and Physiology I	5
BIO 232	Human Anatomy and Physiology II	5
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ¹	4

CHEM 128	General Chemistry for Agriculture and Life Science II	4
CHEM 312	Organic Chemistry: Fundamentals and Applications ³	5
or CHEM 216	Organic Chemistry I	
CHEM 314	Biochemistry: Fundamentals and Applications ³	5
or CHEM 369	Biochemical Principles	
MATH 118	Precalculus Algebra (B4) ^{1, 4}	4
MCRO 221	Microbiology	4-5
or MCRO 224	General Microbiology I	
STAT 218	Applied Statistics for the Life Sciences (GE Electives) ¹	4
Concentration courses (see concentrations below)		26-27
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		48
FREE ELECTIVES		
Free Electives		0-1
Total units		180-181

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Credit in FSN 461; or FSN 478 and FSN 481; or FSN 479 and FSN 481 fulfills the senior project requirement.
- ³ Most Nutrition majors should take CHEM 312 and CHEM 314. Students choosing the Nutrition Science concentration may need to take CHEM 216 and CHEM 369, depending on their career goals and Approved Electives. Students selecting CHEM 216 must also take CHEM 217 and CHEM 218. See advisor.
- ⁴ MATH 116 and MATH 117 substitute.

Concentrations

- Applied Nutrition (p. 110)
- Nutrition Science (p. 110)

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Major) ¹	0
B2	Life Science (4 units in Major) ¹	0

B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Major) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		48

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Applied Nutrition Concentration

FSN 321	Contemporary Issues in Food Choice and Preparation	4
FSN 343	Foodservice Operations I	3
FSN 344	Foodservice Operations II	4
FSN 417	Nutrition Counseling	4
FSN 426	Nutrition and Foodservice Systems Management	4
BIO 302 or BIO 303	Human Genetics Survey of Genetics	4
PSY 201 or PSY 202	General Psychology General Psychology	4
Total units		27

Nutrition Science Concentration

BIO 302 or BIO 303	Human Genetics Survey of Genetics	4-5
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or BIO 351 Principles of Genetics

Approved Electives¹		
Select from the following:		22
ASCI 403	Applied Biotechnology in Animal Science	
BIO 150	Diversity and History of Life	
BIO 162	Introduction to Organismal Form and Function	
BIO 253	Health Professions Shadowing	
BIO 305	Biology of Cancer	
BIO/CHEM 308	Genetic Engineering Technology	
BIO 405	Developmental Biology	
BIO 410	Functional Histology	
BIO 426	Immunology	
BIO 452	Cell Biology	
BIO 476	Gene Expression Laboratory	
BUS 207	Legal Responsibilities of Business	
BUS 212	Financial Accounting for Nonbusiness Majors	
CHEM 129	General Chemistry for Agriculture and Life Science III	
CHEM 217	Organic Chemistry II	
CHEM 218	Organic Chemistry III	
CHEM 231	Quantitative Analysis	
CHEM 324	Organic Chemistry Laboratory III	
CHEM 331	Quantitative Analysis	
CHEM 372	Metabolism	
CHEM 373	Molecular Biology	
CHEM 377	Chemistry of Drugs and Poisons	
CHEM 458	Advanced Organic Chemistry: Spectroscopy	
CHEM 474	Protein Techniques Laboratory	
CHEM 475	Molecular Biology Laboratory	
CHEM 477	Biochemical Pharmacology	
COMS 418	Health Communication	
ECON 303	Economics of Poverty, Discrimination and Immigration	
FSN 405	Advanced Sport Nutrition & Exercise Metabolism	
FSN 417	Nutrition Counseling	
FSN 463	Professional Practice in Nutrition and Dietetics	
HLTH 305	Drugs in Society	
KINE 181	Responding to Emergencies: Comprehensive First Aid, CPR, AED	
KINE 301	Functional Anatomy	
KINE 303	Physiology of Exercise	
KINE 304	Pathophysiology and Exercise	
KINE 308	Motor Development	
KINE 312	Motor Learning and Control	
KINE 403	Biomechanics	
KINE 406	Neuroanatomy	
KINE 445	Electrocardiography	
KINE 446	Echocardiography	

MATH 161 or MATH 141	Calculus for the Life Sciences I Calculus I
MATH 162 or MATH 142	Calculus for the Life Sciences II Calculus II
MATH 143	Calculus III
MCRO 225	General Microbiology II
MCRO 320	Emerging Infectious Diseases
MCRO 342	Public Health Microbiology
MCRO 402	General Virology
MCRO 421	Food Microbiology
MCRO 423	Medical Microbiology
MCRO 433	Microbial Biotechnology
PHIL 339	Biomedical Ethics
PHYS 121	College Physics I
PHYS 122	College Physics II
PHYS 123	College Physics III
PLSC 329	Plants, Biotechnology, and the Media
PSY 201 or PSY 202	General Psychology General Psychology
PSY 256	Developmental Psychology
PSY 310	Psychology of Death
PSY 318	Psychology of Aging
PSY 330	Behavioral Effects of Psychoactive Drugs
PSY 340	Biopsychology
PSY 372	Multicultural Psychology
PSY 405	Abnormal Psychology
PSY 460	Child Abuse and Neglect
SCM 101	Introduction to Health Profession Careers
SCM 363	Public Health Fieldwork
SOC 326	Sociology of the Life Cycle
One quarter of foreign language	

Total units **26-27**

¹ Please consult the Food, Science & Nutrition advising materials and catalog for prerequisites.

Food Science Minor

Required Courses

FSN 125 or FSN 230	Introduction to Food Science Elements of Food Processing	4
FSN 204	Food Processing Operations	4
FSN 335	Food Quality Assurance	4

Emphasis Area

Select from the following: 16

At least 10 units must be at the 300-400 level

ASCI 211	Meat Science
ASCI 415	HACCP for Meat and Poultry Operations
ASCI 484	Processed Meat Products
DSCI 229	General Dairy Manufacturing
FSN 244	Cereal and Bakery Science

FSN 275	Elements of Food Safety
FSN 311	Sensory Evaluation of Food
FSN 330	Principles of Food Engineering
FSN 340	Fermented Foods
FSN 354	Packaging Function in Food Processing
FSN 368	Food Analysis
FSN 370	Food Plant Sanitation and Prerequisite Programs
FSN 374	Food Laws and Regulations
FSN 375	Food Safety
FSN 408	Food Product Development
FSN 410	Nutritional Implications of Food Industry Practices
FSN 444	Food Engineering
FSN 474	Advanced Food Processing
MCRO 421	Food Microbiology

Total units **28**

Nutrition Minor

Required Courses

FSN 202	Introduction to Human Nutrition	4
FSN 310	Maternal and Child Nutrition	4
FSN 315	Nutrition in Aging	4

Emphasis area

Select one area: 15-17

Clinical: (CHEM 313 or equivalent as prerequisite)

FSN 331	Macronutrient Metabolism
FSN 332 & FSN 333	Micronutrient Metabolism and Nutrient Metabolism Lab
FSN 431 & FSN 432	Medical Nutrition Therapy I and Medical Nutrition Therapy II

Community: (CHEM 313 or equivalent as prerequisite)

FSN 331	Macronutrient Metabolism
FSN 332	Micronutrient Metabolism
FSN 416	Community Nutrition

Select one of the following:

ANT 401	Culture and Health
COMS 418	Health Communication
FSN 250	Food and Nutrition: Culture and Customs
FSN 415	Nutrition Education and Communications
POLS 332	World Food Systems
RPTA 450	Resource and Grant Development
SOC 323	Social Stratification

Culinary Science and Food Service Management:

FSN 121	Fundamentals of Food
FSN 321	Contemporary Issues in Food Choice and Preparation
FSN 343	Foodservice Operations I
FSN 304	Advanced Culinary Principles and Practice

or FSN 344	Foodservice Operations II
Sports Nutrition: (CHEM 313 or equivalent as prerequisite)	
FSN 331	Macronutrient Metabolism
FSN 332 & FSN 333	Micronutrient Metabolism and Nutrient Metabolism Lab
KINE 303	Physiology of Exercise
FSN 405	Advanced Sport Nutrition & Exercise Metabolism
or KINE 451	Nutrition for Fitness and Sport

Total units 27-29

MS Food Science

Program Learning Objectives

Graduates of the MS Food Science will:

1. Demonstrate technical competency in the discipline of food science.
2. Design, analyze, interpret, and communicate food science research.
3. Formulate solutions to practical problems in food safety, production, development, sustainability and aspects of consumer health.
4. Communicate and work effectively and ethically with individuals and groups.

Required Courses

ESCI 501	Research Planning	4
FSN 505	Orientation to Graduate Studies	1
FSN 564	Chemistry of Food Systems	4
FSN 575	Advanced Food Safety	4
FSN 581	Graduate Seminar in Food Science and Nutrition	3
FSN 599	Thesis	9
STAT 513	Applied Experimental Design and Regression Models	4

Approved Electives

Any 400-500 level courses with the following prefixes: AG, AGB, AGC, AGED, ASCI, BIO, BMED, BRAE, CHEM, DSCI, ENVE, ESCI, FSN, ITP, MCRO, MATE, NR, PLSC, PSY, RPTA, STAT, WVIT

Total units 45

MS Nutrition

Program Learning Objectives

After successfully completing the Master of Science in Nutrition, students will be able to:

1. Apply fundamental principles of nutrition science in research and required coursework
2. Explain, analyze, and interpret fundamental scientific concepts in the specific area of thesis research
3. Apply the scientific method to nutrition research through the design, conduct, and defense of a thesis research project
4. Apply critical thinking skills to the analysis of published research literature and the design/interpretation of a thesis research project
5. Show independent and creative thinking skills in the formulation, design, conduct, and interpretation of nutrition research

6. Demonstrate strong written and oral communication skills
7. Work productively, respectfully, and professionally as part of a research team and in other group settings
8. Exhibit leadership, ethical conduct, and community values

Required Courses

FSN 516 or FSN 531	Population Health and Epidemiology Lipid Metabolism and Nutrition	3
FSN 528	Biochemical and Molecular Aspects of Human Macronutrient Metabolism	4
FSN 529	Metabolic and Molecular Aspects of Vitamins	2
FSN 530	Metabolic and Molecular Aspects of Minerals	2
FSN 582	Current Nutrition Research	3
FSN 599	Thesis	6
STAT 511	Statistical Methods	4

Approved Electives

See approved electives list below. 21

Total units 45

Approved Electives

Select from one of the three Emphasis Areas in consultation with thesis supervisor (at least 3 units must be at the 500-level): 21

Molecular Nutrition Emphasis Area

Select from the following:

ASCI 403	Applied Biotechnology in Animal Science
ASCI 419	Animal Metabolism and Nutrition
BIO 441	Bioinformatics Applications
BIO 475	Molecular Biology Laboratory
BIO 476	Gene Expression Laboratory
BIO 501	Molecular & Cellular Biology
CHEM 428	Nutritional Biochemistry
CHEM 474	Protein Techniques Laboratory
FSN 500	Individual Study
FSN 505	Orientation to Graduate Studies
FSN 581	Graduate Seminar in Food Science and Nutrition
STAT 513	Applied Experimental Design and Regression Models
STAT 523	Design and Analysis of Experiments I

Public Health Nutrition Emphasis Area

Select from the following:

FSN 500	Individual Study
FSN 505	Orientation to Graduate Studies
FSN 581	Graduate Seminar in Food Science and Nutrition
KINE 503	Current Health Issues
KINE 510	Advanced Health Behavior Change Programs
STAT 417	Survival Analysis Methods
STAT 419	Applied Multivariate Statistics

STAT 421	Survey Sampling and Methodology
STAT 513	Applied Experimental Design and Regression Models
STAT 524	Applied Regression Analysis
STAT 530	Statistical Computing with SAS
Health and Wellness Emphasis Area	
Select from the following:	
COMS 418	Health Communication
FSN 500	Individual Study
FSN 505	Orientation to Graduate Studies
FSN 581	Graduate Seminar in Food Science and Nutrition
HLTH 434	Health Promotion Program Planning
HLTH 450	Worksite and University Health Promotion Programs
KINE 408	Exercise and Health Gerontology
KINE 504	Advanced Pathophysiology and Exercise
KINE 522	Advanced Biomechanics
KINE 525	Advanced Motor Learning and Control
KINE 526	Advanced Sport and Exercise Psychology
KINE 530	Advanced Physiology of Exercise
PSY 465	Cross-Cultural International Psychology
STAT 513	Applied Experimental Design and Regression Models

Military Science

Dexter Bldg. (34), Room 115
 Phone: 805.756.7682
<https://armyrotc.calpoly.edu> (<https://armyrotc.calpoly.edu/>)

Career and Scholarship Advisor: Ken Harris

Programs

Program name	Program type
ROTC	Four-Year Program
Military Science	Minor

Four-Year Program

The Military Science Department conducts a dynamic four-year program of instruction which develops the mental and physical qualifications of graduates in preparation for positions of leadership within the military and civilian communities. Students may enroll at any time for full academic elective credit without incurring any military service obligation. However, the last two years of the program are oriented toward preparing the student for a military career.

The innovative and well-taught courses complement all major areas of study by broadening the student's basic education. The complete curriculum includes both military leadership and management courses; courses which provide an awareness of the heritage of the U.S. military; the Armed Forces' role in national defense strategy; professional military subjects; and military ethics.

Students desiring to attain a highly sought-after commission as a Second Lieutenant in the U.S. Army must meet eligibility requirements and complete the entire Military Science/ROTC (Reserve Officers' Training Corps) Advanced Course (25 units). To be eligible for participation in the Cal Poly ROTC Program, a student must be enrolled full time (12 units) at Cal Poly, have at least two years remaining as a university student to permit completion of the advanced course prior to reaching the 30th birthday, and be physically qualified.

Financial Assistance

Many opportunities for financial assistance are available to students. Three areas of opportunities are: ROTC cadets who sign a contract for Advanced Phase, students who earn an ROTC scholarship, and cadets who train with Reserve or National Guard units. All ROTC cadets sign a contract to participate in the Advanced Phase of ROTC and receive a \$300 - \$500 a month allowance. Criteria to participate in the Advanced Phase are stated later. Highly competitive two-, two and a half, three-, and four-year ROTC scholarships are available. The scholarship provides payment of either full tuition or room and board (student's choice), books, supplies, and the \$300 - 500 a month allowance for the duration of the scholarship. Students interested in ROTC scholarship should contact the Military Science Department. Reserve or National Guard training provides an additional two sources of financial assistance: approximately \$165 a month for one weekend drill and approximately \$190 a month tuition assistance from the National Guard/Army Reserve "New GI Bill@" benefits.

Equipment and Uniforms

All necessary equipment, uniforms and textbooks for participation in the Military Science/ROTC program are furnished to the student by the

United States Government free of charge. Title to this property, other than expendable items, remains with the government.

Phases of Four-Year Program

The four-year program elective military science curriculum is divided into two diverse phases. The basic phase is primarily for freshmen and sophomores, and the advanced phase is for junior and senior level students.

Basic Phase

The Basic Phase is a two-year challenging opportunity where students may, without obligation, investigate the ROTC Program and the military as a full- or part-time career. Students may enter and leave this phase during any quarter. The curriculum for the basic phase is listed below and offers many exciting opportunities for all students. To become an ROTC cadet during this phase requires the student be registered for a Military Science class, completion of an ROTC enrollment form (obtained at the Military Science Department, Dexter Building, Room 115), and an interview with the ROTC Enrollment Officer. Because this phase is for students to examine the ROTC Program without obligation, participation in ROTC activities is encouraged but not mandatory.

Entry to the challenging Advanced Phase is accomplished either by successfully completing the Basic Phase classes, completing ROTC Leader's Training Course or completing any military basic training program. Students have the option of contracting any time during their second year of the Basic Phase of study.

ROTC Leader's Training Course (Summer Session only)

One method to qualify for the Advanced Phase is to successfully complete the four-week challenging ROTC Leader's Training Course (LTC). Students normally attend LTC during the summer between their second and third academic years. Transfer students may complete the camp during the summer immediately prior to their matriculation at Cal Poly. It is important that potential transfer students who plan to participate in the two-year ROTC program make their intentions known directly to the Military Science Department no later than June 1 of the year they plan to register at the university even though this date may precede the date of their final acceptance by the university.

The government provides a transportation allowance to and from LTC and pay at the rate of one-half of a Second Lieutenant's basic pay. All equipment, uniforms, room, board and medical care are furnished free while at camp. A maximum of 7 units elective credit may be earned for attending LTC. No military obligation is incurred for attending this camp.

Basic Training

Outstanding students who have successfully served on active duty, regardless of the branch of service, are qualified to enter the Advanced Phase because they have completed basic training for their particular branch of service. Also, students who have been or are members of Reserve or National Guard units and have completed basic training are qualified for the Advanced Phase.

Advanced Phase

The Advanced Phase is a two-year period where ROTC cadets receive advanced leadership and management training. The cadets receive many hours of hands-on, practical leadership experiences to prepare them for a military career or a management position in the civilian sector. To become a cadet in the Advanced Phase a student must complete the

Basic Phase, ROTC Summer Leader’s Training Course (LTC) or Basic Training. The student must also make a commitment to attend all required training activities and sign a contract to accept a prestigious commission in the United States Army. In return for the student’s commitment, the Military Science Department provides \$450-500 a month (which is based on program year), classroom instruction, real leadership opportunities, and continuous professional development of their leadership skills.

After their first year of the Advanced Phase, cadets usually attend a four-week camp where their leadership skills are further developed and assessed. All equipment, uniforms, room, board, and medical care are furnished free while at this camp. The cadets also receive approximately \$800 during the five weeks. Upon successful completion of the Advanced Phase and graduation from the university, the cadet is commissioned as a Second Lieutenant in the United States Army.

Simultaneous Membership Program

Students can serve simultaneously in either the California National Guard or Army Reserve while they are cadets in ROTC and receive pay from both their unit and ROTC. Those who complete the ROTC Advanced Phase prior to graduation may continue serving in the Reserve or National Guard in the Simultaneous Membership Program. Since students can earn as much as \$4,000 each year, this program provides both substantial financial benefits and leadership experience.

Military Science Minor

The minor emphasizes the following personal and technical skills: time, personnel, and resource management under duress; knowledge of U.S. military heritage, customs, and courtesies; planning and briefing under time constraints; current national defense issues; equal opportunity, sexual harassment, and military ethics; military justice; physical fitness; map reading and orienteering; leadership, management, and counseling skills under duress; oral, visual, and written communication skills in accordance with Army norms; small unit tactics. It provides marketable skills to students interested in government service, personnel management, and law enforcement. The Military Science Minor is limited to contracted ROTC cadets only. A minimum GPA of 2.5 is required in all units counted for completion of the minor.

Basic Phase

Freshman		
MSL 101	Foundation of Officership I	1
MSL 102	Foundation of Officership II	1
MSL 103	Basic Leadership	1
MSL 110	Exercises in Military Leadership	1
MSL 111	Orienteering	2
MSL 112	The Army Physical Fitness Program	1
Sophomore		
MSL 201	Foundations of Leadership I	2
MSL 202	Foundations of Leadership II	2
MSL 203	Foundations of Leadership III	2
MSL 212	Leader’s Training Course ¹	1-7
MSL 229	Ranger Challenge	2

MSL 240	American Military History and the Evolution of Western Warfare ²	4
Total units		20-26

- ¹ LTC is an optional 5-week summer training course (1-7 units) at Fort Knox, Kentucky.
- ² MSL 240 or equivalent is required for commissioning of all cadets; approved substitutions are HIST 320, HIST 321 and HIST 322.

Advanced Phase

Junior		
MSL 301	Tactical Leadership I	3
MSL 302	Tactical Leadership II	3
MSL 303	Applied Leadership	3
MSL 310	Advanced Leadership of Military Exercises	1
MSL 312	Leadership of the Army Physical Fitness Program	1
MSL 314	Leadership Development and Assessment Course ¹	6
Senior		
MSL 400	Special Problems for Advanced Undergraduates	2
MSL 401	Developmental Leadership I	3
MSL 402	Developmental Leadership II	3
MSL 403	Adaptive Leadership	3
MSL 410	Administration and Evaluation of Exercises in Military Leadership	1
MSL 412	Administration and Evaluation of the Army Physical Fitness Program	1
MSL 470	Selected Advanced Topics	1-4
Total units		31-34

- ¹ LDAC is a required 5-week summer training experience at Fort Lewis, Washington (6 credits).

Military Science Minor

Required Courses		
Select from the following:		4
MSL 240	American Military History and the Evolution of Western Warfare	
HIST 320	Colonial and Revolutionary America	
HIST 321	Civil War America	
HIST 322	Modern America	
MSL 301	Tactical Leadership I	3
MSL 302	Tactical Leadership II	3
MSL 303	Applied Leadership	3
MSL 401	Developmental Leadership I	3
MSL 402	Developmental Leadership II	3
MSL 403	Adaptive Leadership	3
Approved Electives		
Select from the following:		6
MSL 101	Foundation of Officership I	

MSL 102	Foundation of Officership II
MSL 103	Basic Leadership
MSL 110	Exercises in Military Leadership
MSL 111	Orienteering
MSL 112	The Army Physical Fitness Program
MSL 201	Foundations of Leadership I
MSL 202	Foundations of Leadership II
MSL 212	Leader's Training Course
MSL 229	Ranger Challenge
MSL 310	Advanced Leadership of Military Exercises
MSL 312	Leadership of the Army Physical Fitness Program
MSL 314	Leadership Development and Assessment Course (ROTC Only)
MSL 410	Administration and Evaluation of Exercises in Military Leadership
MSL 412	Administration and Evaluation of the Army Physical Fitness Program
MSL/RPTA 275	Facilitation and Teambuilding
Total units	28

Natural Resources Management and Environmental Sciences

Baker Center for Sciences and Mathematics Bldg. (180), Room 209
Phone: 805.756.2702; Fax: 805.756.1402
<https://nres.calpoly.edu/>

Department Head: Jeremy James

Academic Programs

Program name	Program type
Environmental Earth and Soil Sciences	BS
Environmental Management and Protection	BS
Environmental Soil Science	Minor
Environmental Sciences and Management	MS
Fire Ecology and Wildfire Hazard Planning	Minor
Forest and Fire Sciences	BS
Indigenous Studies in Natural Resources and the Environment	Minor
Land Rehabilitation and Restoration Ecology	Minor

The Natural Resources Management and Environmental Sciences department offers three undergraduate majors - Environmental Earth and Soil Sciences, Environmental Management and Projection, and Forest and Fire Sciences. Students have access to several thousand acres of agricultural, forest, and rangeland managed by the college. Students gain hands-on experience with equipment and techniques in common use by environmental scientists, environmental managers and planners, foresters, wildland fire fighters, natural resources managers, soil scientists, agricultural scientists, and geologists. The department is equipped for analysis of soil, plant, tree, rock, and water samples. Analytical methods available to students include gas chromatography for analysis of greenhouse gases, portable x-ray fluorescence spectroscopy, inductively coupled plasma - optical emission spectroscopy (ICP-OES), high temperature combustion analysis of carbon, nitrogen, and sulfur, petrographic microscopy with digital image analysis, as well as a suite of microbiological, geographic and geospatial analytical techniques and instrumentation.

The department maintains greenhouse research space and operates state-of-the-art weather monitoring equipment on Cal Poly rangelands, providing data for a wide variety of interdisciplinary research projects.

Experiential Learning

The Natural Resources Management and Environmental Sciences Department has a number of outdoor field sites where faculty and student learn-by-doing projects and research are conducted. Facilities sited at the Cal Poly campus include a Forestry Skills Center, computer labs, GIS laboratories, Coastal Resources Institute Research field lab, and several well-equipped greenhouses. Moreover, the department works closely with Cal Poly's School Forest at Swanton Pacific Ranch, near Santa Cruz, California to ensure our students have many opportunities to engage at this hands-on learning resource. This 3800-acre ranch includes redwood forests, salmonid-bearing streams, agricultural land, and many other ecosystems. The Swanton Pacific Ranch provides hands-on learning of active forest, ranch, agricultural, and watershed management activities. The management of these forest resources is internationally certified by the Forest Stewardship Council. Students make extensive use

of these facilities. Significant field work and laboratory activities occur in all undergraduate and graduate programs.

In addition to these campus-based learning experiences, the department places great importance on work experience before graduation. Work experience validates the student's career goals, confirms the relevance of their classroom education, while offering a pathway to employment. Students can earn course credit through internships, supervisory courses, and/or for volunteer or paid work positions related to their major.

Students are encouraged to reinforce their education, develop professional contacts, and strengthen their career potential by participating in any of the following activities: the Environmental Sciences Club; the Soil Judging Team; Association of Environmental Professionals Student Chapter (AEP); Society of American Foresters Student Chapter (SAF); Logging Team; Student Association of Fire Ecology; and/or Xi Sigma Pi Forestry Honorary Society; attending international and national conferences; and internships and cooperative education programs with government and industry. Each of these opportunities, combined with a friendly, helpful atmosphere, provide students a college experience that is highly personal as well as rewarding. Students also are encouraged to investigate opportunities for international education through Cal Poly's International Center (p. 443).

Undergraduate Programs

BS Environmental Earth and Soil Sciences

The BS in Environmental Earth and Soil Sciences provides an interdisciplinary foundation for understanding how land, water, and atmospheric resources contribute to sustainable natural resource management. The program emphasizes a wide range of disciplines in natural resources and in the cultures that use and modify them. The core of the Environmental Earth and Soil Sciences curriculum is composed of geology, soil science, and geography, and is strengthened by a diverse array of related specialties, which include: climate change studies, environmental policy and management, regenerative agriculture, soil health, sustainable forestry, urban forestry, land management, geospatial technology, and hydrology and water resources.

The Environmental Earth and Soil Sciences major provides detailed and thorough training in the natural and cultural processes that govern the relationship between humans and their environments. The program also furnishes students with the marketable expertise to assess, manage, repair, and improve this fragile relationship while acquiring a well-rounded education in the natural sciences. In addition, majors can meet the educational requirements for professional certification in a number of areas (e.g. Geologist in Training, erosion and sediment control, hydrology, soil conservation, soil science) and find their training ideal for graduate school preparation in a number of related disciplines.

Due to the multidisciplinary nature of the Environmental Earth and Soil Sciences major, students have access to diverse faculty and laboratories in several colleges on campus. California's Central Coast offers a diverse environmental and cultural setting for real-world training and experiences in environmental sciences.

Environmental Earth and Soil Sciences graduates are employed in careers in environmental consulting, carbon farming, natural resource inventory and assessment, environmental mitigation and clean-up, and environmental planning. Environmental Earth and Soil Sciences graduates possess an interdisciplinary understanding of how water, air,

and soil interact, as well as an ability to assess how the management of these critical natural resources impacts global environmental change.

In addition to the required major courses, students select courses from an expansive list of approved electives, or take a minor, or select one of the following concentrations.

Concentrations

Geology

Students learn the fundamentals of a broad variety of geologic subdisciplines, including mineralogy, petrology, seismology, stratigraphy, geochemistry, geomorphology and structural geology. Each of these fundamental subdisciplines are supported by curriculum that emphasizes methods of data collection, interpretation and professional communication of results. Upon completion of this concentration, students are able to critically evaluate geologic reports within the context of our evolving societal needs, and are prepared to pursue post graduate degrees in the geosciences and/or careers in the geotechnical industry. Completion of this concentration coupled with a BS degree in Environmental Earth and Soil Sciences qualifies a graduate to take the Geologist in Training examination (GIT) and become certified as a GIT, which can eventually lead to licensure as a Professional Geologist (PG).

Hydrology

Students learn the fundamentals of a broad variety of hydrologic subdisciplines including vadose zone hydrology, groundwater hydrology, soil erosion control, water quality, and watershed management. Each of these fundamental subdisciplines are supported by curriculum that emphasizes methods of data collection and interpretation, and professional communication of results. Upon completion of this concentration, students will be qualified to work in a water-related position for Federal and State agencies, private companies, and environmental consulting firms. Completion of the Hydrology Concentration meets the course requirements of the U.S. Office of Personnel Management (OPM) for employment as a Hydrologist (GS 1315)

BS Environmental Management and Protection

The BS in Environmental Management and Protection is an interdisciplinary course of study integrating the biophysical and social/economic/political sciences in sustainable natural resource management, protection, and conservation. The curriculum emphasizes an understanding of ecosystem structures and functions, sustainable management of natural systems, and the human and policy dimensions of global change. The major provides students with an integrated science and management background that enables systems-thinking, complex problem solving, and discovery of innovative solutions in a time of rapid environmental change.

Since environmental problems arise from human demands and stresses on the environment, solutions must focus on the human dimension of ecosystems. Thus, environmental management is the management of both people and resources to attain human goals while protecting environmental values in order to sustain natural systems. Knowledge of the social and political dimensions are balanced with study of economic and ecological theories applied to solving conflicts over environmental uses and impacts.

Graduates are prepared for a broad range of professional careers in land conservation and protection, environmental policy, environmental consulting, sustainability science and management, life cycle analysis,

environmental planning, environmental assessment and impact analysis, and natural resource management and stewardship.

The Environmental Management and Protection major is endorsed and supported by the California Association of Environmental Professionals (AEP), a professional association representing the full range of environmental professions in both private and public sectors.

In addition to the required major courses, students select courses from an expansive list of approved electives, or take a minor, or select one of the following concentrations.

Concentrations

Watershed Management and Hydrology

This concentration provides students a focused and encompassing program in watershed management, including a proficiency in watershed hydrology in forest ecosystems, Mediterranean ecosystems, rangeland hydrology, post-fire watershed evaluation, watershed and stream restoration, and urban/wildland hydrologic implications. Students pursuing this concentration can qualify as hydrologists under U.S. Government OPM guidelines (GS 1315).

Wildlife Biology Concentration

This specialized course of study prepares students for wildlife biology certification and employment in the fish and wildlife areas of law enforcement, management, and production.

BS Forest and Fire Sciences

The BS in Forest and Fire Sciences prepares students for exciting careers contributing to the betterment of society through the protection and sustainable management of our forests, including the role of fire as a management tool. Our forests have the greatest capacity of any ecosystem to store carbon and mitigate climate change if managed well. However, without proper management, forests are increasingly susceptible to disease and catastrophic fire events that are re-shaping the landscape and built environments. California and the world needs professionals trained to understand forest management and fire science in order to save lives and improve our environment. Cal Poly's Forest and Fire Sciences major meets this critical need.

Students in the Forest and Fire Sciences major may specialize in watershed management and hydrology, wildlife biology, or fire and fuels management. Optionally, students may select courses from approved electives that are categorized by career area from climate change science to environmental policy and management to geospatial technology to urban forestry.

Graduates qualify for such positions as: fire and fuels manager, forester, geospatial analyst, environmental planner and assessor, natural resource manager, urban forester, park administrator, watershed manager, hydrologist, consultant, and many other related environmental career areas. Cal Poly graduates are employed throughout the world by government, nonprofits, and industry through: managing and sustaining working forests; fire protection and stewardship of wildlands; implementing leading-edge strategies in forestry, land management, and conservation; and protecting and managing the wildland-urban interface.

The Forest and Fire Sciences major provides students with applied learning experiences at our Swanton Pacific Ranch. This 3,200 acre living and learning laboratory engages students in meaningful learn-by-doing opportunities to study the methods of resource conservation applied through sustainable management techniques in redwood forests, riverine

ecosystems, and expansive coastal grasslands overlooking the Monterey Bay National Marine Sanctuary.

The Society of American Foresters accredits the Forest and Fire Sciences major. Also, the U.S. Office of Personnel Management (OPM) recognizes that our graduates meet the classification of forester for federal employment.

In addition to the required major courses, students select courses from an expansive list of approved electives, or take a minor, or select one of the following concentrations.

Concentrations

Watershed Management and Hydrology

This concentration provides students a focused and encompassing program in watershed management, including a proficiency in watershed hydrology in forest ecosystems, Mediterranean ecosystems, rangeland hydrology, post-fire watershed evaluation, watershed and stream restoration, and urban/wildland hydrologic implications. Students pursuing this concentration can qualify as hydrologists under U.S. Government OPM guidelines (GS 1315). This concentration also meets the educational requirements for professional certification through the American Institute of Hydrology.

Wildlife Biology Concentration

This specialized course of study prepares students for wildlife biology certification and employment in the fish and wildlife areas of law enforcement, management, and production.

Wildland Fire and Fuels Management

Focused study on the management of fire and fuels on landscapes ranging from the wildlands to the urban interface. Emphasis on the technologies, issues and policies in managing fire, using fire as an ecosystem management tool and social and economic impacts of fire. Completion of this concentration meets the requirements of the Wildland Fire Practitioner Certification through the Association of Fire Ecology.

Environmental Soil Science Minor

Natural Resources Management & Environmental Sciences Department
Bldg. 180, Room 515
Phone: 805.756.1691
Email: cappel@calpoly.edu

Coordinator: Dr. Chip Appel

Students completing the minor gain skills in understanding and assessing the science and management of soils. Because soils are necessary for sustaining all living organisms, this minor is relevant to all students. Students will gain practical, meaningful, and hands-on experiences in both environmental and agricultural applications of the world's finite soil resources. This minor allows students the opportunity to relate their interests to the ecology, classification, mineralogy, chemistry, physics, and fertility/health parameters of soils.

Fire Ecology and Wildfire Hazard Planning Minor

Natural Resources Management & Environmental Sciences Department
Bldg. 180, Room 506

Phone: 805.756.5104
Email: cdicus@calpoly.edu

Coordinator: Dr. Chris Dicus

This minor prepares students for the diverse, multi-disciplinary expertise needed to address the growing wildfire threat that societies throughout the world are facing, with a particular focus on California as a model system. The career expertise required to address the increasing threat of catastrophic wildfire spans many disciplines. This minor represents a key entry point for many students to tailor their major program in a way that provides an option to apply their undergraduate training to the rapidly growing number of career opportunities around wildfire management and hazard planning. Core coursework will give students an understanding around how fuel, weather and environmental features influence fire behavior, and the contemporary techniques and technology to control wildfire, as well as an understanding of the role of fire in ecosystem management. Beyond these core courses, students will have an opportunity to select between either a wildfire ecology track, focused on hands on and practical knowledge around fire ecology and fuels management, or a hazard planning track, focused on key elements of hazard planning and mitigation in fire prone communities. The wildfire ecology track will help prepare students for work in fuels and ecosystem management to enhance fire resilience in city, county, state and federal forest, rangeland, shrubland and other open space, as well as prepare students to work in the private sector providing technological and capacity solutions to meet wildfire management needs of different agencies. The hazard planning track will help prepare students for a range of work in the public and private sector space, including the design of policies and government functions to address wildfire threat as well as around contemporary approaches to hazard planning and mitigation across different public sectors.

Minor Requirements (p. 135)

Indigenous Studies in Natural Resources and the Environment Minor

Natural Resources Management & Environmental Resources Department
Bldg. 180, Room 505
Phone: 805.756.2773
Email: pverma@calpoly.edu

Coordinator: Dr. Priya Verma

This interdisciplinary minor is sponsored by the Natural Resources Management and Environmental Sciences department in the College of Agriculture, Food and Environmental Sciences and the Ethnic Studies department in the College of Liberal Arts. The minor consists of innovative coursework and provides research opportunities that incorporate indigenous ecological knowledge in areas such as conservation biology, environmental biology, wildlife and fisheries sciences, forest resources management, environmental studies and environmental sciences: as well as agriculture, ethnic studies, geography, biology, and recreation, parks and tourism.

The Indigenous Studies in Natural Resources Management and the Environment minor aims to bring together principles of both Indigenous knowledge and Western science. Instruction in these two approaches will provide students with the necessary skills, practical research methods and critical thinking abilities for addressing complex environmental and health issues, and resource management problems facing both

Indigenous and non-Indigenous communities around the world. Contact the minor coordinator for more details.

Water Science

An interdisciplinary minor sponsored by the departments of BioResource and Agricultural Engineering, and Natural Resources Management and Environmental Sciences, that emphasizes one of three areas of study: irrigation, water policy, or watershed management. For more information, see the College of Agriculture, Food and Environmental Sciences (p. 60) section.

The department also participates in offering minors in Land Rehabilitation and Restoration Ecology, Rangeland Resources, Anthropology-Geography, and Geology. Please see College of Agriculture, Food and Environmental Sciences (p. 60), College of Liberal Arts (p. 268) or the Physics (p. 409) page for additional information.

Additional Minors

Geographic Information Systems for Agriculture

An interdisciplinary minor sponsored by the departments of BioResource and Agricultural Engineering, Natural Resources Management and Environmental Sciences, and Horticulture and Crop Science. For more information, see the College of Agriculture, Food and Environmental Sciences (p. 60) section.

Land Rehabilitation and Restoration Ecology

An interdisciplinary minor focusing on plant science, soil science, and ecology. It was created for students interested in rehabilitation and restoration of disturbed lands. For more information, see the College of Agriculture, Food and Environmental Sciences (p. 60) section.

Graduate Program

MS Environmental Sciences and Management

The Master of Science degree program in Environmental Sciences and Management (MSES) offers advanced study in a range of environmental science and management disciplines.

The purpose of the Master of Science in Environmental Sciences and Management program is to provide advanced education in management of the environment and natural resources. Advanced study in environmental science, management of the environment, quantitative and qualitative analysis, and communication is the core of the degree. The degree allows an emphasis in environmental policy, forest sciences, hydrology, soil science, and sustainability. Through the emphasis of study, students have flexibility in creating elective coursework to suit their professional goals. The culminating experience of the degree is a professional project or thesis that allows students to explore, seek solutions, or provide research on environmental challenges.

Additional Requirements:

- Students must have at least a 3.0 GPA in the final 90 quarter units of their undergraduate degree.
- Completion of 3 quarters or two semesters of any combination of chemistry, biology, ecology, physics, earth science, or atmospheric Science.
- Completes one quarter or one semester of Statistics and Calculus

- An applicant who lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies (12 unit limit) before advancement to classified graduate standing.
- Must have at least 3 letters of reference that can attest to the academic capabilities of the applicant.

BS Environmental Earth and Soil Sciences

Program Learning Objectives

1. Demonstrate critical thinking and problem solving skills.
2. Effectively communicate scientific and technical knowledge in a professional manner.
3. Demonstrate the ability to integrate and apply technical knowledge in the following key areas:
 - a. Geology & Climate – rock materials and processes of the lithosphere, plate tectonics; deformational histories, and past climates;
 - b. Soils & Water – morphology, ecology, chemistry, physics, and health;
 - c. Geography & Geospatial Technology – human cultural impacts, resource utilization trends and spatial patterns, geographic information systems and modeling;
 - d. Resource Management – effects of land management activities on, and restoration and rehabilitation of, soil and water resources.
4. Demonstrate proficiency in quantitative skills and information management specific to their discipline areas.
5. Exhibit an understanding of their professional and ethical responsibilities, including respect for diversity.
6. Promote life-long learning habits by exposing students to the discovery process of applied research and demonstration projects conducted by the faculty.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

NR 140	Careers in Natural Resources Management and Environmental Sciences	1
ERSC 144	Introduction to Earth Science	4
ERSC 223	Rocks and Minerals	4
ERSC 303	Soil Erosion and Water Conservation	4
ERSC/GEOG 333 or BRAE 345 or GEOG 325 or GEOG 350	Human Impact on the Earth ¹ Aerial Photogrammetry and Remote Sensing Climate and Humanity The Global Environment	3-4

or MATH 142	Calculus II	
SS 120	Introductory Soil Science	4
SS 221	Soil Health and Plant Nutrition	4
SS 321	Soil Morphology	4
SS 422	Soil Ecology ²	4
or ERSC 423	Geomorphology	
SS 423	Environmental Soil and Water Chemistry	5
SS 424	Environmental Soil Physics - Senior Project	5
BOT 121	General Botany (B2 & B3) ³	4
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ³	4
CHEM 128	General Chemistry for Agriculture and Life Science II	4
CHEM 129	General Chemistry for Agriculture and Life Science III	4
CHEM 312	Organic Chemistry: Fundamentals and Applications	5
GEOL 201	Physical Geology	3
GEOL 241	Physical Geology Laboratory	1
GEOL 415	Structural Geology ²	4
or GEOL 330	Principles of Stratigraphy	
MATH 161	Calculus for the Life Sciences I (B4) ^{3,4}	4
or MATH 141	Calculus I	
NR/LA 218	Introduction to Geographic Information Systems (GIS)	3
NR 310	Global Climate Change (Upper-Division B) ³	4
NR 363	Undergraduate Seminar	2
NR 418	Applied GIS	3-4
or NR 355	Drone Assisted Surveying	
or NR 416	Environmental Impact Analysis and Management	
or SS 431	Digital Soil Mapping	
PHYS 121	College Physics I ⁵	4
or PHYS 141	General Physics I	
STAT 218	Applied Statistics for the Life Sciences (GE Electives) ³	4
or STAT 217	Introduction to Statistical Concepts and Methods	
Concentration (32 units) or Approved Electives (20 units) in combination with Free Electives ^{6,7,8}		20-32
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		52
FREE ELECTIVES		
Free Electives		0-13
Total units		180-181

- ² Students in the Geology concentration must take ERSC 423 and GEOL 415 to meet requirements for this concentration.
- ³ Required in Major or Support; also satisfies General Education (GE) requirement.
- ⁴ Students in the Geology concentration need to take MATH 141 to meet prerequisites for courses in the concentration. Students interested in the Soil Geotechnical Studies Approved Electives area must take MATH 141 to meet prerequisites for courses in that area.
- ⁵ Students in the Geology concentration need to take PHYS 141 to meet prerequisites for courses in the concentration. Students interested in the Soil Geotechnical Studies Approved Electives area must take PHYS 141 to meet prerequisites for courses in that area.
- ⁶ Unless a concentration is declared, the default will be a combination of Approved Electives and Free Electives.
- ⁷ Students who do not declare a concentration are encouraged to use Approved Electives and Free Electives to earn a minor. See the below Approved Electives Guide for recommended minors.
- ⁸ If a course is taken to meet a Major or Support requirement, it cannot be double-counted as an Approved Elective.

Concentrations

- Geology (p. 124)
- Hydrology (p. 124)

Approved Electives Guide

Approved Electives are courses that support the below career areas. Refer to number(s) next to each course to identify which courses align with each of the career areas. Consultation with an advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

1. Climate Change Science
2. Environmental Mitigation Strategies
3. Environmental Policy and Management
4. Environmental Soil Science
5. Forest and Environmental Practices
6. Geospatial Technology
7. Soil Geotechnical Studies
8. Sustainable Agriculture
9. Urban Forestry

A student may earn one or more of the minors listed below through the appropriate selection of Approved Electives in combination with Free Electives (refer to advising materials for the minor). However, students in this major may not obtain minors in Environmental Soil Science or Geology as the subject areas in these minors are substantially covered in this major.

- Anthropology and Geography
- Biology
- Geographic Information Systems for Agriculture
- Indigenous Studies in Natural Resources and the Environment
- Sustainable Environments
- Water Science

Approved Electives

Select from the following:

¹ Students in the Geology concentration need to take MATH 142 to meet prerequisites for courses in the concentration. Students interested in the Soil Geotechnical Studies are encouraged to take MATH 142 to meet prerequisites for courses in that area. Students interested in taking NR 355 need to take BRAE 345 to meet prerequisites.

At least 8 units must be upper-division (300-400 level)

No more than 6 units of NR 339 may count towards the degree.

Courses used to meet a degree requirement cannot double count as an elective.

AG/PLSC 315	Principles of Organic Crop Production ⁸	BRAE/NR 247	Forest Surveying ⁵
AG 339	Internship in Agriculture ⁸	BRAE 333	Aquacultural Engineering ^{1,2,3,8}
AG/EDES/ENGR/ISLA/SCM/UNIV 350	The Global Environment ^{1,8}	BRAE 340	Irrigation Water Management ^{5,8}
AG 360	Holistic Management ^{5,8}	BRAE 345	Aerial Photogrammetry and Remote Sensing ⁶
AGB 212	Agricultural Economics ⁸	BRAE 348	Energy for a Sustainable Society ¹
AGB 312	Agricultural Policy ⁸	BRAE/NR 349	Water for a Sustainable Society ^{1,2,3,8}
AGB 369	Agricultural Personnel Management ⁸	BRAE 447	Advanced Surveying with GIS Applications ⁶
AGC 205	Agricultural Communications	CE 112	Design Principles in Civil Engineering ⁶
ANT 201	Cultural Anthropology ¹	CE 113	Computer Aided Drafting in Civil Engineering ⁶
or ANT 202	World History Before Writing	CE 204	Mechanics of Materials I ⁷
ANT 250	Biological Anthropology ¹	CE 381	Geotechnical Engineering
ARCE 211	Structures I ⁷	& CE 382	and Geotechnical Engineering Laboratory ⁷
or CE 204	Mechanics of Materials I	or ARCE 421	Soil Mechanics
ARCE 212	Structures II ⁷	CHEM 314	Biochemistry: Fundamentals and Applications ⁴
or ME 211	Engineering Statics	CHEM 331	Quantitative Analysis ⁴
ARCE 223	Mechanics of Structural Members ⁷	CHEM 341	Environmental Chemistry: Water Pollution ⁴
or CE 207	Mechanics of Materials II	CRP 212	Introduction to Urban Planning ^{3,5,6,9}
ARCE 422	Foundation Design ⁷	CRP 336	Introduction to Environmental Planning ^{5,6}
ASCI 112	Principles of Animal Science ⁸	CRP/NR 404	Environmental Law ¹
ASCI 221	Introduction to Beef Production ⁸	CRP/NR 408	Water Resource Law and Policy ^{2,3,5,8}
ASCI 223	Systems of Small Ruminant Management ⁸	CRP 420	Land Use Law ^{3,5}
ASCI 239	Principles of Rangeland Management ^{1,2,3,8}	CSC/CPE 101	Fundamentals of Computer Science ⁶
ASCI 311	Advanced Beef Cattle System Management ⁸	ECON 221	Microeconomics ³
ASCI 372	California Rangeland & Ranch Resource Management ^{1,2,3,8}	EDES 406	Sustainable Environments ⁸
ASCI 465	Applied Practices for Monitoring California Rangelands ^{1,2,3,8}	ENGL 147	Writing Arguments about STEM ^{1,2,3}
BIO 329	Vertebrate Field Zoology ²	ENGL 316	Writing Sustainability ^{1,2,3}
BIO 400	Special Problems for Advanced Undergraduates ^{2,5}	ENVE 264	Environmental Fluid Mechanics ⁷
BIO 427	Wildlife Management ²	ENVE 324	Introduction to Air Pollution ¹
BIO 435	Plant Physiology ⁵	ERSC/GEOG 250	Physical Geography ¹
BOT/PLSC 323	Plant Pathology ⁸	ERSC/GEOG 325	Climate and Humanity ¹
BOT 326	Plant Ecology ²	ERSC/GEOG 414	Global and Regional Climatology ¹
BIO 447	Spatial Ecology ^{2,6}	ERSC/GEOG 415	Applied Meteorology and Climatology ¹
BRAE 141	Agricultural Machinery Safety ⁸	ERSC 423	Geomorphology ^{4,6}
BRAE 142	Agricultural Power and Machinery Management ⁸	ERSC 442	Applied Environmental Groundwater Hydrology ⁴
BRAE 150	Design Graphics and CAD for Agricultural Engineering ^{5,6}	ERSC 443	Applied Environmental Contaminant Transport ⁴
BRAE 237	Introduction to Engineering Surveying ⁵	GEOG 150	Human Geography ^{1,3}
BRAE 239	Engineering Surveying ^{5,6}	GEOG 308	Global Geography ¹
		GEOG 328	Applications in Remote Sensing and GIS ^{1,6}
		GEOG 400	Special Problems for Advanced Undergraduates ¹
		GEOG 435	Biodiversity and Biogeography Methods

GEOG 441	Advanced Applications in Geospatial Technologies ¹	NR 422	Stream Measurements and Water Quality Monitoring ^{5,9}
GEOL 203	The Geologic Record: Fossils and the History of Life ¹	NR 434	Wood Properties, Products and Sustainable Uses ^{5,9}
GEOL 206	Geologic Excursions ⁷	NR 435	Environmental Policy Analysis ^{1,3}
GEOL 305	Seismology and Earth Structure ⁷	NR 445	Systems Thinking in Environmental Management ^{1,2,3,4,5,6,7,8,9}
GEOL 400	Special Problems for Advanced Undergraduates ⁷	NR 455	Wildland-Urban Fire Protection ^{5,9}
GEOL 420	Applied Geophysics ⁷	NR 472	Leadership Practice ^{3,5}
JOUR 203	News Reporting and Writing ⁵	NR 474	Forest Stewardship Practices ^{3,5}
MATH 142	Calculus II ⁴	NR 475	Senior Project - Forest Stewardship ^{3,5}
or MATH 162	Calculus for the Life Sciences II	PHIL 340	Environmental Ethics ^{1,3}
MATH 143	Calculus III ⁷	PHYS 122	College Physics II ⁴
MATH 241	Calculus IV ⁷	or PHYS 142	General Physics II
MCRO 221	Microbiology ⁵	PHYS 143	General Physics III
MCRO 436	Microbial Ecology ⁵	PHYS 410	Physics of Solid Earth ⁷
NR 141	Introduction to Forest Ecosystem Management ^{5,9}	PLSC 123	Landscape Installation and Maintenance ^{5,9}
NR 142	Environmental Management ^{8,9}	PLSC 124	Plant Propagation ^{5,9}
NR 200	Special Problems for Undergraduates ^{1,2,3,4,5,6,7,8,9}	PLSC 203	Organic Enterprise Project ⁸
NR 203	Resource Law Enforcement	PLSC 230	Environmental Horticulture ^{8,9}
NR 204	Wildland Fire Control ^{5,9}	PLSC 233	Plant Materials I ^{5,9}
NR 208	Dendrology ^{5,9}	PLSC 234	Plant Materials II ^{5,9}
NR 215	Land and Resource Measurements ⁵	PLSC 244	Precision Farming ^{6,8}
NR 260	Forest Operations ⁵	PLSC 313	Agricultural Entomology ⁸
NR 306	Natural Resource Ecology and Habitat Management ^{2,5,6,9}	PLSC 321	Weed Biology and Management ^{5,8}
NR/ES 308	Fire and Society ⁵	PLSC 327	Vertebrate Pest Management ⁵
NR 312	Technology of Wildland Fire Management ⁵	PLSC 350	Abiotic Plant Problems ⁹
NR 315	Forest Mensuration ⁵	PLSC 381	Native Plants for California Landscapes ^{8,9}
NR 320	Watershed Processes and Management ⁵	PLSC 420	Organic Crop Production Systems ⁸
NR 323	Human Dimensions in Natural Resources Management ^{1,2,3}	PLSC 425	Arboriculture ^{5,9}
NR 324	Social Dimensions of Sustainable Food and Fiber Systems ⁸	PLSC 431	Insect Pest Management ⁸
NR 326	Natural Resources Economics and Valuation ^{1,3,5}	PLSC 441	Biological Control for Pest Management ⁸
NR 339	Internship in Forest and Natural Resources ^{1,2,3,4,5,6,7,8,9}	PLSC 445	Cropping Systems ⁸
NR 340	Wildland Fire Management ^{5,9}	PLSC 450	Current Issues in the Strawberry Industry ⁸
NR 350	Urban Forestry ^{5,9}	POLS 112	American and California Government ³
NR 355	Drone Assisted Surveying ^{5,6}	POLS 245	Judicial Process ³
NR/ES 360	Ethnicity and the Land ⁵	POLS 332	World Food Systems
NR 365	Silviculture and Fuels Management ⁵	POLS 341	American Constitutional Law ³
NR 400	Special Problems for Advanced Undergraduates ^{1,2,3,4,5,6,7,8,9}	POLS 343	Civil Rights in America ³
NR/ES 406	Indigenous Peoples and International Law and Policy ⁹	POLS 344	Civil Liberties ³
NR 413	Agricultural Law ^{1,2,3,4,8}	PSC 201	Physical Oceanography ¹
NR 420	Watershed Assessment and Protection ⁵	PSC 320	Energy, Society and the Environment ¹
		RPTA 112	Introduction to Parks and Outdoor Recreation ³
		RPTA 210	Experience Design ³
		RPTA 255	Leadership and Diverse Groups ²

RPTA 302	Environmental and Wilderness Education ³	
RPTA 325	Leadership in Outdoor Experiences ³	
SS/ERSC 270	Selected Topics (2) ⁴	
SS 322	Soil Plant Relationships ^{4,8}	
SS/NR/BIO 421	Wetlands ^{2,4,5}	
SS 431	Digital Soil Mapping ^{3,4,5,6,9}	
SS 440	Forest and Range Soils ^{4,5,9}	
SS 444	Soil Judging ⁴	
SS/ERSC 470	Selected Advanced Topics ⁴	
SS/ERSC 471	Selected Advanced Laboratory ⁴	
SS 522	Advanced Soil Fertility ⁴	
SS 582	GIS in Advanced Land Management ⁴	
STAT 313	Applied Experimental Design and Regression Models ⁶	
STAT 331	Statistical Computing with R ⁶	
UNIV 391	Appropriate Technology for the World's People: Development ⁸	
WVIT 233	Basic Viticulture ⁸	
WVIT 331	Advanced Viticulture - Fall ⁸	
WVIT 332	Advanced Viticulture - Winter ⁸	
WVIT 333	Advanced Viticulture - Spring ⁸	
WVIT 428	Winegrape Vineyard Management ⁸	
Any SCM course and any upper division AG, ANT, BIO, BOT, BRAE, CHEM, COMS, EDES, ENVE, ERSC, GEOG, GEOL, JOUR, MCRO, PLSC, NR, RPTA, SS, or UNIV courses		

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking ²	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Major) ¹	0
B2	Life Science (4 units in Major) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	

Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C ³		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D ⁴	4
Upper-Division D ⁵		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Majors plus 4 units in GE) ¹		4
Total units		52

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Recommended course to satisfy GE Area A3: ENGL 147.
- ³ Recommended courses to satisfy GE Area Upper-division C: NR 360 or ENGL 316.
- ⁴ Recommended course to satisfy GE Area D2: GEOG 150.
- ⁵ Recommended courses to satisfy GE Area Upper-division D: BRAE 349, GEOG 308, or NR 323.

Geology Concentration

GEOL 301	Physical Models in the Geosciences	4
GEOL 303	Computation and Visualization in the Geosciences	3
GEOL 305	Seismology and Earth Structure	4
GEOL 309	Igneous Petrology	3
GEOL 311	Metamorphic Petrology	3
GEOL 330	Principles of Stratigraphy	4
GEOL/ERSC 416	Field-Geology Methods	4
GEOL/ERSC 417	Geologic Mapping	4
GEOL 420	Applied Geophysics	3
Total units		32

Hydrology Concentration

ERSC 442	Applied Environmental Groundwater Hydrology	4
or ERSC 443	Applied Environmental Contaminant Transport	

Select from the following:		4
MATH 142	Calculus II ¹	
MATH 162	Calculus for the Life Sciences II	
NR 320	Watershed Processes and Management	4
NR 420	Watershed Assessment and Protection	4
PHYS 122	College Physics II	4
or PHYS 142	General Physics II	
SS 431	Digital Soil Mapping	4
or SS 440	Forest and Range Soils	
Approved Electives ¹		
Select from the following:		8
BRAE 331	Irrigation Theory	
BRAE 340	Irrigation Water Management	
BRAE 345	Aerial Photogrammetry and Remote Sensing	
BRAE 435	Drainage	
BRAE 532	Water Wells and Pumps	
ERSC 423	Geomorphology	
ERSC 442	Applied Environmental Groundwater Hydrology	
ERSC 443	Applied Environmental Contaminant Transport	
NR 400	Special Problems for Advanced Undergraduates	
NR/CRP 408	Water Resource Law and Policy	
NR 422	Stream Measurements and Water Quality Monitoring	
NR/RPTA 472	Leadership Practice	
SS/BIO/NR 421	Wetlands	
SS 431	Digital Soil Mapping	
SS 440	Forest and Range Soils	
Total units		32

¹ If a course is taken to meet a Major requirement, it cannot be double-counted in the concentration.

BS Environmental Management and Protection

Program Learning Objectives

1. Demonstrate critical-thinking problem-solving skills.
2. Effectively communicate scientific and technical knowledge in a professional manner.
3. Demonstrate competency in scientific and technical knowledge related to environmental management in the following key areas:
 - a. Ecology and Biology – applied ecology to inform environmental impact analysis;
 - b. Measurement – identification of key ecosystem elements, indicators and range of variability; land and water quality indicators;
 - c. Management and Protection – developing alternatives and mitigation measures;

- d. Social, Economic, and Political – conflict management, CEQA (California Environmental Quality Act) and NEPA (National Environmental Policy Act) interpretation and analysis, i.e., environmental impact reports (EIR), environmental impact statements (EIS), and other environmental documents.
4. Demonstrate proficiency in quantitative skills and information management specific to their discipline areas.
 5. Exhibit an understanding of their professional and ethical responsibilities as sustainability managers, environmental managers, natural resources managers, forest managers, including respect for diversity.
 6. Promote life-long learning habits by exposing students to the discovery process of applied research and demonstration projects conducted by the faculty.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section for this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

NR 140	Careers in Natural Resources Management and Environmental Sciences	1
NR 142	Environmental Management	3
NR 208	Dendrology ^{1,2}	3-4
or BIO 162	Introduction to Organismal Form and Function	
or BIO 222	Biodiversity of California	
or BIO 227	Wildlife Conservation Biology	
or GEOL 201	Physical Geology	
NR 215	Land and Resource Measurements	1
NR/LA 218	Introduction to Geographic Information Systems (GIS)	3
NR 306	Natural Resource Ecology and Habitat Management	4
or NR 304	Agroecology	
or NR 305	Forest Ecology and Silvics	
NR 314	Environmental Life-Cycle Analysis	4
or NR 445	Systems Thinking in Environmental Management	
NR 320	Watershed Processes and Management ²	4
or NR 402	Forest Health	
or ERSC 303	Soil Erosion and Water Conservation	
NR 323	Human Dimensions in Natural Resources Management (Upper-Division D) ³	4
or NR 324	Social Dimensions of Sustainable Food and Fiber Systems	

or NR 328	Environmental Leadership and Community Engagement	
NR 326	Natural Resources Economics and Valuation	4
NR 335	Conflict Management in Natural Resources	4
NR 363	Undergraduate Seminar	2
NR/CRP 404	Environmental Law	4
NR 416	Environmental Impact Analysis and Management	4
Select from the following: ⁴		12
NR 425 & NR 435 & NR 465	Applied Resource Analysis and Assessment and Environmental Policy Analysis and Senior Project - Ecosystem Management	
NR 474 & NR 475	Forest Stewardship Practices and Senior Project - Forest Stewardship	
BIO 111	General Biology ¹	4
or BIO 150	Diversity and History of Life	
or BIO 161	Introduction to Cell and Molecular Biology	
BIO 114	Plant Diversity and Ecology (B2 & B3) ³	4
or BOT 121	General Botany	
BRAE 237	Introduction to Engineering Surveying	2-3
or BRAE 345	Aerial Photogrammetry and Remote Sensing	
BRAE 348	Energy for a Sustainable Society (Upper-Division B) ³	4
or ENVE 324	Introduction to Air Pollution	
or NR 310	Global Climate Change	
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ³	4
MATH 161	Calculus for the Life Sciences I (B4) ^{3,5}	4
or MATH 221	Calculus for Business and Economics	
PHYS 121	College Physics I	4
SS 120	Introductory Soil Science	4
STAT 217	Introduction to Statistical Concepts and Methods (GE Electives) ³	4
or STAT 218	Applied Statistics for the Life Sciences	
Concentration (41 units) or Approved Electives (29 units) in combination with Free Electives ^{6,7,8}		29-41
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		48
FREE ELECTIVES		
Free Electives		0-12
Total units		180-182

¹ Students in the Wildlife Biology concentration need to take BIO 161 and BIO 162 to meet prerequisites for courses in the concentration.

² Students in the Watershed Management and Hydrology concentration need to take GEOL 201 and NR 320 to meet prerequisites for courses in the concentration.

³ Required in Major or Support; also satisfies General Education (GE) requirement.

⁴ Students must choose to take either NR 425, NR 435, and NR 465 or NR 474 and NR 475.

⁵ Students in the Watershed Management and Hydrology concentration need to take MATH 161 to meet prerequisites for courses in the concentration.

⁶ Unless a concentration is declared, the default will be a combination of Approved Electives and Free Electives.

⁷ Students who do not declare a concentration are encouraged to use Approved Electives and Free Electives to earn one or more minors. See the below Approved Electives Guide for recommended minors.

⁸ If a course is taken to meet a Major or Support requirement, it cannot be double-counted in a concentration or as an approved elective.

Concentrations

- Watershed Management and Hydrology (p. 129)
- Wildlife Biology (p. 130)

Approved Electives Guide

Approved Electives are courses that support the below career areas. Refer to number(s) next to each course to identify which courses align with each of the career areas. Consultation with an advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

1. Climate Change Science
2. Environmental Mitigation Strategies
3. Environmental Policy and Management
4. Environmental Soil Science
5. Forest and Environmental Practices
6. Geology
7. Geospatial Technology
8. Sustainable Agriculture
9. Urban Forestry

Additionally, a student may earn one or more of the following minors through the appropriate selection of Approved Electives in combination with Free Electives (refer to advising materials for the minor):

- Agribusiness
- Anthropology and Geography
- Biology
- City and Regional Planning
- Entrepreneurship
- Environmental Soil Science
- Geographic Information Systems for Agriculture
- Geology
- Indigenous Studies in Natural Resources and the Environment
- Land Rehabilitation and Restoration Ecology
- Law and Society
- Political Science
- Spanish
- Sustainable Agriculture

- Sustainable Environments
- Water Science

Approved Electives

Select from the following:

At least 6 units must be upper-division (300-400 level). Additional units of upper-division coursework may be needed, depending on coursework taken in Major or Support.

If a course is taken to meet a Major or Support requirement, it cannot be double-counted as an Approved Elective.

AG/PLSC 315	Principles of Organic Crop Production ⁸
AG 339	Internship in Agriculture ⁸
AG/EDES/ENGR/ISLA/SCM/UNIV 350	The Global Environment ⁸
AG 360	Holistic Management ^{5,8}
AGB 212	Agricultural Economics ⁸
AGB 312	Agricultural Policy ⁸
AGB 369	Agricultural Personnel Management ⁸
AGC 205	Agricultural Communications
ANT 201	Cultural Anthropology ¹
or ANT 202	World History Before Writing
or GEOG 150	Human Geography
ANT 250	Biological Anthropology ¹
ASCI 112	Principles of Animal Science ⁸
ASCI 221	Introduction to Beef Production ⁸
ASCI 223	Systems of Small Ruminant Management ⁸
ASCI 239	Principles of Rangeland Management ^{1,2,3,8}
ASCI 311	Advanced Beef Cattle System Management ⁸
ASCI 370	Rangeland Improvements ^{1,2,3,8}
ASCI 465	Applied Practices for Monitoring California Rangelands ^{1,2,3,8}
BIO 329	Vertebrate Field Zoology ²
BIO 400	Special Problems for Advanced Undergraduates
BIO 427	Wildlife Management ²
BIO 435	Plant Physiology ⁵
BIO 447	Spatial Ecology ^{2,7}
BOT 121	General Botany ⁵
BRAE 141	Agricultural Machinery Safety ⁸
BRAE 142	Agricultural Power and Machinery Management ⁸
BRAE 150	Design Graphics and CAD for Agricultural Engineering ^{5,7}
BRAE 239	Engineering Surveying ⁷
BRAE 333	Aquacultural Engineering ^{1,2,3,8}
BRAE 340	Irrigation Water Management ^{5,8}
BRAE 345	Aerial Photogrammetry and Remote Sensing ⁷

BRAE 348	Energy for a Sustainable Society ¹
BRAE 349	Water for a Sustainable Society ^{4,8}
BRAE 447	Advanced Surveying with GIS Applications ⁷
CE 112	Design Principles in Civil Engineering ⁷
CE 113	Computer Aided Drafting in Civil Engineering ⁷
CHEM 128	General Chemistry for Agriculture and Life Science II ⁴
CHEM 129	General Chemistry for Agriculture and Life Science III ⁴
CHEM 312	Organic Chemistry: Fundamentals and Applications ⁴
CRP 212	Introduction to Urban Planning ^{2,5,7,9}
CRP 336	Introduction to Environmental Planning ^{5,7}
CRP 420	Land Use Law ^{3,5}
ECON 221	Microeconomics ³
EDES 406	Sustainable Environments ⁸
ENGL 147	Writing Arguments about STEM ^{1,2,3}
ENGL 316	Writing Sustainability ^{1,2,3}
ERSC 223	Rocks and Minerals ^{3,4,5,6,7}
ERSC/GEOG 250	Physical Geography ^{1,7}
ERSC 303	Soil Erosion and Water Conservation ^{4,8}
ERSC/GEOG 325	Climate and Humanity ¹
ERSC/GEOG 414	Global and Regional Climatology ¹
ERSC/GEOG 415	Applied Meteorology and Climatology ¹
ERSC 423	Geomorphology ^{4,6}
ERSC 442	Applied Environmental Groundwater Hydrology ⁴
ERSC 443	Applied Environmental Contaminant Transport ⁴
GEOG 308	Global Geography ¹
GEOG 328	Applications in Remote Sensing and GIS ^{1,7}
GEOG 435	Biodiversity and Biogeography Methods
GEOL 206	Geologic Excursions ⁶
GEOL 241	Physical Geology Laboratory ⁶
GEOL 305	Seismology and Earth Structure ⁶
GEOL 309	Igneous Petrology ⁶
GEOL 311	Metamorphic Petrology ⁶
GEOL 330	Principles of Stratigraphy ⁶
GEOL 415	Structural Geology ⁶
GEOL 420	Applied Geophysics ⁶
GEOL/ERSC 416	Field-Geology Methods ⁶
GEOL/ERSC 417	Geologic Mapping ⁶
JOUR 203	News Reporting and Writing ⁵
MATH 142	Calculus II ⁶
or MATH 162	Calculus for the Life Sciences II
MCRO 221	Microbiology ⁵

MCRO 436	Microbial Ecology ⁵	PLSC 350	Abiotic Plant Problems ⁹
NR 200	Special Problems for Undergraduates ^{1,2,3,4,5,6,7,8,9}	PLSC 381	Native Plants for California Landscapes ^{8,9}
NR/RPTA 203	Resource Law Enforcement ^{2,3,5}	PLSC 420	Organic Crop Production Systems ⁸
NR 204	Wildland Fire Control ^{5,9}	PLSC 425	Arboriculture ^{5,9}
NR/ES 308	Fire and Society ⁵	PLSC 431	Insect Pest Management ⁸
NR 312	Technology of Wildland Fire Management ⁵	PLSC 441	Biological Control for Pest Management ⁸
NR 324	Social Dimensions of Sustainable Food and Fiber Systems ⁸	PLSC 445	Cropping Systems ⁸
NR 328	Environmental Leadership and Community Engagement ^{1,2,3,4,5,6,7,8,9}	PLSC 450	Current Issues in the Strawberry Industry ⁸
NR 339	Internship in Forest and Natural Resources ^{1,2,3,4,5,6,7,8,9}	POLS 112	American and California Government ³
NR 340	Wildland Fire Management ^{5,8,9}	POLS 245	Judicial Process ³
NR 350	Urban Forestry ^{5,9}	POLS 332	World Food Systems
NR 355	Drone Assisted Surveying ⁷	POLS 341	American Constitutional Law ³
NR/ES 360	Ethnicity and the Land ⁵	POLS 343	Civil Rights in America ³
NR 400	Special Problems for Advanced Undergraduates ^{5,9}	POLS 344	Civil Liberties ³
NR/CRP 404	Environmental Law ^{2,5,8,9}	PSC 201	Physical Oceanography ¹
NR/ES 406	Indigenous Peoples and International Law and Policy ⁹	RPTA 112	Introduction to Parks and Outdoor Recreation ²
NR/CRP 408	Water Resource Law and Policy ^{2,3,5,8}	RPTA 210	Experience Design ²
NR 413	Agricultural Law ^{1,2,3,4,8}	RPTA 255	Leadership and Diverse Groups ²
NR 418	Applied GIS ^{1,5,7,9}	RPTA 302	Environmental and Wilderness Education ²
NR 420	Watershed Assessment and Protection ⁵	RPTA 313	Sustainability in the Experience Industry
NR/BIO/SS 421	Wetlands ^{2,4,5}	RPTA 314	Sustainable Travel and Tourism Planning
NR 422	Stream Measurements and Water Quality Monitoring ^{5,9}	RPTA 321	Visitor Services in Experience Industry Management
NR 434	Wood Properties, Products and Sustainable Uses ^{5,9}	RPTA 325	Leadership in Outdoor Experiences ²
NR 435	Environmental Policy Analysis ^{1,3}	RPTA 412	Advanced Experience Industry Management Applications
NR 445	Systems Thinking in Environmental Management ^{1,2,3,4,5,6,7,8,9}	RPTA 413	Tourism and Protected Area Management
NR 455	Wildland-Urban Fire Protection ^{5,9}	SS 221	Soil Health and Plant Nutrition ^{4,5,8}
PHIL 340	Environmental Ethics ³	SS 321	Soil Morphology ^{3,4,5,7}
PHYS 122 or PHYS 142	College Physics II ⁶ General Physics II	SS 322	Soil Plant Relationships ^{4,8}
PLSC 123	Landscape Installation and Maintenance ^{5,9}	SS 422	Soil Ecology ⁴
PLSC 124	Plant Propagation ^{5,9}	SS 423	Environmental Soil and Water Chemistry ⁴
PLSC 203	Organic Enterprise Project ⁸	SS 431	Digital Soil Mapping ^{2,4,5,7,9}
PLSC 230	Environmental Horticulture ^{8,9}	SS 440	Forest and Range Soils ^{4,5,9}
PLSC 233	Plant Materials I ^{5,9}	SS 444	Soil Judging ⁴
PLSC 234	Plant Materials II ^{5,9}	UNIV 391	Appropriate Technology for the World's People: Development ⁸
PLSC 244	Precision Farming ^{7,8}	WVIT 233	Basic Viticulture ⁸
PLSC 313	Agricultural Entomology ⁸	WVIT 331	Advanced Viticulture - Fall ⁸
PLSC 321	Weed Biology and Management ^{5,8}	WVIT 332	Advanced Viticulture - Winter ⁸
PLSC 323	Plant Pathology ⁸	WVIT 333	Advanced Viticulture - Spring ⁸
PLSC 327	Vertebrate Pest Management ⁵	WVIT 428	Winegrape Vineyard Management ⁸

Any SCM course and any upper-division AG, ANT, BIO, BOT, BRAE, CHEM, CM, COMS, CRP, EDES, ERSC, GEOG, GEOL, JOUR, LA, MCRO, MSCI, NR, PHIL, PHYS, PLSC, POLS, PSY, SS, STAT, or UNIV courses

GE Electives (4 units in Major plus 4 units in GE) ²	4
Total units	48

- ¹ Recommended course to satisfy GE Area A3: ENGL 147.
- ² Required in Major or Support; also satisfies General Education (GE) requirement.
- ³ Recommended courses to satisfy GE Area Upper-division C: NR 360 or ENGL 316.

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking ¹	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Major) ²	0
B2	Life Science (4 units in Major) ²	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ²	0
Upper-Division B (4 units in Major) ²		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C ³		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D (4 units in Major) ²		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		

Watershed Management and Hydrology Concentration - Environmental Management and Protection

CHEM 128	General Chemistry for Agriculture and Life Science II	4
CHEM 312	Organic Chemistry: Fundamentals and Applications	5
ERSC 442	Applied Environmental Groundwater Hydrology	4
or ERSC 443	Applied Environmental Contaminant Transport	
MATH 162	Calculus for the Life Sciences II	4
NR 420	Watershed Assessment and Protection	4
PHYS 122	College Physics II	4
SS 321	Soil Morphology	4
SS 440	Forest and Range Soils	4
or SS 431	Digital Soil Mapping	
Approved Electives ^{1,2}		
Select from the following:		8
BRAE 340	Irrigation Water Management	
BRAE 345	Aerial Photogrammetry and Remote Sensing	
BRAE 532	Water Wells and Pumps	
ERSC 303	Soil Erosion and Water Conservation	
ERSC 423	Geomorphology	
ERSC 442	Applied Environmental Groundwater Hydrology	
ERSC 443	Applied Environmental Contaminant Transport	
GEOL 241	Physical Geology Laboratory	
NR 260	Forest Operations	
NR 315	Forest Mensuration	
NR 339	Internship in Forest and Natural Resources	
NR 400	Special Problems for Advanced Undergraduates	
NR/CRP 408	Water Resource Law and Policy	
NR 413	Agricultural Law	
NR 418	Applied GIS	
NR/BIO/SS 421	Wetlands	
NR 422	Stream Measurements and Water Quality Monitoring	

NR 472	Leadership Practice
NR 474	Forest Stewardship Practices
SS 431	Digital Soil Mapping
SS 440	Forest and Range Soils
STAT 313	Applied Experimental Design and Regression Models

Total units **41**

¹ If a course is taken to meet a Major requirement, it cannot be double-counted as an Approved Elective for the concentration.

² Consultation with an advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

Wildlife Biology Concentration - Environmental Management and Protection

ASCI 239	Principles of Rangeland Management	4
BIO 321	Mammalogy	4
BIO 323	Ornithology	4
BIO 327	Wildlife Ecology	4
BIO 363 or BIO 444	Principles of Conservation Biology Population Ecology	4
BIO 427	Wildlife Management	4
BOT 313	Taxonomy of Vascular Plants	4
BOT 433	Field Botany: California Plant Diversity	5

Approved Electives

Select from the following: **8**

BIO 150	Diversity and History of Life
BIO 263	Introductory Ecology and Evolution
BIO 322	Ichthyology
BIO 324	Herpetology
BIO 329	Vertebrate Field Zoology
BIO 330	Extended Field Biology Activity
BIO 335	General Entomology
BIO 336	Invertebrate Zoology
BIO 363	Principles of Conservation Biology
BIO 400	Special Problems for Advanced Undergraduates
BIO 415	Biogeography
BIO 427	Wildlife Management
BIO 429	Parasitology
BIO 434	Environmental Physiology
BIO 442	Behavioral Ecology
BIO 444	Population Ecology
BOT 326	Plant Ecology
NR 400	Special Problems for Advanced Undergraduates
PLSC 313	Agricultural Entomology

Total units **41**

BS Forest and Fire Sciences

Program Learning Objectives

- Demonstrate critical-thinking problem-solving skills.
- Effectively communicate scientific and technical knowledge in a professional manner.
- Demonstrate competency in scientific and technical knowledge related to forestry, fire and fuels management, and environmental management in the following key areas:
 - Forest Ecology and Biology – watershed, vegetation, and stand classification; analysis and prediction of stand dynamics; disturbance ecology;
 - Measurement of Forest Resources – forest sampling and inventory, biometrics, GPS, GIS, remote sensing;
 - Management of Forest Resources – develop vegetation, fuel, stand, landscape prescriptions and management plans; environmental impact analysis, profitability and valuation analysis;
 - Forest Resource Policy and Administration – present and defend management plans, work in interdisciplinary (i.e., ID) teams, apply forest policies and regulations to management decisions.
- Demonstrate proficiency in quantitative skills and information management specific to their discipline areas.
- Exhibit an understanding of their professional and ethical responsibilities as forest managers, natural resources managers, environmental managers, including respect for diversity.
- Promote life-long learning habits by exposing students to the discovery process of applied research and demonstration projects conducted by the faculty.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, student must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

NR 140	Careers in Natural Resources Management and Environmental Sciences	1
NR 141	Introduction to Forest Ecosystem Management	3
NR 204	Wildland Fire Control	3
NR 208	Dendrology	4
NR 215	Land and Resource Measurements	1
NR/LA 218	Introduction to Geographic Information Systems (GIS)	3
NR 260	Forest Operations	4
NR 305	Forest Ecology and Silvics	4
NR 307	Fire Ecology	3

NR 308	Fire and Society (Upper-Division D) ¹	4
NR 310	Global Climate Change (Upper-Division B) ¹	4
NR 315	Forest Mensuration	4
NR 320	Watershed Processes and Management	4
NR 326	Natural Resources Economics and Valuation	4
NR 335	Conflict Management in Natural Resources	4
NR 350	Urban Forestry	3
NR 365	Silviculture and Fuels Management	4
NR 402	Forest Health	4
NR 414	Sustainable Forest Management	4
Select from the following: ²		12
NR 416 & NR 435 & NR 465	Environmental Impact Analysis and Management and Environmental Policy Analysis and Senior Project - Ecosystem Management	
NR 474 & NR 475	Forest Stewardship Practices and Senior Project - Forest Stewardship	

Concentration (26-28 units) or Approved Electives (14 units) in combination with Free Electives ^{3,4} 14-28

SUPPORT COURSES

ASCI 239	Principles of Rangeland Management ⁵	4
or BIO 227	Wildlife Conservation Biology	
or BIO 363	Principles of Conservation Biology	
or BIO 427	Wildlife Management	
or PHYS 121	College Physics I	
BOT 121	General Botany (B2 & B3) ¹	4
BRAE 237	Introduction to Engineering Surveying	2-4
or BRAE 239	Engineering Surveying	
BRAE 345	Aerial Photogrammetry and Remote Sensing	3
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ¹	4
MATH 161	Calculus for the Life Sciences I (B4) ^{1,6}	4
or MATH 221	Calculus for Business and Economics	
SS 120	Introductory Soil Science	4
STAT 217	Introduction to Statistical Concepts and Methods (GE Electives) ¹	4
or STAT 218	Applied Statistics for the Life Sciences	

GENERAL EDUCATION (GE)

(See GE program requirements below.) 48

FREE ELECTIVES

Free Electives 0-12

Total units 180-184

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Students must choose to take either NR 416, NR 435, and NR 465 or NR 474 and NR 475.

³ Unless a concentration is declared, the default will be a combination of Approved Electives and Free Electives.

⁴ Students who do not declare a concentration are encouraged to use Approved Electives and Free Electives to earn a minor. See the below Approved Electives Guide for recommended minors.

⁵ Students in the Watershed Management and Hydrology concentration need to take PHYS 121 and students in the Wildlife Biology concentration need to take BIO 427 to meet prerequisites for courses in the concentration.

⁶ Students in the Watershed Management and Hydrology concentration need to take MATH 161 to meet prerequisites for courses in the concentration.

Concentrations

- Watershed Management and Hydrology (p. 134)
- Wildlife Biology (p. 134)
- Wildland Fire and Fuels Management (p. 135)

Approved Electives Guide

Approved Electives are courses that support the below career areas. Refer to number(s) next to each course to identify which courses align with each of the career areas. Consultation with an advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

1. Climate Change Science
2. Environmental Mitigation Strategies
3. Environmental Policy and Management
4. Environmental Soil Science
5. Forest and Environmental Practices
6. Geology
7. Geospatial Technology
8. Sustainable Agriculture
9. Urban Forestry

Additionally, a student may earn one or more of the following minors through the appropriate selection of Approved Electives in combination with Free Electives (refer to advising materials for minor):

- Anthropology and Geography
- Biology
- Geographic Information Systems for Agriculture
- Geology
- Indigenous Studies in Natural Resources and the Environment
- Sustainable Environments
- Water Science

Approved Electives

Select from the following:

If a course is taken to meet a Major or Support requirement, it cannot be double-counted as an Approved Elective.

AG/PLSC 315 Principles of Organic Crop Production ⁸

AG 339	Internship in Agriculture ⁸	CRP 336	Introduction to Environmental Planning ^{5,7}
AG/EDES/ENGR/ISLA/SCM/UNIV 350	The Global Environment ⁸	CRP 420	Land Use Law ^{3,5}
AG 360	Holistic Management ^{5,8}	ECON 221	Microeconomics ³
AGB 212	Agricultural Economics ⁸	ECON 431	Environmental Economics ³
AGB 312	Agricultural Policy ⁸	EDES 406	Sustainable Environments ⁸
AGB 369	Agricultural Personnel Management ⁸	ENGL 147	Writing Arguments about STEM ^{1,2,3}
AGC 205	Agricultural Communications ⁵	ENGL 316	Writing Sustainability ^{1,2,3}
ANT 201	Cultural Anthropology ¹	ERSC 223	Rocks and Minerals ^{3,4,5,6,7}
or ANT 202	World History Before Writing	ERSC/GEOG 250	Physical Geography ¹
or GEOG 150	Human Geography	ERSC 303	Soil Erosion and Water Conservation ^{4,8}
ANT 250	Biological Anthropology ¹	ERSC/GEOG 325	Climate and Humanity ¹
ASCI 112	Principles of Animal Science ⁸	ERSC/GEOG 414	Global and Regional Climatology ¹
ASCI 221	Introduction to Beef Production ⁸	ERSC/GEOG 415	Applied Meteorology and Climatology ¹
ASCI 223	Systems of Small Ruminant Management ⁸	ERSC/GEOL 416	Field-Geology Methods ⁶
ASCI 311	Advanced Beef Cattle System Management ⁸	ERSC/GEOL 417	Geologic Mapping ⁶
ASCI 372	California Rangeland & Ranch Resource Management ^{1,2,3,8}	ERSC 423	Geomorphology ^{4,6}
ASCI 465	Applied Practices for Monitoring California Rangelands ^{1,2,3,8}	ERSC 442	Applied Environmental Groundwater Hydrology ⁴
BIO 329	Vertebrate Field Zoology ²	ERSC 443	Applied Environmental Contaminant Transport ⁴
BIO 400	Special Problems for Advanced Undergraduates ²	GEOG 308	Global Geography ¹
BIO 427	Wildlife Management ²	GEOG 328	Applications in Remote Sensing and GIS ^{1,7}
BIO 435	Plant Physiology ⁵	GEOG 435	Biodiversity and Biogeography Methods
BIO 447	Spatial Ecology ^{2,7}	GEOL 201	Physical Geology ⁶
BOT/PLSC 323	Plant Pathology ⁸	GEOL 206	Geologic Excursions ⁶
BRAE 141	Agricultural Machinery Safety ⁸	GEOL 241	Physical Geology Laboratory ⁶
BRAE 142	Agricultural Power and Machinery Management ⁸	GEOL 305	Seismology and Earth Structure ⁶
BRAE 150	Design Graphics and CAD for Agricultural Engineering	GEOL 309	Igneous Petrology
BRAE 239	Engineering Surveying ⁷	GEOL 311	Metamorphic Petrology
BRAE 333	Aquacultural Engineering ^{1,2,3,8}	GEOL 330	Principles of Stratigraphy ⁶
BRAE 340	Irrigation Water Management ^{5,8}	GEOL 415	Structural Geology ⁶
BRAE 345	Aerial Photogrammetry and Remote Sensing ⁷	GEOL 420	Applied Geophysics ⁶
BRAE 348	Energy for a Sustainable Society ¹	JOUR 203	News Reporting and Writing ⁵
BRAE 349	Water for a Sustainable Society ^{1,2,3,8}	MATH 142	Calculus II ⁶
BRAE 447	Advanced Surveying with GIS Applications ⁷	or MATH 162	Calculus for the Life Sciences II
CE 112	Design Principles in Civil Engineering ⁷	MCRO 221	Microbiology ⁵
CE 113	Computer Aided Drafting in Civil Engineering ⁷	MCRO 436	Microbial Ecology ⁵
CHEM 128	General Chemistry for Agriculture and Life Science II ⁴	NR 142	Environmental Management ⁸
CHEM 129	General Chemistry for Agriculture and Life Science III ⁴	NR 200	Special Problems for Undergraduates ^{1,2,3,4,5,6,7,8,9}
CHEM 312	Organic Chemistry: Fundamentals and Applications ⁴	NR 203	Resource Law Enforcement ^{5,9}
CRP 212	Introduction to Urban Planning ^{3,5,7,9}	NR 204	Wildland Fire Control ^{5,9}
		NR/ES 308	Fire and Society ⁵
		NR 312	Technology of Wildland Fire Management ⁵
		NR 324	Social Dimensions of Sustainable Food and Fiber Systems ⁸
		NR 339	Internship in Forest and Natural Resources ^{1,2,3,4,5,6,7,8,9}

NR 340	Wildland Fire Management ^{5, 8, 9}
NR 350	Urban Forestry ^{5, 9}
NR 355	Drone Assisted Surveying ⁴
NR/ES 360	Ethnicity and the Land ⁵
NR 363	Undergraduate Seminar ^{1, 2, 3, 4, 5, 6, 7, 8, 9}
NR 400	Special Problems for Advanced Undergraduates ^{1, 2, 3, 4, 5, 6, 7, 8, 9}
NR/CRP 404	Environmental Law ^{2, 3, 5, 8, 9}
NR/ES 406	Indigenous Peoples and International Law and Policy ⁹
NR/CRP 408	Water Resource Law and Policy ^{2, 3, 5, 8}
NR 413	Agricultural Law ^{1, 2, 3, 4, 8}
NR 418	Applied GIS ^{1, 5, 7, 9}
NR 420	Watershed Assessment and Protection ⁵
NR/BIO/SS 421	Wetlands ^{2, 4, 5}
NR 422	Stream Measurements and Water Quality Monitoring ^{5, 9}
NR 434	Wood Properties, Products and Sustainable Uses ^{5, 9}
NR 445	Systems Thinking in Environmental Management ^{1, 2, 3, 4, 5, 6, 7, 8, 9}
NR 455	Wildland-Urban Fire Protection ^{5, 9}
NR 472	Leadership Practice ^{3, 5}
PHIL 340	Environmental Ethics ³
PHYS 122	College Physics II ⁶
or PHYS 142	General Physics II
PLSC 123	Landscape Installation and Maintenance ^{5, 9}
PLSC 124	Plant Propagation ^{5, 9}
PLSC 203	Organic Enterprise Project ⁸
PLSC 230	Environmental Horticulture ^{8, 9}
PLSC 233	Plant Materials I ^{5, 9}
PLSC 234	Plant Materials II ^{5, 9}
PLSC 244	Precision Farming ^{7, 8}
PLSC 313	Agricultural Entomology ⁸
PLSC 321	Weed Biology and Management ^{5, 8}
PLSC 327	Vertebrate Pest Management ⁵
PLSC 350	Abiotic Plant Problems ⁹
PLSC 381	Native Plants for California Landscapes ^{8, 9}
PLSC 420	Organic Crop Production Systems ⁸
PLSC 425	Arboriculture ^{5, 9}
PLSC 431	Insect Pest Management ⁸
PLSC 441	Biological Control for Pest Management ⁸
PLSC 450	Current Issues in the Strawberry Industry ⁸
POLS 112	American and California Government ³
POLS 245	Judicial Process ³
POLS 332	World Food Systems

POLS 341	American Constitutional Law ³
POLS 343	Civil Rights in America ³
POLS 344	Civil Liberties ³
PSC 201	Physical Oceanography ¹
RPTA 112	Introduction to Parks and Outdoor Recreation ³
RPTA 210	Experience Design ³
RPTA 255	Leadership and Diverse Groups ²
RPTA 302	Environmental and Wilderness Education ³
RPTA 325	Leadership in Outdoor Experiences ³
SS 221	Soil Health and Plant Nutrition ^{4, 5, 8}
SS 321	Soil Morphology ^{3, 4, 5, 7}
SS 322	Soil Plant Relationships ^{4, 8}
SS 422	Soil Ecology ⁴
SS 423	Environmental Soil and Water Chemistry ⁴
SS 431	Digital Soil Mapping ^{3, 4, 5, 7, 9}
SS 440	Forest and Range Soils ^{4, 5, 7, 9}
SS 444	Soil Judging ⁴
UNIV 391	Appropriate Technology for the World's People: Development ⁸
WVIT 233	Basic Viticulture ⁸
WVIT 331	Advanced Viticulture - Fall ⁸
WVIT 332	Advanced Viticulture - Winter ⁸
WVIT 333	Advanced Viticulture - Spring ⁸
WVIT 428	Winegrape Vineyard Management ⁸

Any SCM course and any upper-division AG, ANT, BIO, BOT, BRAE, CHEM, COMS, CRP, EDES, ERSC, GEOG, GEOL, JOUR, LA, MCRO, NR, PLSC, RPTA, SS or UNIV courses

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking ¹	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ²	0
B2	Life Science (4 units in Support) ²	0
B3	One lab taken with either a B1 or B2 course	

B4	Mathematics/Quantitative Reasoning (4 units in Support) ²	0
Upper-Division B (4 units in Major) ²		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C ³		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D (4 units in Major) ²		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ²		4
Total units		48

¹ Recommended course to satisfy GE Area A3: ENGL 147.

² Required in Major or Support; also satisfies General Education (GE) requirement.

³ Recommended course to satisfy GE Area Upper-division C: NR 360 or ENGL 316.

Watershed Management and Hydrology Concentration - Forest and Fire Sciences

CHEM 128	General Chemistry for Agriculture and Life Science II	4
MATH 162	Calculus for the Life Sciences II	4
NR 363	Undergraduate Seminar	2
NR 420	Watershed Assessment and Protection	4
PHYS 122	College Physics II	4
SS 321	Soil Morphology	4
Approved Electives ^{1,2}		
Select from the following:		4
BRAE 340	Irrigation Water Management	
BRAE 532	Water Wells and Pumps	

CHEM 312	Organic Chemistry: Fundamentals and Applications	
ERSC 303	Soil Erosion and Water Conservation	
ERSC 423	Geomorphology	
ERSC 442	Applied Environmental Groundwater Hydrology	
ERSC 443	Applied Environmental Contaminant Transport	
GEOL 201	Physical Geology	
GEOL 241	Physical Geology Laboratory	
NR 339	Internship in Forest and Natural Resources	
NR 400	Special Problems for Advanced Undergraduates	
NR/CRP 408	Water Resource Law and Policy	
NR 418	Applied GIS	
NR/BIO/SS 421	Wetlands	
NR 422	Stream Measurements and Water Quality Monitoring	
NR 472	Leadership Practice	
NR 475	Senior Project - Forest Stewardship	
SS 424	Environmental Soil Physics - Senior Project	
SS 431	Digital Soil Mapping	
SS 440	Forest and Range Soils	
STAT 313	Applied Experimental Design and Regression Models	
Total units		26

¹ If a course is taken to meet a Major or Support requirement, it cannot be double-counted as an Approved Elective for the concentration.

² Consultation with an advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

Wildlife Biology Concentration - Forest and Fire Sciences

BIO 161	Introduction to Cell and Molecular Biology	4
BIO 162	Introduction to Organismal Form and Function	4
BIO 321	Mammalogy	4
BIO 323	Ornithology	4
BIO 327	Wildlife Ecology	4
BIO 363	Principles of Conservation Biology	4
or BIO 444	Population Ecology	
BOT 313	Taxonomy of Vascular Plants	4
Total units		28

Wildland Fire and Fuels Management Concentration - Forest and Fire Sciences

NR 312	Technology of Wildland Fire Management	4
NR 340	Wildland Fire Management	3
NR 363	Undergraduate Seminar	2
NR 455	Wildland-Urban Fire Protection	4
Approved Electives ^{1,2}		
Select from the following:		14
BOT 326	Plant Ecology	
CRP 212	Introduction to Urban Planning	
CRP 336	Introduction to Environmental Planning	
CRP 342	Environmental Planning Methods	
CRP 458	Hazard Mitigation Planning & Resilient Design	
KINE 181	Responding to Emergencies: Comprehensive First Aid, CPR, AED	
LA 221	California Plants and Plant Communities	
NR 200	Special Problems for Undergraduates	
NR/RPTA 203	Resource Law Enforcement	
NR 339	Internship in Forest and Natural Resources	
NR 400	Special Problems for Advanced Undergraduates	
NR/CRP 404	Environmental Law	
NR/ES 406	Indigenous Peoples and International Law and Policy	
NR/CRP 408	Water Resource Law and Policy	
NR 418	Applied GIS	
NR 420	Watershed Assessment and Protection	
NR 425	Applied Resource Analysis and Assessment	
NR 475	Senior Project - Forest Stewardship	
PLSC 230	Environmental Horticulture	
PLSC 381	Native Plants for California Landscapes	
PLSC 425	Arboriculture	
SS 321	Soil Morphology	
SS 440	Forest and Range Soils	
Any CSU-transferable course recognized by Cal Regional Fire Academy		
Any CSU-transferable fire technology course		
Any CSU-transferable emergency medical technician course		
Total units		27

¹ If a course is taken to meet a Major or Support requirement, it cannot be double-counted as an Approved Elective for the concentration.

² Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

Environmental Soil Science Minor

Required Courses

ERSC 303	Soil Erosion and Water Conservation	4
SS 120	Introductory Soil Science	4
SS 221	Soil Health and Plant Nutrition	4
or ERSC 223	Rocks and Minerals	
SS 321	Soil Morphology	4

Approved Electives

Select from the following:		11-14
BIO/NR/SS 421	Wetlands	
ERSC 423	Geomorphology	
ERSC 442	Applied Environmental Groundwater Hydrology	
ERSC 443	Applied Environmental Contaminant Transport	
SS 322	Soil Plant Relationships	
SS 422	Soil Ecology	
SS 423	Environmental Soil and Water Chemistry	
SS 424	Environmental Soil Physics - Senior Project	
SS 431	Digital Soil Mapping	
SS 440	Forest and Range Soils	
SS 444	Soil Judging	

Total units **27-30**

Fire Ecology and Wildfire Hazard Planning Minor

Required Courses

NR 204	Wildland Fire Control (Required) ¹	3
NR 218	Introduction to Geographic Information Systems (GIS)	3-4
or NR 317	The World of Spatial Data and Geographic Information Technology	
or CRP 457	GIS Applications in Planning	
or GEOG 218	Applications in GIS	
NR 308	Fire and Society	4
NR 312	Technology of Wildland Fire Management	4
NR 340	Wildland Fire Management	3-4
or ME 361	Fundamentals of Fire Protection Engineering	
Select the Fire Ecology Track or the Fire Protection Track ²		10-11

Fire Ecology Track

NR 307	Fire Ecology	
Select 7-8 units from the following:		
NR 305	Forest Ecology and Silvics	
NR 306	Natural Resource Ecology and Habitat Management	

NR 310	Global Climate Change
NR 402	Forest Health
NR 416	Environmental Impact Analysis and Management
SS 431	Digital Soil Mapping
SS 440	Forest and Range Soils
ASCI 239	Principles of Rangeland Management
ASCI 370	Rangeland Improvements
ASCI 372	California Rangeland & Ranch Resource Management
BIO 263	Introductory Ecology and Evolution
BIO 446	Ecosystem Ecology
BIO 447	Spatial Ecology
Fire Protection Track	
NR 455	Wildland-Urban Fire Protection
Select 6-7 units from the following: ³	
CRP 212	Introduction to Urban Planning
CRP 351	Introduction to Emergency Management in California
CRP 440	Climate Action Planning
CRP 458	Hazard Mitigation Planning & Resilient Design
NR 401	Disaster Recovery

Total units **27-30**

¹ CSU-transferable Firefighter 1 Academy by accredited Fire Protection Technology Associates degree programs or CSU-transferable Fire Academy may be substituted for NR 204.

² At least half of the units completed for the minor must be upper-division (300-400 level).

³ Up to 8 units of CSU-transferable Firefighter 1 Academy by accredited Fire Protection Technology Associates degree programs or CSU-transferable Fire Academy may substitute for the Fire Protection Track.

Indigenous Studies in Natural Resources and the Environment Minor

Required Courses

ES 253	Introduction to American Indian Studies	4
ES/NR 360	Ethnicity and the Land	4
NR 141	Introduction to Forest Ecosystem Management	3
or NR 142	Environmental Management	

Emphasis

Select from the following:		8
ERSC/GEOG 325	Climate and Humanity	
ES 321	Native Americans in Popular Culture	
ES/NR 406	Indigenous Peoples and International Law and Policy	
NR/ES 308	Fire and Society	

NR 323	Human Dimensions in Natural Resources Management
NR 335	Conflict Management in Natural Resources
PHIL 340	Environmental Ethics

Approved Electives¹
 At least 4 units must be upper-division (300-400 level).
 Select from the following: 8

Ethnic Studies	
ES/CRP 215	Planning for and with Multiple Publics
ES 255	Introduction to Latino/a/x Studies
ES 321	Native Americans in Popular Culture
ES/ARCH 326	Native American Architecture and Place
ES 380	Critical Race Theory
ES 381	The Social Construction of Whiteness
ES/NR 406	Indigenous Peoples and International Law and Policy

Natural Resource Management and Environmental Sciences	
ERSC/GEOG 250	Physical Geography
ERSC 303	Soil Erosion and Water Conservation
ERSC/GEOG 325	Climate and Humanity
ERSC/GEOG 333	Human Impact on the Earth
ERSC/GEOL 417	Geologic Mapping
NR 215	Land and Resource Measurements
NR/LA 218	Introduction to Geographic Information Systems (GIS)
NR 260	Forest Operations
NR 306	Natural Resource Ecology and Habitat Management
NR 307	Fire Ecology
NR/ES 308	Fire and Society
NR 312	Technology of Wildland Fire Management
NR 314	Environmental Life-Cycle Analysis
NR 320	Watershed Processes and Management
NR 321	Water Resources Technology and Society
NR 323	Human Dimensions in Natural Resources Management
NR 326	Natural Resources Economics and Valuation
NR 335	Conflict Management in Natural Resources
NR 340	Wildland Fire Management
NR/CRP 404	Environmental Law
NR 408	Water Resource Law and Policy
NR/BIO/SS 421	Wetlands
SS 120	Introductory Soil Science
SS 321	Soil Morphology

Additional Electives

AG 350	The Global Environment
AG 360	Holistic Management
ANT 201	Cultural Anthropology
ANT 312	Introduction to Cultural Resources Management
ANT 320	California's Native Past
ANT 330	Indigenous South Americans
ANT 415	Native American Cultures
BIO 114	Plant Diversity and Ecology
BIO 227	Wildlife Conservation Biology
BIO 327	Wildlife Ecology
BIO 363	Principles of Conservation Biology
BOT 311	Plants, People and Civilization
ENGL 346	Ethnic American Literature
ENGL 380	Literary Themes
FSN 250	Food and Nutrition: Culture and Customs
HIST 208	Survey of California History
ISLA 330	Cal Poly Land: Nature, Technology, and Society
LA 220	Landscape Ecology: Concepts, Issues, and Interrelationships
LA 330	Cultural Landscapes: People, Places and Ethical Decisions
PHIL 340	Environmental Ethics
POLS 325	Global Political Issues
RPTA 302	Environmental and Wilderness Education
RPTA 413	Tourism and Protected Area Management
SPAN 351	Chicano/Latino Writers in the United States
SOC 315	Global Race and Ethnic Relations
Total units	27

4. Communicate research or professional project outcomes effectively using oral, written and digital media communication appropriate for the discipline.
5. Synthesize and communicate core knowledge content contained within at least one environmental science sub-discipline.
6. Apply scientific knowledge to the management of environmental problems.
7. Demonstrate ethical reasoning and choose an appropriate course of action based on ethical standards in the research discipline and the research process in general, including publication and intellectual property.
8. Analyze, interpret and explain how environmental, economic, and social systems interact to promote the sustainable management of environmental and natural resources.

Research Skills

ESCI 501	Research Planning	4
ESCI 502	Research Methods and Data Analysis	4
ESCI 581	Graduate Seminar in Environmental Sciences	2

Select one of the following options: 11

ESCI 599 & ESCI 500	Thesis and Individual Study ¹	
OR		

ESCI 596 & ESCI 500	Environmental Sciences and Management Project and Individual Study ²	
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Environmental Sciences

ESCI 550	Advanced Environmental Science	4
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Environmental Management

ESCI 590	Advanced Environmental Management	4
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Approved Electives

Electives ³		16
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Total units 45

¹ Consultation with the minor advisor is desirable and recommended in selecting classes. If any of these courses is taken to meet a Major or Support requirement in the degree, it cannot be double-counted as an Approved Elective.

¹ Students in the research thesis option take 9 units of ESCI 599 and 2 units of ESCI 500.

² Students in the professional project option take 6 units of ESCI 500.

³ Students in the research thesis option need to consult with their research supervisor for the selection of electives. Students in the professional project option need to consult with the graduate program coordinator for the selection of electives.

MS Environmental Sciences and Management

Program Learning Objectives

Graduates of the MS in Environmental Science and Management will be able to:

1. Apply appropriate research methods for data collection, analyses, and communication of environmental science and management problems.
2. Analyze a research problem or objective/hypothesis (knowledge gap) and develop a research plan to address the problem or objective/hypothesis.
3. Execute a research plan (research design, data collection, analyses, and communication) or professional project plan to completion.

Plant Sciences

Agricultural Sciences Bldg. (11), Room 230
Phone: 805.756.1237
<https://aepe.calpoly.edu/>

Department Head: Scott Steinmaus

Academic Programs

Program name	Program type
Plant Sciences	BS
Crop Science	Minor
Fruit Science	Minor
Landscape Horticulture	Minor
Plant Protection	Minor
Sustainable Agriculture	Minor

The department offers the Plant Sciences major leading to the Bachelor of Science degree. Within this major are three concentrations: Environmental Horticultural Science, Fruit and Crop Science, and Plant Protection Science. Each concentration is well-grounded in the sciences and designed to prepare students for many attractive career opportunities.

Experiential Learning Opportunities and Facilities

The Plant Sciences Department has well-equipped laboratories for instruction in plant biotechnology, insect and weed pest management, postharvest technology, plant production, and landscape horticulture, including CAD capabilities and plant materials.

Students have hands-on experiences in the production and marketing of landscape and ornamental plants using comprehensive facilities at the 16-acre Environmental Horticulture Unit. This unit includes 35,000 square feet of greenhouses, a 5,000 square-foot retractable roof greenhouse, 7,500 square feet of shade houses, an extensive field container growing area, and a five-acre arboretum. Additionally, there are six horticulture laboratories. The Leaning Pine Arboretum and Gardens is an outdoor teaching laboratory while the 200 acres of landscaped campus are planted with many interesting and unusual trees and shrubs from all over the world, as well as California natives.

The Crops Unit has 70 acres of productive citrus, avocados, grapes, deciduous fruit trees, and berries, with additional nonbearing acreage for instructional use. There are approximately 35 acres of annual vegetable and forage crops, of which eleven acres are certified for organic production. There is a modern building containing two teaching labs with prep rooms, two greenhouses, coolers, a hydroponic vegetable production facility and a state-of-the-art fruit and vegetable processing line.

The technological aspects of instruction are enhanced by an array of equipment required in crop and fruit production systems, postharvest handling, biotechnology, seed processing, pesticide application, nursery and greenhouse operation, and landscape construction. Field trips supplement instruction and are encouraged for many classes.

Students are encouraged to gain experience participating in the Enterprise project program or by working on the Department's production units. Enterprise projects are run under faculty supervision but are student operated. These projects provide students with a "no risk" glimpse of a commercial plant production. The Department offers Enterprise projects in the production of vegetables, citrus, avocados,

deciduous fruit and nut crops, floricultural crops, nursery plants, and forages. Available marketing outlets range from contract sales of vegetable seeds, wholesaling to area supermarkets, and direct marketing at local farmers' markets, garden centers, florist shops, and through campus outlets. Certified organic produce is marketed through weekly Farmers' Markets or is sold to local restaurants and retailers.

The Department supports co-curricular activities for its students, including two student clubs: the Crops Club and the Horticulture Club. Student teams in flower judging, floral design and the landscape industry continue to place or win at national championships.

Undergraduate Programs

BS Plant Sciences

The Plant Sciences Department at Cal Poly offers students an opportunity not just to learn, but to learn-by-doing. Our students benefit from a broad spectrum of opportunities ranging from hands-on experiences in our fields, groves, nurseries, and greenhouses to real world application through internships and other collaborations with our industry partners. We also excel in providing a foundational plant science background and instilling a passion for plants, as we produce the next generation of leaders in the agricultural and environmental plant sciences.

Students in this major begin with core courses that provide a thorough introduction to the various concentrations. Each concentration, in turn, has required courses, which may be shared by other concentrations. In their first year, students explore curricular and professional opportunities to enable them to choose a concentration. In consultation with professional and faculty advisors, students have the flexibility to select electives within the concentrations according to their career goals and interests.

Internships are readily available to students and are highly recommended. Interns are typically placed with private industry and public facilities all across the United States but may also take place in foreign countries.

Over \$100,000 in scholarships are available to students as are several undergraduate student assistantships which are sponsored by industry.

Program alumni are employed nationally and internationally and are often leaders in their industries. Graduates of the department are in great demand. Typically there are more internship and job opportunities than there are students to fill them.

Concentrations

Each concentration offers introductory, intermediate and advanced classes. The concentrations offer their own course of study (including required courses and electives) as well as opportunities for cross-training and multi-disciplinary learning.

Environmental Horticultural Science

This concentration offers students a comprehensive preparation for positions in the nursery, turf, greenhouse, landscape, and floriculture industries, including public horticulture. Graduates are employed as business owners, growers, managers, researchers, educators, arboreta and botanical garden directors, landscape contractors and designers, landscape management professionals, pest control advisors, and park, sports field and golf course superintendents. The curriculum stresses production and marketing of nursery plants, fresh flowers, and flowering and foliage plants, landscape contracting, design, installation

and management, turf installation and management, integrated pest management, and horticultural education, native plant restoration, green roofs and walls, and the public display of plants.

Fruit and Crop Science

The Fruit and Crop Science concentration provides students with detailed knowledge of the production of tree fruits and nuts, grapes, small fruits, vegetables and other row crops, and forages. The concentration details factors influencing the growth, development, and productivity of these crops (e.g., site selection, cultivar selection, field and plant establishment, pest management, harvesting, and postharvest handling). The concentration also focuses on ongoing and newly emerging specialty industries and concerns such as beekeeping, postharvest technology, plant breeding and biotechnology, integrated pest management, and precision agriculture.

Plant Protection Science

Approximately one-third of the world's food crops are destroyed each year by insects, rodents, diseases and other pests. Finding ways to reduce these losses is the challenge of the plant protection specialist. In this concentration, students learn a broad range of pest management subjects including entomology, plant pathology, weed control and integrated pest management. Students develop an understanding of crop production principles, ecology, biotechnology, pesticide toxicology and environmental science. As environmental regulations continue to increase, employment opportunities will grow for those holding professional licenses, and this concentration prepares students to take the California Pest Control Advisor (PCA) and Certified Crop Advisor (CCA) license exams.

Crop Science Minor

Designed for students majoring in related academic disciplines who desire careers in crop production or its associated industries. The minor offers a broad-based knowledge of the science and technology of agronomy and vegetable production, especially as practiced in California. Not open to Plant Sciences majors concentrating in Fruit and Crop Science or Plant Protection Science.

Fruit Science Minor

The minor is designed for students majoring in related academic disciplines who desire to seek careers in fruit production or its associated industries. The minor offers a broad-based knowledge of the science and technology of fruit and nut production. Not open to Plant Sciences majors concentrating in Fruit and Crop Science or Plant Protection Science.

Landscape Horticulture Minor

The minor provides students with an understanding of the landscape horticultural industry and provides basic skills to understand the design, installation, and maintenance of landscapes. Students develop a knowledge of landscape plants and plant care as well as the basics of landscape contracting, including construction processes and materials used in the landscape industry. Students may learn advanced skills and concepts in the areas of turfgrass for golf course/sports field applications, design/build, plant care and arboriculture. Not open to Plant Sciences majors concentrating in Environmental Horticultural Science.

Plant Protection Minor

This program emphasizes both plant protection and plant production. Within the plant protection field of study, the student is exposed to a broad range of pest management subjects including entomology, plant pathology, and weed control. Within the production area the student may emphasize fruit production, crop production, ornamental horticulture, or natural resource management. Not open to Plant Sciences majors.

Interdisciplinary Minors

The department participates in offering interdisciplinary minors in Geographic Information Systems for Agriculture, Land Rehabilitation, and Sustainable Agriculture. Please see College of Agriculture, Food and Environmental Sciences (p. 60) section for more information.

Graduate Programs

Cal Poly offers a Master of Science degree in Agriculture with specializations in Crop Science, Environmental Horticultural Science, and Plant Protection Science, among others. Please refer to the MS Agriculture (p. 61) section of the College of Agriculture, Food and Environmental Sciences.

BS Plant Sciences

Program Learning Objectives

1. Demonstrate technical competence in their concentration by identifying the majority of globally important food, and/or ornamental plants and demonstrating applications of theoretical sciences to their production, maintenance and post-harvest handling.
2. Effectively evaluate and adapt basic cultural practices, economic uses, and environmental interactions in the production of food, fiber, or ornamental plants.
3. Assess and implement appropriate sustainable growing and/or horticultural design practices based on region and microclimate, especially as they relate to water, soil and other natural resources.
4. Make informed and ethical decisions regarding environmental, social, and economic impacts of horticultural and agricultural activities and will contribute to their professions' continued relevancy by identifying, evaluating and responding to changing public perceptions, governmental regulations and industry challenges.
5. Practice a range of complex problem-solving exercises and excel in diagnosing and resolving plant health issues in outdoor and enclosed plant production systems.
6. Organize, synthesize, evaluate, and reconfigure information about complex, multivariate, living systems to gain new insights and communicate their findings to multiple stakeholder groups clearly, scientifically, and ethically.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation section of this catalog, including:

- 60 units upper-division
- GWR
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

PLSC 101	Orientation to Horticulture and Crop Science	1
PLSC 120	Principles of Horticulture and Crop Science	4
PLSC 124	Plant Propagation	4
PLSC 304	Introduction to Plant Breeding	4
PLSC 313	Agricultural Entomology	4
PLSC 321	Weed Biology and Management	4
PLSC/BOT 323	Plant Pathology	4
PLSC 350	Abiotic Plant Problems	4
PLSC 351	Experimental Techniques and Analysis	4
PLSC 410	Crop Physiology	4
PLSC 461	Senior Project I	2
PLSC 462	Senior Project II	2
BOT 121	General Botany (B2 & B3) ¹	4
SS 120	Introductory Soil Science	4

Concentration

(See list of Concentrations below) 46

SUPPORT COURSES

BRAE 340	Irrigation Water Management (Upper-Division B) ¹	4
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ¹	4
CHEM 128	General Chemistry for Agriculture and Life Science II	4
MATH 118	Precalculus Algebra (B4) ¹	4
Select from the following:		4
SPAN 101	Elementary Spanish I	
SPAN 102	Elementary Spanish II	
SPAN 103	Elementary Spanish III	
SPAN 111	Elementary Hispanic Language and Culture (USCP)	
SS 221	Soil Health and Plant Nutrition	4
STAT 218	Applied Statistics for the Life Sciences (GE Electives) ¹	4

GENERAL EDUCATION (GE)

(See GE program requirements below.) 52

FREE ELECTIVES

Free Electives 5

Total units 180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Concentrations (select one)

- Environmental Horticultural Science (p. 141)
- Fruit and Crop Science (p. 141)
- Plant Protection Science (p. 142)

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Major) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
	Upper-Division B (4 units in Support) ¹	0
Area C	Arts and Humanities	
	Lower-division courses in Area C must come from three different subject prefixes.	
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
	Lower-Division C Elective - Select a course from either C1 or C2	4
	Upper-Division C	4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
	Upper-Division D	4
Area E	Lifelong Learning and Self-Development	
	Lower-Division E	4
Area F	Ethnic Studies	
F	Ethnic Studies	4
	GE Electives in Areas B, C, and D	
	Select courses from two different areas; may be lower-division or upper-division courses.	
	GE Electives (4 units in Support plus 4 units in GE) ¹	4
Total units		52

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² A maximum of 2 units of PLSC 200 and/or a maximum of 2 units of PLSC 400 may count towards Approved Electives.

³ A maximum of 4 units of PLSC 339 may count towards Approved Electives.

Environmental Horticulture Science Concentration

PLSC 123	Landscape Installation and Maintenance	4
PLSC 127	Horticulture and Landscape Design	4
PLSC 233	Plant Materials I	4
PLSC 234	Plant Materials II	4
PLSC 245	Horticultural Production Techniques	4
PLSC 427	Disease and Pest Control Systems for Ornamental Plants	4

Approved Electives ¹

Select from the following (at least 12 units must be upper-division): 22

AGB 212	Agricultural Economics	
AGB 214 or BUS 212	Agribusiness Financial Accounting Financial Accounting for Nonbusiness Majors	
BRAE 337	Landscape Irrigation	
BUS 346	Principles of Marketing	
PLSC 126	Landscape Construction	
PLSC 200	Special Problems for Undergraduates ²	
PLSC 212 or PLSC 312	Environmental Horticulture Enterprise Project I Environmental Horticulture Enterprise Project II	
PLSC 215	Floral Design I	
PLSC 225	Floral Design II	
PLSC 327	Vertebrate Pest Management	
PLSC 333	Greenhouse Vegetable Production	
PLSC 339	Internship in Horticulture and Crop Science	
PLSC 340	Principles of Greenhouse Environment	
PLSC 341	Cut Flower Production	
PLSC 342	Potted Plant Production	
PLSC 343	Turfgrass Management	
PLSC 381	Native Plants for California Landscapes	
PLSC 400	Special Problems for Advanced Undergraduates ²	
PLSC 421	Postharvest Technology of Horticultural Crops	
PLSC 424	Nursery Crop Production	
PLSC 425	Arboriculture	
PLSC 428	Advances in Plant Pathology	
PLSC 441	Biological Control for Pest Management	

Total units 46

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

Fruit and Crop Science Concentration

PLSC 132	Pomology I	4
PLSC 133	Pomology II	4
PLSC 190	California Vegetable Production	4
PLSC 203 or PLSC 205 or PLSC 333	Organic Enterprise Project Orchard and Vegetable Enterprise Project Greenhouse Vegetable Production	2
PLSC/BRAE 244	Precision Farming	4
PLSC 421	Postharvest Technology of Horticultural Crops	4

Approved Electives (at least 12 units must be upper-division) ¹

Select from the following: 24

AG/ASCI 360	Holistic Management	
AGB 212	Agricultural Economics	
AGB 214 or BUS 212	Agribusiness Financial Accounting Financial Accounting for Nonbusiness Majors	
BRAE 405	Chemigation	
BRAE 438	Drip/Micro Irrigation	
BRAE 440	Agricultural Irrigation Systems	
FSN 275	Elements of Food Safety	
PLSC 150	Forage Crops	
PLSC 175	Beekeeping	
PLSC 200	Special Problems for Undergraduates ²	
PLSC 240	Commercial Seed Production	
PLSC 327	Vertebrate Pest Management	
PLSC/WVIT 331	Advanced Viticulture - Fall	
PLSC 336/ WVIT 332	Advanced Viticulture - Winter	
PLSC 337/ WVIT 333	Advanced Viticulture - Spring	
PLSC 334	Greenhouse Vegetable Enterprise Project	
PLSC 339	Internship in Horticulture and Crop Science ³	
PLSC 340	Principles of Greenhouse Environment	
PLSC 355	Citrus and Avocado Fruit Production	
PLSC 360	Nut Crops Production	
PLSC 400	Special Problems for Advanced Undergraduates ²	
PLSC 406	Advanced Weed Management	
PLSC/WVIT 414	Grape Pest Management	
PLSC 420	Organic Crop Production Systems	
PLSC 427	Disease and Pest Control Systems for Ornamental Plants	
PLSC 428	Advances in Plant Pathology	

PLSC 431	Insect Pest Management	
PLSC 441	Biological Control for Pest Management	
PLSC 445	Cropping Systems	
PLSC 450	Current Issues in the Strawberry Industry	
SS 321	Soil Morphology	
SS 322	Soil Plant Relationships	
WVIT 233/ PLSC 232	Basic Viticulture	
Total units		46

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² A maximum of 2 units of PLSC 200 and/or a maximum of 2 units of PLSC 400 may count towards Approved Electives.

³ A maximum of 4 units of PLSC 339 may count towards Approved Electives.

Plant Protection Science Concentration

PLSC 203 or PLSC 205 or PLSC 212 or PLSC 312 or PLSC 333	Organic Enterprise Project Orchard and Vegetable Enterprise Project Environmental Horticulture Enterprise Project I Environmental Horticulture Enterprise Project II Greenhouse Vegetable Production	2
PLSC 327	Vertebrate Pest Management	4
PLSC 406	Advanced Weed Management	4
PLSC 427	Disease and Pest Control Systems for Ornamental Plants	4
PLSC 428	Advances in Plant Pathology	4
PLSC 431	Insect Pest Management	4
PLSC 441	Biological Control for Pest Management	4

Approved Electives ¹

Select from the following: 20

AGB 212	Agricultural Economics	
AGB 214 or BUS 212	Agribusiness Financial Accounting Financial Accounting for Nonbusiness Majors	
CHEM 314	Biochemistry: Fundamentals and Applications	
FSN 275	Elements of Food Safety	
MCRO 221	Microbiology	
PLSC 132	Pomology I	
PLSC 133	Pomology II	
PLSC 150	Forage Crops	
PLSC 175	Beekeeping	
PLSC 190	California Vegetable Production	
PLSC 200	Special Problems for Undergraduates ²	
PLSC 240	Commercial Seed Production	
PLSC/BRAE 244	Precision Farming	

PLSC 245	Horticultural Production Techniques	
PLSC/WVIT 331	Advanced Viticulture - Fall	
PLSC 336/ WVIT 332	Advanced Viticulture - Winter	
PLSC 337/ WVIT 333	Advanced Viticulture - Spring	
PLSC 334	Greenhouse Vegetable Enterprise Project	
PLSC 339	Internship in Horticulture and Crop Science ³	
PLSC 340	Principles of Greenhouse Environment	
PLSC 341	Cut Flower Production	
PLSC 342	Potted Plant Production	
PLSC 343	Turfgrass Management	
PLSC 355	Citrus and Avocado Fruit Production	
PLSC 360	Nut Crops Production	
PLSC 400	Special Problems for Advanced Undergraduates ²	
PLSC 420	Organic Crop Production Systems	
PLSC 421	Postharvest Technology of Horticultural Crops	
PLSC 445	Cropping Systems	
PLSC 450	Current Issues in the Strawberry Industry	
WVIT 233/ PLSC 232	Basic Viticulture	

Total units 46

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² A maximum of 2 units of PLSC 200 and/or a maximum of 2 units of PLSC 400 may count towards Approved Electives.

³ A maximum of 4 units of PLSC 339 may count towards Approved Electives.

Crop Science Minor

Required Courses

BRAE 340	Irrigation Water Management	4
PLSC 120	Principles of Horticulture and Crop Science	4
PLSC 190	California Vegetable Production	4
PLSC 203 or PLSC 205 or PLSC 333	Organic Enterprise Project Orchard and Vegetable Enterprise Project Greenhouse Vegetable Production	2
PLSC/BRAE 244	Precision Farming	4

Approved Electives

Select from the following: 12

PLSC 304	Introduction to Plant Breeding	
PLSC 313	Agricultural Entomology	
PLSC/AG 315 or PLSC 420	Principles of Organic Crop Production Organic Crop Production Systems	
PLSC 321	Weed Biology and Management	

PLSC 334	Greenhouse Vegetable Enterprise Project	
PLSC 421	Postharvest Technology of Horticultural Crops	
PLSC 445	Cropping Systems	
Total units		30

Fruit Science Minor

Required Courses

PLSC 120	Principles of Horticulture and Crop Science	4
PLSC 132	Pomology I	4
PLSC 133	Pomology II	4
or WVIT 233	Basic Viticulture	
PLSC 205	Orchard and Vegetable Enterprise Project	2
PLSC 355	Citrus and Avocado Fruit Production	4
or PLSC 360	Nut Crops Production	

Approved Electives

Select from the following:		12
BRAE 340	Irrigation Water Management	
PLSC 313	Agricultural Entomology	
PLSC 315	Principles of Organic Crop Production	
or PLSC 420	Organic Crop Production Systems	
PLSC 321	Weed Biology and Management	
PLSC 327	Vertebrate Pest Management	
PLSC 329	Plants, Biotechnology, and the Media	
PLSC/WVIT 331	Advanced Viticulture - Fall	
PLSC 336/ WVIT 332	Advanced Viticulture - Winter	
PLSC 337/ WVIT 333	Advanced Viticulture - Spring	
PLSC 421	Postharvest Technology of Horticultural Crops	
PLSC 445	Cropping Systems	

Total units **30**

Landscape Horticulture Minor

Required Courses

PLSC 120	Principles of Horticulture and Crop Science	4
PLSC 123	Landscape Installation and Maintenance	4
PLSC 126	Landscape Construction	3
PLSC 233	Plant Materials I	4
or PLSC 234	Plant Materials II	
PLSC 332	Landscape Contracting	4

Approved Electives

Select from the following:		11
PLSC 343	Turfgrass Management	
PLSC 381	Native Plants for California Landscapes	

PLSC 425	Arboriculture	
PLSC 432	Specialized Operations for Golf Courses and Athletic Fields	
PLSC 437	Park and Public Space Management	
Total units		30

Plant Protection Minor

Required Courses

PLSC 120	Principles of Horticulture and Crop Science	4
PLSC 313	Agricultural Entomology	4
PLSC 321	Weed Biology and Management	4
PLSC/BOT 323	Plant Pathology	4

Elective Courses

Agricultural Production ¹

Select from the following:		4
PLSC 124	Plant Propagation	
PLSC 132	Pomology I	
PLSC 150	Forage Crops	
PLSC 190	California Vegetable Production	
PLSC 230	Environmental Horticulture	
PLSC 240	Commercial Seed Production	
PLSC 245	Horticultural Production Techniques	
PLSC 315	Principles of Organic Crop Production	
PLSC 341	Cut Flower Production	
PLSC 355	Citrus and Avocado Fruit Production	
PLSC 360	Nut Crops Production	
PLSC 445	Cropping Systems	
NR 141	Introduction to Forest Ecosystem Management	
WVIT 233	Basic Viticulture	

Enterprise-Related Course ¹

Select from the following:		2
PLSC 203	Organic Enterprise Project	
PLSC 205	Orchard and Vegetable Enterprise Project	
PLSC 312	Environmental Horticulture Enterprise Project II	
PLSC 333	Greenhouse Vegetable Production	

Pest Management ¹

Select from the following:		8
PLSC 327	Vertebrate Pest Management	
PLSC 406	Advanced Weed Management	
PLSC/WVIT 414	Grape Pest Management	
PLSC 427	Disease and Pest Control Systems for Ornamental Plants	
PLSC 431	Insect Pest Management	
PLSC 441	Biological Control for Pest Management	

Total units **30**

¹ Approval of minor advisor required.

Wine and Viticulture

Agricultural Sciences Bldg. (11), Room 217
Phone: 805.756.7308; Fax: 805.756.1335
<https://wwit.calpoly.edu/>

Department Head: Benoit Lecat

Academic Programs

Program name	Program type
Wine and Viticulture	BS

Professional positions within the grape and wine industry are multi-dimensional, where winemakers and winegrape-growers work together with wine marketing and sales personnel. To develop successful strategies, management teams need to understand all aspects of wine.

The WVIT major provides a unique interdisciplinary learning experience, combining a solid foundation in winegrape production, winemaking, and wine business with a concentration in enology, viticulture or wine business. With a campus located in the heart of California's Central Coast wine country, Cal Poly students have the added benefit of gaining hands-on experience at one of more than 400 local vineyards and wineries. The WVIT major is based on fundamental and applied sciences, modern agribusiness principles, and appropriate social sciences. The curriculum encompasses winegrape cultivation, enology, sensory science, and wine business and fosters an academic alliance among production agriculture, food -science, and agricultural business interests to provide an academic understanding of the "vine to glass" philosophy.

Cal Poly has a 14-acre campus vineyard, a state-of-the-art facility, the JUSTIN & J. Lohr Center for Wine and Viticulture and a wine sales program that provide students the opportunity to practice our "learn-by-doing" method of education.

Undergraduate Program BS Wine and Viticulture

The major is based on fundamental and applied sciences, modern agribusiness principles, and appropriate social sciences. The curriculum encompasses winegrape cultivation, enology, and wine business and fosters an academic alliance among production agriculture, food science, and agricultural business interests to provide an academic understanding of the "vine to glass".

Concentrations

Enology

The science of winemaking and its creative and practical application. Students monitor and assess wines and winemaking choices using sensory, chemical and microbiological analyses. Graduates are able to make creative winemaking decisions, manage a winery and provide successful solutions to winemaking challenges.

Viticulture

Intensive training in all aspects of quality wine grape production. Students learn site evaluation and vine-yard development, disease and pest management, sustain-ability, and state-of-the-art cultural practices. Graduates typically become vineyard managers, pest control advisors, or vineyard owners.

Wine Business

Students learn financial management, principles of vineyard and winery operations, strategic planning, branded wine marketing, packaging, wine consumer behavior, and government compliance. Graduates are prepared for a variety of wine industry careers, with many planning to operate vineyards or wineries of their own.

Graduate Program

Cal Poly offers a Master of Science degree in Agriculture in which students can choose a thesis topic in enology, viticulture or wine business. Please refer to the MS Agriculture (p. 61) section of the College of Agriculture, Food and Environmental Sciences.

BS Wine and Viticulture Program Learning Objectives

1. An understanding of the fundamental principles of wine grape growing, winemaking, and wine business, both domestically and globally, with in-depth knowledge in a chosen sub-discipline (viticulture, enology, or wine business).
2. Development of the ability to think critically and creatively, analyze and interpret data, and make reasoned and informed decisions.
3. Development of effective leadership skills, and strong written and oral communication skills.
4. An understanding of legal and environmental issues, and sustainability principles, within the wine industry.
5. A high commitment and respect for cultural diversity.
6. Strong interpersonal skills and an ability to collaborate with other wine industry professionals.
7. Create the desire to engage in lifelong learning.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation section of this catalog, including:

- 60 units upper-division
- GWR
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

WVIT 102	Global Wine and Viticulture	4
WVIT 202	Fundamentals of Enology	4
WVIT 233	Basic Viticulture	4
WVIT 331	Advanced Viticulture - Fall	4
WVIT 339	Internship Wine and Viticulture	4
WVIT 343	Branded Wine Marketing	4
WVIT 423	Wine Law and Compliance	4
WVIT 442	Sensory Evaluation of Wine	4
WVIT 463	Issues, Trends and Careers in the Wine Industry	2
AGB 214	Agribusiness Financial Accounting	4
BOT 121	General Botany (B2 & B3) ¹	4

BRAE 340	Irrigation Water Management (Upper-Division B) ¹	4
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ¹	4
ECON 222	Macroeconomics (D2) ¹	4
MATH 161	Calculus for the Life Sciences I (B4) ¹	4
or MATH 141	Calculus I	
or MATH 221	Calculus for Business and Economics	
SS 120	Introductory Soil Science	4
STAT 218	Applied Statistics for the Life Sciences (GE Electives) ¹	4
Concentration courses (see below)		58-60
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		48
FREE ELECTIVES		
Free Electives		6-8
Total units		180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Concentrations (select one)

- Enology (p. 145)
- Viticulture (p. 146)
- Wine Business (p. 146)

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Major) ¹	0
B2	Life Science (4 units in Major) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		

C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Major) ¹	0
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		48

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Enology Concentration

CHEM 128	General Chemistry for Agriculture and Life Science II	4
CHEM 129	General Chemistry for Agriculture and Life Science III	4
CHEM 312	Organic Chemistry: Fundamentals and Applications	5
CHEM 314	Biochemistry: Fundamentals and Applications	5
MCRO 221	Microbiology	4
WVIT/MCRO 301	Wine Microbiology	4
WVIT 365	Wine Analysis and Amelioration	4
WVIT 404	Winemaking I	4
WVIT 405	Winemaking II	4
WVIT 406	Winemaking III	4
Senior Project		
Select from the following:		4
WVIT 464	Senior Project - Enology and Viticulture	
WVIT 465	Senior Project - Research Experience in Enology or Viticulture (2, 2)	
Approved Electives¹		
Select from the following:		12
AGB 212	Agricultural Economics	
AGB 310	Agribusiness Credit and Finance	

AGB 323	Decision Making with Agribusiness Accounting Information
BIO 111	General Biology
BIO 161	Introduction to Cell and Molecular Biology
BIO 303	Survey of Genetics
BIO 435	Plant Physiology
BOT/PLSC 323	Plant Pathology
BRAE 348	Energy for a Sustainable Society
CHEM 216	Organic Chemistry I
CHEM 217	Organic Chemistry II
CHEM 401	Advanced Undergraduate Research
FSN 230	Elements of Food Processing
FSN 340	Fermented Foods
FSN 342	Brewing Science
FSN 346	Brewing Methods
FSN 354	Packaging Function in Food Processing
FSN 370	Food Plant Sanitation and Prerequisite Programs
FSN 374	Food Laws and Regulations
MCRO 342	Public Health Microbiology
MCRO 421	Food Microbiology
PLSC 313	Agricultural Entomology
PLSC 321	Weed Biology and Management
PLSC 421	Postharvest Technology of Horticultural Crops
SPAN 101	Elementary Spanish I ²
or FR 101	Elementary French I
or GER 101	Elementary German Language and Culture I
or ITAL 101	Elementary Italian I
SPAN 102	Elementary Spanish II ²
or FR 102	Elementary French II
or GER 102	Elementary German Language and Culture II
or ITAL 102	Elementary Italian II
SPAN 103	Elementary Spanish III ²
or FR 103	Elementary French III
or GER 103	Elementary German Language and Culture III
or ITAL 103	Elementary Italian III
SPAN 201	Intermediate Spanish I ²
or FR 201	Intermediate French I
or GER 201	Intermediate German I
or ITAL 201	Intermediate Italian I
SPAN 202	Intermediate Spanish II ²
or FR 202	Intermediate French II
or GER 202	Intermediate German II
SS 221	Soil Health and Plant Nutrition
WVIT 332	Advanced Viticulture - Winter
WVIT 333	Advanced Viticulture - Spring
WVIT 339	Internship Wine and Viticulture (limited to 2 units)
WVIT 344	Direct to Consumer Wine Sales

WVIT 345	Wine Marketing Research and Market Analysis
WVIT 400	Special Problems for Advanced Undergraduates
WVIT/PLSC 414	Grape Pest Management
WVIT 428	Winegrape Vineyard Management
WVIT 433	Wine Sales and E-Commerce
WVIT 447	Logistics for the Global Wine Industry
WVIT 450	Wine Business Plan Development
WVIT 460	Senior Project - Wine Business
WVIT 470	Selected Advanced Topics
WVIT 471	Selected Advanced Laboratory
WVIT 477	Advanced Wine Sensory Analysis
Total units	58

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² A maximum of 8 units of foreign language may be counted toward Approved Electives.

Viticulture Concentration

BOT/PLSC 323	Plant Pathology	4
CHEM 128	General Chemistry for Agriculture and Life Science II	4
CHEM 312	Organic Chemistry: Fundamentals and Applications	5
CHEM 314	Biochemistry: Fundamentals and Applications	5
PLSC 313	Agricultural Entomology	4
PLSC 321	Weed Biology and Management	4
SS 221	Soil Health and Plant Nutrition	4
WVIT 332/PLSC 336	Advanced Viticulture - Winter	4
WVIT 333/PLSC 337	Advanced Viticulture - Spring	4
WVIT 365	Wine Analysis and Amelioration	4
WVIT 404	Winemaking I	4
WVIT/PLSC 414	Grape Pest Management	4
WVIT 428	Winegrape Vineyard Management	4
Senior Project		
Select from the following:		4
WVIT 464	Senior Project - Enology and Viticulture	
WVIT 465	Senior Project - Research Experience in Enology or Viticulture (2, 2)	
Total units		58

Wine Business Concentration

AGB 212	Agricultural Economics	4
AGB 260	Agribusiness Data Literacy	4
AGB 310	Agribusiness Credit and Finance	4
AGB 323	Decision Making with Agribusiness Accounting Information	4
RPTA 320	Strategic Event Planning	4

AGB 369 or BUS 384	Agricultural Personnel Management Human Resources Management	4	RPTA 321	Visitor Services in Experience Industry Management ²	
WVIT 302 or WVIT 404	Wine Fermentation Laboratory Winemaking I	2-4	RPTA 412	Advanced Experience Industry Management Applications ²	
WVIT 344	Direct to Consumer Wine Sales	4	RPTA 420	Strategic Event Implementation	
WVIT 345	Wine Marketing Research and Market Analysis	4	SPAN 101	Elementary Spanish I ³	
WVIT 433	Wine Sales and E-Commerce	4	or FR 101	Elementary French I	
WVIT 447	Logistics for the Global Wine Industry	4	or GER 101	Elementary German Language and Culture I	
WVIT 450	Wine Business Plan Development	4	or ITAL 101	Elementary Italian I	
WVIT 460	Senior Project - Wine Business	4	SPAN 102	Elementary Spanish II ³	
Approved Electives ¹			or FR 102	Elementary French II	
Select from the following:		8-10	or GER 102	Elementary German Language and Culture II	
AGB 311	Intermediate Agribusiness Finance		or ITAL 102	Elementary Italian II	
AGB 312	Agricultural Policy		SPAN 103	Elementary Spanish III ³	
AGB 326	Rural Property Appraisal		or FR 103	Elementary French III	
AGB 404	Food Retail Management		or GER 103	Elementary German Language and Culture III	
AGB 452	Agricultural Market Structure and Strategy		or ITAL 103	Elementary Italian III	
BRAE 348	Energy for a Sustainable Society		SPAN 201	Intermediate Spanish I ³	
BRAE 438	Drip/Micro Irrigation		or FR 201	Intermediate French I	
BUS 207	Legal Responsibilities of Business		or GER 201	Intermediate German I	
BUS 301	Global Financial Institutions and Markets		or ITAL 201	Intermediate Italian I	
BUS 302	International and Cross Cultural Management		SPAN 202	Intermediate Spanish II ³	
BUS 303	Introduction to International Business		or FR 202	Intermediate French II	
BUS 304	International Supply Chains		or GER 202	Intermediate German II	
BUS 310	Introduction to Entrepreneurship		SS 221	Soil Health and Plant Nutrition	
BUS 410	The Legal Environment of International Business		WVIT/MCRO 301	Wine Microbiology	
CHEM 128	General Chemistry for Agriculture and Life Science II		WVIT 332	Advanced Viticulture - Winter	
CHEM 312	Organic Chemistry: Fundamentals and Applications		WVIT 333	Advanced Viticulture - Spring	
CHEM 314	Biochemistry: Fundamentals and Applications		WVIT 339	Internship Wine and Viticulture (limited to 2 units)	
FSN 230	Elements of Food Processing		WVIT 346	Winery Digital Media Marketing and Data Analytics	
FSN 354	Packaging Function in Food Processing		WVIT 365	Wine Analysis and Amelioration	
FSN 374	Food Laws and Regulations		WVIT 400	Special Problems for Advanced Undergraduates	
JOUR 203	News Reporting and Writing		WVIT 404	Winemaking I	
JOUR 285	Introduction to Multimedia Journalism		WVIT 405	Winemaking II	
JOUR 312	Public Relations		WVIT 406	Winemaking III	
JOUR 331	Contemporary Advertising		WVIT/PLSC 414	Grape Pest Management	
JOUR 342	Public Relations Writing and Editing		WVIT 428	Winegrape Vineyard Management	
PLSC 421	Postharvest Technology of Horticultural Crops		WVIT 470	Selected Advanced Topics	
RPTA 114	Introduction to Hospitality and Travel		WVIT 471	Selected Advanced Laboratory	
RPTA 314	Sustainable Travel and Tourism Planning		Total units		60

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² Consultation with an advisor is recommended prior to enrollment depending on topic being offered.

³ A maximum of 8 units of foreign language may be counted toward Approved Electives.

College of Architecture and Environmental Design

Architecture and Environmental Design Bldg. (05), Room 212
Phone: 805.756.1311
<http://caed.calpoly.edu>

Dean: Christine Theodoropoulos
Associate Dean: Mark Cabrinha
Associate Dean: James Mwangi

Academic Programs

Program name	Program type
Architectural Engineering	BS, Minor, MS
Architecture	BArch, Minor, MS
City and Regional Planning	BS, MCRP, Minor
Construction Management	BS, Minor
Cross Disciplinary Studies Minor in Heavy Civil	Minor
Landscape Architecture	BLA, Minor
Real Property Development	Minor
Specialization in Transportation Planning	Concurrent CE-MS/ MCRP
Sustainable Environments	Minor

The College of Architecture and Environmental Design (CAED) offers programs that prepare graduates to create meaningful, resilient places.

Experiential Learning

Under the guidance of expert faculty, students actively participate in hands-on project-based learning that promotes understanding of the built environment and develops the knowledge and skills needed to plan, design, construct and steward.

Interdisciplinary Learning

The college offers interdisciplinary minors, coursework and activities that explore shared areas of interest such as community resilience, real estate development, sustainable environments, earthquake-resistant design, project delivery methods, building technologies, computing technologies, and integrated design and construction.

Co-curricular Activities

Students participate in chapters of professional organizations related to all of the college's majors, and take part in college leadership through the CAED Student Council, the CAED Student Committee for Diversity and Inclusion and the CAED Ambassadors Leadership Program.

Off-campus Field trips and Programs

Cal Poly's location in Central California provides access to field trip destinations throughout the state where students study the built environment and interact with communities and experts.

Students have numerous opportunities to participate in national and international off-campus programs offered by the college ranging from field trips associated with courses to community volunteer work, to academic programs with durations ranging from one quarter to a full year. In addition to programs offered by the college, students attend study

abroad programs offered by the university, the California State University System and our international exchange partners across the globe.

Internships and Careers

Students are encouraged to gain professional experience through internships that prepare them for careers. The college hosts an annual career fair for all majors and career fairs in the fields of construction and engineering serve all CAED students. The college's departments and the Cal Poly Career Center assist students with internship preparation and placements.

Facilities

The college's learning environments include design studios, galleries, the Paul and Verla Neel Resource Center, instructional laboratories equipped for testing building materials and systems, computing laboratories equipped with industry-standard hardware and software, and instructional shops where students create images, models, and prototypes using a variety of media and methods including wood, metals, photography, printing, and digital fabrication. Students build experimental structures and host the annual Design Village Competition in the nine-acre construction site known as "Poly Canyon."

Accreditation

The Master of City and Regional Planning program and each of the college's five bachelor's programs are accredited by their respective national accrediting organizations.

Recommended Preparation

In addition to pursuing CSU entrance requirements, prospective students are encouraged to engage in activities that introduce them to the college's fields of study so that they can make an informed decision about program choice. These activities may include, but are not limited to, school clubs, professional mentoring programs such as ACE, professional organizations and relevant work, internship or volunteer experience.

Additional information

<http://caed.calpoly.edu>.

CAED Advising Center

Mitra Nafisi, Director, CAED Advising Center
Bldg. (05), Room 210
Phone: 805.756.1325
<http://www.caed.calpoly.edu/caed-advising> (<http://www.caed.calpoly.edu/caed-advising/>)

The college's Advising Center provides academic advising services to all students enrolled in CAED programs, in coordination with departmental faculty advisors. At the center students receive assistance related to course planning and program completion, transfer and evaluation credit and articulation, academic probation, change of major and course substitution procedures, tutoring, special academic programs, scholarships, and other campus resources.

Interdisciplinary Minors Real Property Development Minor

Construction Management Department (186), Room A100
Phone: 805.756.1323

Scott Kelting, Minor Advisor
skelting@calpoly.edu

This minor is designed for students who are interested in the built environment, and want to expand their knowledge of how projects get initiated, move through the development process, and then how they are managed after construction.

The program is designed to prepare students for entry-level employment with professionals engaged in real property development. Courses include aspects of practitioners' real world experiences and knowledge of state-of-the-art practices, techniques, and challenges.

Students learn about the economic, design, environmental, and regulatory factors that influence housing, office, industrial, and commercial projects. They gain a clearer understanding of how these factors impact green development, urban sprawl, place-making, and transit oriented development.

Sustainable Environments Minor

Landscape Architecture Department (34), Room 216
Phone: 805.756.2040

Joseph Ragsdale, Minor Advisor
jragsdal (jragsdal@calpoly.edu)@calpoly.edu (jragsdal@calpoly.edu)

This minor is designed for students who are interested in principles and applications of sustainable environmental design and want to expand their understanding of the global, regional and local perspectives and concepts that guide the creation of sustainable environments. It provides students with the knowledge and abilities needed to integrate ecology, social equity and economics within the context of human and natural resource systems and the built environment.

Real Property Development Minor

Required Courses

CRP 212	Introduction to Urban Planning	4
CM 232	Evaluation of Cost Alternatives ¹	3-4
or CRP 315	Fiscal and Project Feasibility	
CM 475	Real Property Development Principles	4

Approved Electives

Select from the following:		12-13
ARCH 445	Urban Design in Architecture	
ARCH 472	Housing Design Concepts	
BUS 342	Fundamentals of Corporate Finance	
BUS 409	Law of Real Property	
BUS 434	Real Estate Finance	
BUS 435	Real Estate Investment	
CM 102	Introduction to Construction Management ²	
CM 214	Residential Construction Management ²	
CM 313	Commercial Construction Management ²	
CM 317	Sustainability and the Built Environment	
CM 318	Housing and Communities	
CM 413	Jobsite Construction Management ²	

CM 420	Service / Experiential Learning
CM 421	Emerging Trends
CM 422	Professional Preparation
CM 423	Construction Materials / Assemblies
CM 424	Construction Technology
CM 425	Sustainability and Environment
CM 426	International Construction Studies
CM 450	Integrated Project, Design and Program Management ²
CRP 336	Introduction to Environmental Planning ³
CRP 412	Plan Implementation
CRP 420	Land Use Law ³
CRP 430	Professional Planning Practice
CRP 435	Transportation Theory
CRP 442	Housing and Planning
CRP 446	Development Review and Entitlement
CRP 448	Principles of Urban Design
CRP 452	Community Design Methods
CRP 458	Hazard Mitigation Planning & Resilient Design
CRP 470	Selected Advanced Topics
ECON 434	Urban Economics
ECON 435	Economics of Land and Water
LA 470	Selected Advanced Topics

Total units **24**

- ¹ If CM 232 is taken, then at least 8 units of approved electives at the 300-400 level must be completed to meet the minimum requirement of 12 units of upper-division coursework for the minor.
- ² CM 102, CM 214, CM 313, CM 413, CM 420, CM 421, CM 422, CM 423, CM 424, CM 425, CM 426, and CM 450 do not count for Construction Management majors.
- ³ CRP 336 and CRP 420 do not count for City and Regional Planning majors.

Sustainable Environments Minor

Required Courses

EDES 406	Sustainable Environments	4
EDES 408	Implementing Sustainable Principles	4

Approved Electives

Select from the following:		16
At least 4 units must be upper division (300-400 level)		
ANT 201	Cultural Anthropology ¹	
ANT 360	Human Cultural Adaptations ²	
ARCH 445	Urban Design in Architecture	
ARCH 472	Housing Design Concepts	
BIO 227	Wildlife Conservation Biology	
BRAE 348	Energy for a Sustainable Society	
CRP 211	Cities: Form, Culture and Evolution ⁴	
CRP 212	Introduction to Urban Planning ⁴	
CRP 214	Land Use and Transportation Studies ⁴	

CRP/ES 215	Planning for and with Multiple Publics
CRP 334	Cities in a Global World
CRP 336	Introduction to Environmental Planning ⁴
CRP 342	Environmental Planning Methods ⁴
ECON/HNRS 303	Economics of Poverty, Discrimination and Immigration
EDES 410	Advanced Implementation of Sustainable Principles
ENGL 380	Literary Themes (Eco-Lit)
ES/ARCH 326	Native American Architecture and Place
ES 360	Ethnicity and the Land
GEOG 150	Human Geography ¹
GEOG/ERSC 325	Climate and Humanity
GEOG/ERSC 333	Human Impact on the Earth
ISLA 303/ HNRS 304	Values and Technology
NR/LA 218	Introduction to Geographic Information Systems (GIS) ³
NR 306	Natural Resource Ecology and Habitat Management ³
NR 320	Watershed Processes and Management
NR 321	Water Resources Technology and Society
NR 323	Human Dimensions in Natural Resources Management
NR/ES 360	Ethnicity and the Land
NR/CRP 404	Environmental Law
NR 414	Sustainable Forest Management
NR 434	Wood Properties, Products and Sustainable Uses
NR 475	Senior Project - Forest Stewardship
PHIL 340	Environmental Ethics
PHYS 310	Physics of Energy
POLS 332	World Food Systems
PSC 320	Energy, Society and the Environment
PSY 311	Environmental Psychology
UNIV/AG/ISLA 330	Cal Poly Land: Nature, Technology, and Society
UNIV 350	The Global Environment
UNIV 391	Appropriate Technology for the World's People: Development
UNIV 392	Appropriate Technology for the World's People: Design
UNIV 492	Appropriate Technology for the World's People: Design

Total units **24**

¹ ANT 201 and GEOG 150 do not count for Sociology, Social Sciences, and Anthropology and Geography majors.

² ANT 360 does not count for Anthropology and Geography majors.

³ LA 218 / NR 218, and NR 306 do not count for Environmental Management and Protection majors.

⁴ CRP 211, CRP 212, CRP 214, CRP 336, and CRP 342 do not count for City and Regional Planning majors.

Architectural Engineering

Engineering West (21), Room 110
Phone: 805.756.1314
<https://arce.calpoly.edu>

Department Head: Allen C. Estes

Academic Programs

Program name	Program type
Architectural Engineering	BS, Minor, MS

The Architectural Engineering Department is an integral part of the College of Architecture and Environmental Design, and it shares and supports the mission of the College. The mission of the architectural engineering program is to educate students to be successful in the practice of structural engineering. The department has several overall program objectives, which are: to advance in the profession through a combination of continuing education, graduate studies, lifelong learning and professional society participation; obtain a PE license and be working toward an SE license; communicate effectively with colleagues, clients and the public; and display leadership, initiative, creativity, teamwork, ethical behavior, work ethic and technical expertise in the chosen profession while exhibiting confidence and humility.

To eventually attain these overall program objectives, the following student learning outcomes must be satisfied. At the time of graduation, we expect our graduates to be able to: identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics; apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors; communicate effectively with a range of audiences; recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts; function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives; develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions; and acquire and apply new knowledge as needed, using appropriate learning strategies. To attain these outcomes, the program provides a balance of theoretical (analytical) and experimental courses.

The Architectural Engineering program carefully addresses architectural design, constructability issues, life safety and economy of construction. In addition, course projects address realistic design criteria, such as economic implications and environmental, social, ethical and sustainability issues. Using integrated design projects, modern technological tools, and the latest design codes to address these goals, the department emphasizes the advantages of a close, interdisciplinary team-based approach to design and construction.

The use of interdisciplinary projects allows students to hone their communication, critical thinking, and project management skills by working in multi-disciplinary teams. As students learn more about building design, they become cognizant of the ethical implications of design, specifically of how political and societal issues affect the engineering of the built environment, both on a local scale and on a broader international scale. These larger societal issues motivate

students to engage in life-long learning, allowing them to use their skills in professional structural engineering practice.

The department's learn-by-doing philosophy is part of a pedagogy which emphasizes design-centered laboratories, integrating theory and design, culminating in a senior project capstone design experience.

The Architectural Engineering Program is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

Undergraduate Programs

BS Architectural Engineering

Cal Poly's Department of Architectural Engineering's (ARCE) curriculum focuses on the structural engineering of buildings. By focusing on building design students are able to take many more structural engineering courses than is possible in a traditional civil engineering program. Beyond structural engineering courses, students take several architecture and construction management courses and studios, giving them an appreciation for these disciplines.

Laptop Requirement - The department has a requirement that all students have a laptop computer. Computing is an integral component in today's engineering environment. Many Architectural Engineering classes emphasize cooperative projects / assignments, and a laptop computer provides the required mobility to facilitate collaboration. Financial aid may be available to help cover the cost of the computer laptop (contact the Financial Aid Office (<http://financialaid.calpoly.edu>) for more information). Refer to department website for additional information.

Architectural Engineering Minor

The minor is designed for students wishing to pursue a more in-depth education in structures. The coursework exposes students to analytical, design, and construction issues relevant to the structural design process. Students select a sequence of courses that focus on either structural design or structural analysis. The program is tailored for students majoring in architecture and construction management. Contact the department for additional information.

Graduate Program

MS Architectural Engineering

The Master of Science in Architectural Engineering (MS Architectural Engineering) program is designed for students holding an accredited degree in architectural, civil or structural engineering. For students within the Cal Poly Architectural Engineering undergraduate program, a blended BS + MS option is available. The program is designed to prepare graduates to meet the demands for practice in the structural engineering profession. Core curriculum courses expose students to emerging topics in structures, advanced methodologies to predict and analyze structural behavior, and cutting edge design procedures. Additionally, related topics in architecture and building constructability are integrated into the curriculum to create a unique interdisciplinary masters level education. Elective courses also allow individuals to advance their knowledge in technical areas offered from graduate degree programs across the campus. Candidates should refer to the "General Policies Governing Graduate Studies (p. 435)" section for supplemental University requirements.

Blended BS Architectural Engineering + MS Architectural Engineering

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

A blended program is available for MS Architectural Engineering.

Eligibility

Students majoring in BS Architectural Engineering are eligible for the blended program in MS Architectural Engineering.

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Architectural Engineering department for any additional eligibility criteria.

BS Architectural Engineering

Program Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

All ARCE majors must obtain a grade of C- or better in ARCE courses that are prerequisites for other ARCE courses.

MAJOR COURSES

ARCE 106	Introduction to Building Systems	2
ARCE 211	Structures I	3
ARCE 212	Structures II	3
ARCE 223	Mechanics of Structural Members	3
ARCE 224	Mechanics of Structural Members Laboratory	1
ARCE 227	Structures III	2
ARCE 257	Structural CAD for Building Design	2
ARCE 302	Structural Analysis	3
ARCE 303	Steel Design I	3
ARCE 304	Timber Design	3
ARCE 305	Masonry Design	2
ARCE 306	Matrix Analysis of Structures	3
ARCE 352	Structural Computing Analysis	1
ARCE 353	Matrix Structural Computing Analysis	1
ARCE 354	Numerical Analysis Laboratory	1
ARCE 371	Structural Systems Laboratory	3
ARCE 372	Steel Structures Design Laboratory	3
ARCE 412	Dynamics of Framed Structures	3
ARCE 421	Soil Mechanics	3
ARCE 422	Foundation Design	3
ARCE 444	Reinforced Concrete Design	4
ARCE 451	Timber and Masonry Structures Design and Constructability Laboratory	3
ARCE 452	Concrete Structures Design and Constructability Laboratory	3
ARCE 476	Architectural Engineering Building Systems	3
ARCE 483	Seismic Analysis and Design	3
ME 212	Engineering Dynamics	3
Senior Project		
ARCE 415	Interdisciplinary Capstone Project	4
SUPPORT COURSES		
ARCH 131 & ARCH 132 & ARCH 133	Design and Visual Communication 1.1 and Design and Visual Communication 1.2 and Design and Visual Communication 1.3	12
ARCH 217	History of World Architecture: Prehistory - Middle Ages (C1) ¹	4
or ARCH 218	History of World Architecture: Middle Ages - 18th Century	
or ARCH 219	History of World Architecture: 18th Century - Present	
or ARCE 260	History of Structures	
BRAE 237	Introduction to Engineering Surveying	2
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ¹	4

CM 115	Fundamentals of Construction Management	6
CM 232 or IME 314	Evaluation of Cost Alternatives Engineering Economics	3
CSC 231	Programming for Engineering Students	2
EE 201	Electric Circuit Theory	3
GEOL 201	Physical Geology	3
MATH 141	Calculus I (B4) ¹	4
MATH 142	Calculus II (B4) ¹	4
MATH 143	Calculus III (Area B Electives) ¹	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
ME 302	Thermodynamics I	3
ME 341	Fluid Mechanics I	3
PHYS 141	General Physics I (Area B Electives) ¹	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
STAT 312 or STAT 321	Statistical Methods for Engineers (Upper-Division B) ¹ Probability and Statistics for Engineers and Scientists	4
GENERAL EDUCATION (GE) (See GE program requirements below.)		44
FREE ELECTIVES		
Free Electives		0
Total units		196

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

General Education (GE) Requirements

- 72 units required, 28 of which are specified in Major and/or Support.
- If any of the remaining 44 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	

B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater (4 units in Support) ¹	0
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		44

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Architectural Engineering Minor

Required Courses

ARCE 211 & ARCE 212	Structures I and Structures II	6
ARCE 223	Mechanics of Structural Members	3
ARCE 226	Introduction to Structural Systems	3
ARCE 315	Introduction to Structural Design	4
ARCE 316 or ARCE 421	Structural Integration in Architecture Soil Mechanics	3-4
Select either Analysis or Design Option:		8
Analysis Option		
ARCE 227	Structures III	
ARCE 302	Structural Analysis	
Select one of the following:		
ARCE 303	Steel Design I	
ARCE 304	Timber Design	
Design Option		
ARCE 303	Steel Design I	
ARCE 304	Timber Design	
ARCE 305	Masonry Design	
Total units		27-28

MS Architectural Engineering

Program Learning Objectives

- a. Formulate and solve advanced structural engineering problems.
- b. Analyze and model non-linear building response.
- c. Design a building system, component, or process to meet desired needs within realistic constraints such as regulatory, economic, environmental and constructability.
- d. Function in interdisciplinary teams for the design and construction of buildings.
- e. Communicate effectively.

Required Courses

ARCE 501	Advanced Structural Mechanics	3
ARCE 502	Nonlinear Structural Behavior I	3
ARCE 503	Nonlinear Structural Behavior II	3
ARCE 504	Finite Element Method for Building Structures	3
ARCE 511	Structural Systems Behavior	3
ARCH 551	Architectural Design (5, 5) ¹	10
Select from the following: ²		9
ARCE 598	Structural Engineering Design Project (3, 3, 3)	

or 9 units of approved elective courses in a student's Formal Study Plan and a comprehensive examination

Approved Electives ²

Electives	11
Total units	45

¹ 5 units of ARCH 551 may be replaced with 5 units of approved elective courses for students to collaborate with faculty on teaching-scholar research, to pursue electives focused on their masters project, or to broaden their masters coursework where appropriate.

² At least 7 units of Approved Elective courses must be at 500 level.

Architecture

Architecture & Environmental Design Bldg. (05), Rm 212A

Phone: 805.756.1316

<https://architecture.calpoly.edu>

Department Head: Margot McDonald

Associate Department Head: Robert Arens

Assistant Department Head: Carmen Trudell

Academic Programs

Program name	Program type
Architecture	BArch, Minor, MSARCH, Blended BARCH+MSARCH

The objective of the five-year Bachelor of Architecture degree program is to develop design and related skills necessary for entry into the professional field of architecture. Preparation for architecture spans several disciplines and requires a range of aptitudes. As the architect has a responsibility for solving problems of the built environment involving people, an understanding and sensitivity to human needs is required. Therefore, programs in architecture are broad in nature. With careful selection of elective work, students may develop focus areas.

The Bachelor of Architecture degree is accredited by the National Architectural Accrediting Board.

Statement on NAAB Accredited Degrees

In the United States, most registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit professional degree programs in architecture offered by institutions with U.S. regional accreditation, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted an eight-year term with conditions or two-year term of continuing accreditation, or a three-year term of initial accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may require a non-accredited undergraduate degree in architecture for admission. However, the non-accredited degree is not, by itself, recognized as an accredited degree.

California Polytechnic State University, Architecture Department, offers the following NAAB-accredited degree program:

B.Arch. (225 undergraduate credits)

Next accreditation visit for the B.Arch. program: 2025

Transfer Students

Transfer applicants into Architecture are ranked by University Admissions in accordance to the formula outlined on the Admissions Web Site. The Architecture Department then invites the top ranked candidates to submit a portfolio of their work for final selection by the Architecture Department faculty.

Laptop Requirement

The department has a requirement that all freshmen or transfer students have a notebook computer when they enter the program. In

the profession of architecture, computing is an integral component, and developing the ability to critically integrate hand and digital tools is a fundamental aspect of architectural education. A notebook computer is the key to having computing capabilities available at all times and all locations. Financial aid may be available to cover the cost of the laptop computer (contact the Financial Aid Office (<http://financialaid.calpoly.edu/>) for more information).

Off-Campus Architecture Programs

Off-campus study opportunities for fourth year Architecture students are offered in a variety of formats and locations. Programs from one quarter to a full year are available abroad and in the United States. There is a third-year student general information session each fall quarter to present the department pre-approved programs offered for the following year. Applications from third year students for all programs are due in the winter quarter.

CSU International Programs and Direct International Exchanges

There are several CSU-sponsored study abroad programs for Architecture majors, including Copenhagen, Denmark; Florence, Italy; Biberach, Germany; Queretaro, Mexico; and, Santiago, Chile. The concept of the studio organization is similar to Cal Poly. Credit for major design courses, professional electives, general education courses and free electives are coordinated collectively through the CSU Office of International Programs (CSUIP), Cal Poly International Center and Architecture Department. In addition, there are several direct international exchange programs to choose from including the Ecole Nationale Supérieure d'Architecture Paris Val de Seine, Lucerne University of Applied Sciences, and Munich University of Applied Sciences and others.

San Francisco Urban Design / LA Metro Programs

Two Urban Design/Internship Programs offer fourth-year students the opportunity to live and study in San Francisco or Los Angeles for two quarters (winter and spring). Each class utilizes projects with the participation of talented, award-winning architectural offices and urban designers to introduce students to urban design and architectural practice.

Washington Alexandria Architecture Center (WAAC)

The WAAC, now offered to Cal Poly students through the National Student Exchange, is an extension of the Virginia Polytechnic Institute and State University (Virginia Tech) in the Washington DC Metropolitan Area. In addition to offering fourth-year students studio, major, and professional elective courses, internship opportunities exist in both the Alexandria, VA and Washington DC areas.

Other Architecture Off Campus Programs

The Architecture Department offers students a changing variety of off-campus programs throughout the world. In addition to opportunities listed above, there are campus partnerships with organizations such as the National Student Exchange (NSE), the Council for International Education Exchange (CIEE) and The Education Abroad Network (TEAN). Contact the Architecture Department and the Cal Poly International Center for the most current information.

Cooperative Education (Co-op)

In addition to traditional classroom study and instructor-led field trips, students have the opportunity to intern for professional architecture firms and receive professional elective credits and, in some cases, fourth-year studio credit. To find out more about cooperative education opportunities, visit the Architecture Department's webpage or Career

Services. Applications and opportunities for co-op credit are available year-round.

Undergraduate Programs

Bachelor of Architecture

The objective of the five-year Bachelor of Architecture degree program is to develop design and related skills necessary for entry into the professional field of architecture.

Architecture Minor

The Architecture Minor blends studies in aesthetics, culture, sciences, math, technologies and craft and their influences on the design and construction of buildings and spaces. Architectural constructs embody collective values and impact quality of life, affecting experiences at multiple scales, from the context of the individual to the expanse of cities, often over long periods of time. In this minor, students may choose courses in the categories of history and theory, architectural technology, architecture and society, or create a path around personal interests, but at least 50% of the courses selected must be upper division. The Architecture Minor welcomes students from all majors and is meant to provide an introduction to the discipline.

Graduate Program

Master of Science in Architecture

Graduate Coordinator: Thomas Fowler

The Master of Science in Architecture (MS ARCH (<https://architecture.calpoly.edu/prospective/masters/>)) program prepares graduates for research and consulting in the fields of architecture, environmental design and the built environment. The MS ARCH program provides opportunities for specialization and interdisciplinary collaboration through coursework and research. The program welcomes applications from candidates holding bachelor degrees including graduates with a Bachelor of Architecture seeking post-professional specialization and those with a degree outside of architecture.

The post-professional Master of Science in Architecture (MS ARCH) Degree is **not** a NAAB (<https://www.naab.org/>)-accredited professional degree in architecture. Read more about the differences between professional/non-professional degrees and requirements for licensure at NCARB (<https://www.ncarb.org/become-architect/study-architecture/accredited-programs/>).

Curriculum Overview

The MS ARCH involves a master's research project as the principal component. A research proposal is prepared by each student, based upon their scholarship interests formulated during the first year of the program. The first year of the curriculum immerses students in multi-disciplinary design teams on professionally-oriented projects. Students learn best practices of collaboration, and skills are developed through partnerships with students in other disciplines and with industry professionals. Students also have opportunities for coursework and engagement with the four other departments in the College of Architecture and Environmental Design (CAED) which includes City and Regional Planning, Architectural Engineering, Construction Management and Landscape Architecture. Forty-five (45) total units are required for completion of the degree.

Graduate Study Areas

The MS ARCH provides a wide range of areas of study. Graduate students are encouraged to build on the knowledge that they have gained from their previous academic studies and/or professional experiences, as they acquire and contribute new knowledge in their chosen research specialization within one of the following broadly defined research areas:

- *Innovative Materials Practice*: This specialization focuses on design integration through innovations in materials and material assemblies enabled by contemporary modes of traditional and digital fabrication and their impact on design and construction processes. Of particular interest are sustainable practices in fabrication from material economies and cradle-to-cradle methodologies to responsive envelopes. The Innovative Materials Practice research area promotes interdisciplinary work as essential to innovation in design and construction with connections to other disciplines.
- *Interdisciplinary Building Design*: The making of architecture is a complex process and involves multiple disciplines to be successful. Studying this collaborative model for design and understanding the range of work flow strategies, tools and coordination issues, design challenges and the implications for applying new approaches to a component of this building design / systems integration process should be the focus. Study and research areas include, but are not limited to: collaborative projects involving two or more disciplines, collaborative workflow strategies, advanced tools for collaboration, and small scaled design-build projects that model proof of concept multi-disciplinary examples.
- *Resilient, Sustainable and Circular Communities*: Given the increasing number, intensity and size of natural and social catastrophes in the world today, it is apparent that sustainability principles alone may not be explicit enough to ignite the kind of societal and economic transformations that are needed for the health of the planet and all its inhabitants. Study and research areas include, but are not limited to: adapting full circle principles involving theory and practice examples, design detailing for deconstruction, biomaterials development for construction, service-learning education opportunities with local schools and businesses, and construction waste reuse for industrial byproducts.
- *Urban Architecture and Design*: Urban architecture is extremely important today as it attempts to comprehend the impact architecture and infrastructure not only on city life, but on global and local society, culture, politics, and economics. Study and research areas include, but are not limited to: GIS mapping of defined range of urban architecture parameters (i.e., biological ecologies, material resources and energy allocation systems, social proximities and cultural iconographies), 3D city modeling with open source "dapps" in the urban design of buildings, and infrastructure.

Blended Bachelor of Architecture + MS Architecture

For motivated students, a blended master of science program, also referred to as a 5 + 1 program, is available. The blended program allows students to simultaneously complete both a BARCH and an MSARCH. The blended program offers promising individuals an opportunity to continue their studies in architecture in a collaborative multi-disciplinary learning environment.

Eligibility for the Blended Program

Acceptance into the blended program is contingent upon completion of the fourth year of the Architecture courses and 205 units. **Please note that all blended program applicants must have completed their**

Graduation Writing Requirement (GWR) prior to acceptance. The Architecture Graduate Committee reviews all applications and selects individuals with records that demonstrate success at the undergraduate level and potential to succeed at the graduate level. Candidates shall meet the University requirements, as a minimum, stated in "Blended BS +MS Programs" in the Graduate Education (p. 435) section, in addition to the requirements outlined in the "MS ARCH Program Supplemental Components" by the Architecture Department MSARCH Program (<https://architecture.calpoly.edu/prospective/masters/msarch-appl-process/>).

Students wishing to pursue the blended BARCH + MSARCH degree shall complete the Blended BARCH + MSARCH application. Applicants may contact the MSARCH coordinator, msarch@calpoly.edu, after their third year of the BARCH program for further information. Blended Applications (<https://architecture.calpoly.edu/draft-blended-msarch-program-application/>) Admission's Process Opens up on October 1st for the Following Fall Start.

Bachelor of Architecture

Program Learning Objectives

1. Think critically and creatively about architectural problems.
2. Use a diverse range of communication skills including writing, speaking, drawing, and modeling to think about and convey architectural ideas.
3. Understand and apply the technical aspects of architecture, while considering the environmental impact of design decisions.
4. Synthesize a wide range of variables that contribute to an integrated design solution.
5. Understand the professional practice of architecture.
6. Understand architecture in relation to the larger world of knowledge.
7. Work productively with diverse groups including design professionals, clients, and users.
8. Use architectural knowledge and skills to make a positive contribution to society.
9. Make reasoned decisions based on an architectural understanding of ethics, diversity, and sustainability.
10. Engage in lifelong learning as a professional.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

ARCH 101	Survey of Architectural Education and Practice (1, 1, 1) ¹	3
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ARCH 131 & ARCH 132 & ARCH 133	Design and Visual Communication 1.1 and Design and Visual Communication 1.2 and Design and Visual Communication 1.3	12
ARCH 207	Architectural Technology Fundamentals 2.3	4
ARCH 217	History of World Architecture: Prehistory - Middle Ages (C1) ²	4
ARCH 218	History of World Architecture: Middle Ages - 18th Century (GE Electives) ²	4
ARCH 219	History of World Architecture: 18th Century - Present	4
ARCH 241 & ARCH 242	Architectural Technology Fundamentals 2.1 and Architectural Technology Fundamentals 2.2	8
ARCH 251 & ARCH 252 & ARCH 253	Architectural Design 2.1 and Architectural Design 2.2 and Architectural Design 2.3	15
ARCH 307	Architectural Systems Integration 3.2	4
ARCH 341 & ARCH 342	Architectural Systems Integration 3.1 and Architectural Systems Integration 3.3	8
ARCH 351 & ARCH 352 & ARCH 353	Architectural Design 3.1 and Architectural Design 3.2 and Architectural Design 3.3	15
	Select from the following:	4
ARCH 420	Seminar in Architectural History, Theory and Criticism	
ARCH 320	Topics in Architectural History (Upper-Division C) ²	
ARCH 443	Issues in Contemporary Professional Practice	4
ARCH 451 & ARCH 452 & ARCH 453	Architectural Design 4.1 and Architectural Design 4.2 and Architectural Design 4.3	15
ARCH 481	Senior Architectural Design Project (5, 5, 5)	15
ARCH 492	Senior Design Thesis	3
SUPPORT COURSES		
ARCE 211	Structures I	3
ARCE 212	Structures II	3
ARCE 226	Introduction to Structural Systems	3
ARCE 315	Introduction to Structural Design	4
ARCE 316	Structural Integration in Architecture	4
EDES 123	Principles of Environmental Design (E) ²	4
MATH 141	Calculus I (B4) ²	4
MATH 182	Calculus for Architecture and Construction Management (GE Electives) ^{2,3}	4
PHYS 121 or PHYS 141	College Physics I (B1) ² General Physics I	4
PHYS 122	College Physics II (B1 & B3) ²	4

or PHYS 142	General Physics II	
Professional Electives		18
May include: Any EDES, ARCH, ARCE, CM, CRP, LA or ART course. Any course included in any College of Architecture and Environmental Design minor, or the ART minor.		
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		48
FREE ELECTIVES		
Free Electives ⁴		0
Total units		225

- ¹ Transfer students may take additional ARCH course(s) to substitute for ARCH 101. Contact the department for details.
- ² Required in Major or Support; also satisfies General Education (GE) requirement.
- ³ MATH 142 Calculus II substitutes for MATH 182.
- ⁴ If a General Education (GE) course is used to satisfy a Major or Support requirements, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater (4 units in Major) ¹	0
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4

Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Support) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (8 units in GE Electives fulfilled by 4 units in Major and 4 units in Support) ¹		0
Total units		48

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Architecture Minor

Required Courses

ARCH 217	History of World Architecture: Prehistory - Middle Ages	4
or ARCH 218	History of World Architecture: Middle Ages - 18th Century	
or ARCH 219	History of World Architecture: 18th Century - Present	
ARCH 320	Topics in Architectural History	4
EDES 123	Principles of Environmental Design	4

Approved Electives

Select from the following (at least 8 units must be at the 300-400 level):

History and Theory

ARCE 260	History of Structures	
ARCH 101	Survey of Architectural Education and Practice	
ARCH 217	History of World Architecture: Prehistory - Middle Ages	
ARCH 218	History of World Architecture: Middle Ages - 18th Century	
ARCH 219	History of World Architecture: 18th Century - Present	
ARCH 326	Native American Architecture and Place	
ARCH 420	Seminar in Architectural History, Theory and Criticism	
LA 212	History of Modern and Contemporary Landscape Architecture	

Architecture and Technology

ARCH 400	Special Problems for Advanced Undergraduates	
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ARCH 460	Computer Applications
ARCH 479	Design Build
CM 317	Sustainability and the Built Environment

Architecture and Society

ARCH 445	Urban Design in Architecture
ARCH 462	Topics in Architectural Practice
CRP 211	Cities: Form, Culture and Evolution
EDES 350	The Global Environment
EDES 406	Sustainable Environments

Additional Electives

ARCH 270	Selected Topics
ARCH 313	Advanced Delineation
ARCH 469	Topics in Design Methods
ARCH 470	Selected Advanced Topics
ARCH 480	Special Studies in Architecture
CRP 212	Introduction to Urban Planning
LA 320	Design Theory for Landscape Architects

Total units **24**

Master of Science in Architecture

Program Learning Objectives

- a. Formulate and solve advanced architecture problems
- b. Design a building system, component, or process to meet desired needs within realistic constraints such as regulatory, economic, environmental and constructability.
- c. Function in interdisciplinary teams for the design and proposed construction of buildings.

Required Courses

ARCH 551	Architectural Design (5, 5, 5)	15
ARCH 561	Advanced Design (3, 3, 3)	9
ARCH 598	Master's Design Project (3, 3, 3 or 3, 6)	9

Approved Electives

Advisor approved elective courses are included in a student's formal study plan.	12
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Total units **45**

City and Regional Planning

Architecture & Environmental Design Bldg. (05), Room 313
Phone: 805.756.1315
<https://planning.calpoly.edu>

Department Head: Michael Boswell

Academic Programs

Program name	Program type
City and Regional Planning	BS, Minor, Master of
Specialization in Transportation Planning	Concurrent CE-MS/ MCRP

The profession of city and regional planning involves helping people and communities manage growth and change in their physical, social, and economic environments. The focus is on understanding how cities and towns (human settlements) function and how to make them better places for people to live, work and play. City planning has its roots in engineering, architecture, landscape architecture, law, social welfare and government reform. The practice of city and regional planning is both science and art. It involves technical competence, creativity, hard-headed pragmatism and the ability to develop a vision of the future and to build on that vision. Contemporary planners combine design, quantitative, and people skills to assist communities and society. Both the undergraduate (BSCRCP) and the graduate (MCRP) programs are accredited by the national Planning Accreditation Board.

The degree programs prepare students for professional careers in the design of human settlements in harmony with the natural environment and the needs of society. Practicing planners work in public agencies, non-profit organizations, and private consulting firms, preparing comprehensive plans for projects, neighborhoods, cities, and entire regions. The plans address the use of land, housing, transportation, public facilities, and open space. In addition, they are responsible for finding the means to make their plans become a reality by budgeting for public projects and programs and by reviewing and regulating private development.

The curriculum leading to the Bachelor of Science in City and Regional Planning provides a broad, interdisciplinary education as well as competency in physical planning with an emphasis on urban design and development. The Master of City and Regional Planning degree builds on a general undergraduate preparation in the humanities, architecture, landscape architecture, social sciences or natural sciences, and offers four areas of excellence in research and teaching: Urban Design, Environment and Sustainability, Transportation and, Housing, Economic, and Community Development.

Undergraduate Programs

BS City and Regional Planning

The BSCRCP program cultivates creativity and problem solving in the management of urban change. Technical design and analytic skills for professional practice are taught utilizing field-based experiences.

The BSCRCP program is one of the most studio/lab intensive, four-year undergraduate planning degree in the United States. Beginning in year two and continuing through year four, students must take at least seven studio courses. In addition, students take the foundation courses necessary to be able to fulfill the studio expectations and learn from the studio experience. These foundation courses include urban design,

computer skill, planning theory, plan implementation methods and land use law.

The BSCRCP degree curriculum is a total of 180 quarter units, composed of three parts:

1. Required CRP major courses
2. Required Support courses; and
3. Required General Education courses

The Support courses are designed to provide core knowledge in the areas of ecology, natural science, political science, and statistics. These skills provide the scientific, policy and analytical tools necessary for community planning.

All BSCRCP students are required to do an Internship. They must take an internship seminar course that contextualizes the practice experience and allow professional reflection.

In addition, all students prepare a "Senior Project" or they can meet this requirement by completing the Senior Project-Professional Practice studio.

City and Regional Planning Minor

The minor provides students with an interdisciplinary understanding of the science and the art of city planning and its relationship with other environmental design professionals. The student is provided with an understanding of how growth and change affect the physical, social and economic aspects of the city, including the relationships among land use, transportation, housing and the environment. Courses that build skills in the preparation of plan documents, land use studies and environmental studies are combined with laboratory courses providing opportunities for involvement in community building and plan-making projects.

The minor is excellent preparation for creating visions of the future, participation in government and community organizations. It enhances skills in disciplines that have linkages with cities and the built and natural environments. It provides the student with the knowledge, skills and values that help people build better communities and cities.

Additional Minors

The department also participates in offering interdisciplinary minors in Real Property Development, and Sustainable Environments. See the College of Architecture and Environmental Design (p. 148) page for further information.

Graduate Programs

Master of City and Regional Planning

General Characteristics

The Master of City and Regional Planning (MCRP) degree is an applied, comprehensive, and professionally-based program. It is open to students from any undergraduate major, with high standards of academic achievement who wish to pursue careers in city and regional planning. It is structured to prepare graduates to function in a general context of city planning. The core courses cover planning theory and history, methods, law, community-based studios, and formulation and implementation of plans and policies. In addition, skill building in all aspects of planning communications (visual, verbal, written) is stressed.

The program is six quarters (two years) in duration and consists of 72 approved units (not including courses necessary to compensate for deficiencies). Because of the sequencing of courses, students admitted to the program are generally expected to begin their studies in the fall quarter. Students with prerequisite coursework deficiencies and those with backgrounds allowing waivers of first-year core courses may be admitted in other quarters. The degree culminates in a thesis, professional project, or a community planning studio.

Students have an opportunity to develop a close working relationship with the planning faculty. Self-directed study, tailored to the student's interests and needs, is also encouraged.

Prerequisites

Students entering the MCRP program are required to have a basic working knowledge of word processing, spreadsheets and presentation software.

Applicants for admission to the Master of City and Regional Planning program are expected to:

1. Have earned a bachelor's degree from an accredited university or college.
2. Demonstrated academic excellence by earning at least a 3.0 (out of 4.0) grade point average in the last 90 quarter (60 semester) units of undergraduate work.
3. Show evidence of motivation, maturity, work ethic, academic excellence, and intellectual ability through references (3 letters required), work experience, and other life experiences.
4. Submit a representative example of a self-authored paper or project to demonstrate writing ability.
5. Demonstrate understanding of, and areas of interest in, city and regional planning from the perspective of their career and educational objectives, through the statement of purpose.

Applicants lacking prerequisites or other background requirements for classified standing requirements may be admitted on a conditionally classified basis, depending on the results of an individual analysis of their applications.

Specialization in Landscape and Urban Design

The Landscape and Urban Design specialization provides students with advanced study in design, analysis, and ecological and preservation planning of the environment. Students pursuing the specialization are prepared for professional positions in urban design and landscape and preservation planning at local and regional levels. The specialization includes urban design and landscape architecture theory and practice, analysis of cultural and natural landscapes, and interpretation and visualization of data.

Specialization in Transportation Planning

The Transportation Planning specialization provides students with advanced study in the design, engineering, analysis, planning, and implementation of transportation systems and policy. Students pursuing the specialization are prepared for professional positions in public transportation agencies, private transportation planning and engineering firms, and other organizations desiring specialized knowledge in

transportation. The specialization includes instruction on theory, land use integration, policy, engineering, and sustainability.

MCRP, Architecture or Landscape Architecture Pathway

This pathway is available only to students who are enrolled in either Cal Poly's Bachelor of Architecture (BArch) program or Bachelor of Landscape Architecture (BLA) program. Students may request permission to enroll in Master of City and Regional Planning (MCRP) graduate level courses during their fourth and fifth years of study. Upon completion of the BArch or BLA degree, students are eligible to formally apply for the MCRP program. Students who fulfill all the requirements first receive their bachelor's degree and then the MCRP. Contact the Graduate Coordinator, City and Regional Planning Department for additional information.

Joint Interdisciplinary Program Concurrent CE-MS/MCRP with Specialization in Transportation Planning

The Concurrent CE-MS/MCRP with Specialization in Transportation Planning (p. 429) is a joint interdisciplinary program between the Civil and Environmental Engineering Department in the College of Engineering and the City and Regional Planning Department in the College of Architecture and Environmental Design. Participation in the program requires enrollment in both Colleges. Participants successfully completing the program are awarded both the Master of Science in Civil and Environmental Engineering (CE-MS) and the Master of City and Regional Planning (MCRP) with a Specialization in Transportation Planning.

BS City and Regional Planning Program Learning Objectives

After successfully completing the BSCR program, students will be able to:

Foundational skills

1. Demonstrate an understanding of the historical, theoretical, legal, and methodological foundations of planning
2. Effectively represent and communicate planning and urban design information

Methodology

1. Gather, organize, analyze and present planning information
2. Transform data and information into knowledge for action

Integrative skills

1. Integrate and apply the necessary skills and knowledge to address complex planning problems
2. Implement a planning process
3. Work with a variety of audiences: multiple publics, officials, and decision-makers

Professional skills

1. Reflect upon, critique, and evolve the practice of planning
2. Address issues of sustainability, diversity, and environmental and social justice
3. Practice in accordance with the AICP Code of Ethics

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

CRP 201	Basic Graphic Skills	4
CRP 202	Urban Design Studio I	4
CRP 203	Urban Design Studio II	4
CRP 204	Theories and Methods of Urban Design	3
CRP 211	Cities: Form, Culture and Evolution	4
CRP 212	Introduction to Urban Planning	4
CRP 213	Population, Housing and Economic Applications	4
CRP 214	Land Use and Transportation Studies	4
CRP 215	Planning for and with Multiple Publics (USCP)	4
CRP 216	Representing the City	2
CRP 314	Planning Theory	4
CRP 315	Fiscal and Project Feasibility	4
CRP 336	Introduction to Environmental Planning	4
CRP 341	Urban Design Studio III	4
CRP 342	Environmental Planning Methods	4
CRP 409	Planning Internship	2
CRP 410	Community Planning Laboratory I	4
CRP 411	Community Planning Lab II	4
CRP 412	Plan Implementation	4
CRP 420	Land Use Law	4
CRP 430	Professional Planning Practice	3
CRP 457	GIS Applications in Planning	3
Select from the following:		4
CRP 461 & CRP 462	Senior Project I and Senior Project II (2, 2)	
CRP 463	Senior Project Professional Practice (4)	
Approved Electives ^{1, 2}		
Select from the following:		15
AG/EDES/ENGR/ISLA/SCM/UNIV 350	The Global Environment	
ANT 360	Human Cultural Adaptations	

ARCH 445	Urban Design in Architecture
ARCH 461	Advanced Computer-Aided Fabrication in Architecture
BUS 382	Leadership and Organizations
BUS 384	Human Resources Management
BUS 477	Management Consulting and Change Management
CM 475	Real Property Development Principles
CRP 303	Digital Cities
CRP 334	Cities in a Global World
CRP 400	Special Problems for Advanced Undergraduates
CRP 402	Contemporary Urban Design
CRP/NR 404	Environmental Law
CRP/NR 408	Water Resource Law and Policy
CRP 426	Planning Healthy Communities
CRP 428	International Planning and Development
CRP 435	Transportation Theory
CRP 440	Climate Action Planning
CRP 442	Housing and Planning
CRP 445	Planning and Urban Ecology
CRP 446	Development Review and Entitlement
CRP 448	Principles of Urban Design
CRP 452	Community Design Methods
CRP 455	Transportation Policy and Planning
CRP 456	Web Technologies for Planning
CRP 458	Hazard Mitigation Planning & Resilient Design
CRP 470	Selected Advanced Topics
CRP 471	Selected Advanced Laboratory
CRP 500	Individual Study
CRP 513	Planning Research and Analysis
CRP 516	Demographic and Analytic Tools
CRP 520	Feasibility Studies
CRP 525	Plan Implementation
CRP 545	Principles of Environmental Planning
ECON 303	Economics of Poverty, Discrimination and Immigration
EDES 123	Principles of Environmental Design
EDES 406	Sustainable Environments
EDES 408	Implementing Sustainable Principles
EDES 410	Advanced Implementation of Sustainable Principles
ENGL 310	Corporate Communication
ENGL 317	Technical Editing
ENVE 323	Engineering for the Environment
ENVE 324	Introduction to Air Pollution
ERSC/GEOG 325	Climate and Humanity
ERSC/GEOG 333	Human Impact on the Earth
ERSC/GEOG 414	Global and Regional Climatology
GEOG 218	Applications in GIS
GEOG 308	Global Geography

JOUR 312	Public Relations
LA/NR 218	Introduction to Geographic Information Systems (GIS)
LA/NR 317	The World of Spatial Data and Geographic Information Technology
NR 306	Natural Resource Ecology and Habitat Management
NR 323	Human Dimensions in Natural Resources Management
NR 326	Natural Resources Economics and Valuation
NR 416	Environmental Impact Analysis and Management
NR 425	Applied Resource Analysis and Assessment
NR 435	Environmental Policy Analysis
NR 465	Senior Project - Ecosystem Management
NR 475	Senior Project - Forest Stewardship
PHIL 333	Political Philosophy
PHIL 334	Philosophy of Law
PHIL 335	Social Ethics
PHIL 336	Feminist Ethics, Gender, Sexuality and Society
PHIL 337	Business Ethics
PHIL 340	Environmental Ethics
PHIL 350	Aesthetics
POLS 310	The Politics of Race, Class, Gender and Sexuality
POLS 316	Political Participation
POLS 325	Global Political Issues
POLS 332	World Food Systems
POLS 338	Critical Issues in American Politics
POLS 375	California Politics
POLS 419	Social Movements and Political Protest
POLS 451	Technology and Public Policy
POLS 459	The Politics of Poverty
POLS 471	Urban Politics
POLS 515	Public Policy
PSC 320	Energy, Society and the Environment
PSY 302	Behavior in Organizations
PSY 304	Intergroup Dialogues
PSY 311	Environmental Psychology
PSY 350	Teamwork
PSY 352	Conflict Resolution: Violent and Nonviolent
RPTA 450	Resource and Grant Development
SOC 315	Global Race and Ethnic Relations
SOC 323	Social Stratification
SOC 355	Quantitative Research Methods
SOC 395	Sociology of Complex Organizations
STAT 313	Applied Experimental Design and Regression Models

STAT 321	Probability and Statistics for Engineers and Scientists
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SUPPORT COURSES

MATH 118	Precalculus Algebra (B4) ³	4
NR 306	Natural Resource Ecology and Habitat Management	4
or BIO 263	Introductory Ecology and Evolution	
or LA 220	Landscape Ecology: Concepts, Issues, and Interrelationships	

Select from the following: 4

POLS 316	Political Participation	
POLS 338	Critical Issues in American Politics	
POLS 340	American Judicial Politics	
POLS 341	American Constitutional Law	
POLS 343	Civil Rights in America	
POLS 349	Contemporary American Political Thought	
POLS 351	Public Policy and Administration	
POLS 375	California Politics	
POLS 471	Urban Politics	
STAT 217	Introduction to Statistical Concepts and Methods (GE Electives) ³	4
or STAT 218	Applied Statistics for the Life Sciences	

GENERAL EDUCATION (GE)

(See GE program requirements below.) 64

FREE ELECTIVES

Free Electives⁴ 0

Total units 180

- 1 Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- 2 If any of these courses are taken to meet a Major or Support requirement in the degree, it cannot be double-counted as an Approved Elective.
- 3 Required in Major or Support; also satisfies General Education (GE) requirement.
- 4 If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required, 8 of which are specified in Major and/or Support.
- If any of the remaining 64 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4

A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		
Total units		64

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

City and Regional Planning Minor

Required Courses

CRP 212	Introduction to Urban Planning	4
Select from the following:		
CRP 211	Cities: Form, Culture and Evolution	
CRP 213	Population, Housing and Economic Applications	
CRP 214	Land Use and Transportation Studies	

Approved Electives

Select from the following:		
CRP 215	Planning for and with Multiple Publics	19-20
CRP 303	Digital Cities	

CRP 314	Planning Theory	
CRP 325	Reflections on Biking, Walking and the City	
CRP 334	Cities in a Global World	
CRP 336	Introduction to Environmental Planning	
CRP 402	Contemporary Urban Design	
CRP 404	Environmental Law	
CRP 408	Water Resource Law and Policy	
CRP 412	Plan Implementation	
CRP 420	Land Use Law	
CRP 426	Planning Healthy Communities	
CRP 428	International Planning and Development	
CRP 430	Professional Planning Practice	
CRP 435	Transportation Theory	
CRP 440	Climate Action Planning	
CRP 442	Housing and Planning	
CRP 445	Planning and Urban Ecology	
CRP 446	Development Review and Entitlement	
CRP 448	Principles of Urban Design	
CRP 452	Community Design Methods	
CRP 455	Transportation Policy and Planning	
CRP 456	Web Technologies for Planning	
CRP 458	Hazard Mitigation Planning & Resilient Design	
CRP 470	Selected Advanced Topics	
CRP 545	Principles of Environmental Planning	
Total units		27-28

Master of City and Regional Planning Program Learning Objectives

After successfully completing the MCRP program, students will be able to:

Foundational skills

1. Demonstrate an understanding of the historical, theoretical, legal, and methodological foundations of planning
2. Effectively represent and communicate planning information

Methodology

1. Gather, organize, analyze and present planning information
2. Transform data and information into knowledge for action
3. Critically assess and apply scientific research

Integrative skills

1. Integrate and apply the necessary skills and knowledge to address complex planning problems
2. Develop and manage a planning process
3. Work with a variety of audiences: multiple publics, officials, and decision-makers

Professional skills

1. Reflect upon, critique, and evolve the practice of planning
2. Address issues of sustainability, diversity, and environmental and social justice
3. Practice in accordance with the AICP Code of Ethics

Required Courses

First Year		
CRP 501	Foundations of Cities and Planning	4
CRP 504	Sustainable Communities	4
CRP 510	Planning Theory	4
CRP 512	Introduction to Visual Communication and GIS	4
CRP 513	Planning Research and Analysis	4
CRP 516	Demographic and Analytic Tools	4
CRP 525	Plan Implementation	4
CRP 553	Project Planning and Design Studio	4

Second Year		
CRP 518	Policy Development	4
CRP 530	Planning Agency Management	4
CRP 535	Land Use and Planning Law	4
CRP 552	Community and Regional Planning Studio I	4
CRP 554	Community and Regional Planning Studio II	4

Select one of the following options:		4-6
CRP 556	Community and Regional Planning Studio III (4)	
CRP 596	Professional Project (2, 2, 2)	
CRP 599	Thesis (2, 2, 2)	

Advisor Approved Electives	
Additional 400 and 500-level courses, to be selected with graduate advisor's approval.	14-16

Total units 72

Specialization in Landscape and Urban Design

Required Courses

First Year		
CRP 501	Foundations of Cities and Planning	4
CRP 504	Sustainable Communities	4
CRP 510	Planning Theory	4
CRP 512	Introduction to Visual Communication and GIS	4
CRP 513	Planning Research and Analysis	4
CRP 516	Demographic and Analytic Tools	4
CRP 525	Plan Implementation	4
CRP 553	Project Planning and Design Studio	4

Second Year		
CRP 518	Policy Development	4
CRP 530	Planning Agency Management	4
CRP 535	Land Use and Planning Law	4
CRP 552	Community and Regional Planning Studio I	4

CRP 554	Community and Regional Planning Studio II	4
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Select one of the following options: 4-6

CRP 556	Community and Regional Planning Studio III	
CRP 596	Professional Project	
CRP 599	Thesis	

Required Specialization Courses

CRP 448	Principles of Urban Design	4
LA 520	Design with Cultural Landscapes	4
or LA 521	Ecological Urban Design	
LA 531	Information Graphics for Landscape and Urban Studies	4
or LA 538	Advanced GIS Application to Projects	

Advisor Approved Electives	
Electives	2-4

Total units 72

Specialization in Transportation Planning

Program Learning Objectives

1. Identify and articulate the range of issues and problems associated with urban transportation.
2. Identify the primary analytic methods used in urban transportation planning.
3. Identify the ranges of solutions and policy options used to address the problems and issues associated with urban transportation.
4. Identify and articulate the key issues that drive transportation policy.
5. Understand driver behavior, traffic characteristics, traffic operations, highway capacity and level of service, and operational considerations for the design of traffic facilities.
6. Articulate the interdependency between transportation and land use.
7. Develop travel demand forecasts and analyze transportation models.
8. Estimate the impacts of changes in land use and transportation infrastructure in terms of various performance measures.
9. Formulate a plan to achieve sustainability goals through transportation system planning

Required Courses

First Year		
CRP 501	Foundations of Cities and Planning	4
CRP 504	Sustainable Communities	4
CRP 510	Planning Theory	4
CRP 512	Introduction to Visual Communication and GIS	4
CRP 513	Planning Research and Analysis	4
CRP 516	Demographic and Analytic Tools	4
CRP 525	Plan Implementation	4
CRP 553	Project Planning and Design Studio	4

Second Year		
CRP 518	Policy Development	4
CRP 530	Planning Agency Management	4
CRP 535	Land Use and Planning Law	4

CRP 552	Community and Regional Planning Studio I	4
CRP 554	Community and Regional Planning Studio II	4
Select one of the following options:		4-6
CRP 556	Community and Regional Planning Studio III (4)	
CRP 596	Professional Project (2, 2, 2)	
CRP 599	Thesis (2, 2, 2)	
Required Specialization Courses		
CRP 435	Transportation Theory	4
CE 527	Sustainable Mobility	4
CE 523	Transportation Systems Planning	4
or CE 421	Traffic Engineering	
Advisor Approved Electives		
Electives		2-4
Total units		72

Construction Management

Building 186, Room A100

Phone: 805.756.1323

Department Head: Jeong Woo

<https://construction.calpoly.edu>

Academic Programs

Program name	Program type
Construction Management	BS, Minor
Cross Disciplinary Studies Minor in Heavy Civil	Minor
Real Property Development	Minor

The professional constructor plays the central role in building and maintaining the infrastructure of this country and in markets around the world, making significant contributions throughout the planning, design, construction, and facilities management phases of major projects. The curriculum of the Construction Management program is specifically designed to prepare young men and women to fill this essential role. Building on a solid foundation in architecture, engineering, and business, the curriculum introduces students to construction methods and materials; to the techniques used to manage budgets, schedules, quality, and safety; to the varied contracting approaches used to deliver today's complex construction projects; and to the leadership and teamwork skills demanded by this profession. This curricular content is delivered in a unique, project-based environment that explores how these management principles are applied in each of the construction sectors, such as, commercial building, residential, heavy/civil, industrial, and specialty.

The vision of the department is "Building Leaders through Collaboration and Innovation." As stated in our mission, "The Cal Poly Construction Management program builds innovative leaders in the construction industry". Based on this mission, the department is proud to embody the values of this polytechnic university which "promotes the application of theory to practice". We are committed to, believe in, and are faithful to continuously improving construction education by these core values:

- Project Based Learning
- Collaboration
- Learn by Doing
- Environmental Responsibility
- Diversity and Inclusion
- Service to communities, organizations, and societies
- Professionalism and Leadership
- Technology Integration
- Undergraduate Research
- Ethical Integrity
- Life-Long Stewardship of the CM department

Due to the department's close association with practitioners in the industry, many professional development opportunities are provided for our students. Over 200 companies per year recruit for internships, co-ops, and permanent job placements directly through the department. Through our Professional Advancement for Construction Students (PACS) program, students are systematically introduced to and encouraged to participate with the major associations and societies representing this industry. These opportunities include participation in the Associated Students of Construction Management (ASCM), which serves as the umbrella organization for many student professional chapters and clubs including AGC, ABC, CMAA, DBIA, NAHB, MCAA, NECA, Women

in Construction, Building Information Modeling, Emerging Green Professionals, and Sigma Lambda Chi, the national honorary society for construction students. Extensive interaction with industry brings practicing professionals into the classroom and students out to the jobsites of projects throughout the region. Finally, student participation in regional and national project management competitions gives our students the opportunity to test their knowledge and management skills against teams of students from other universities.

For both first time Freshmen and transfer students from community colleges, the Construction Management faculty and staff are committed to providing the best education possible for the future generation of leaders in the construction profession. These future constructors are educated in modern, state-of-the-art facilities utilizing the technology typical of the companies for whom they will work. They benefit from a unique, interdisciplinary program that has been accredited by the American Council for Construction Education (ACCE) since 1978. The program at Cal Poly remains one of the largest and most respected Construction Management programs in the United States.

Transfer Students

Transfer students are welcome in the Construction Management program and should contact the department for advising help with efficiently scheduling their graduation requirements. Most lower division courses may be completed at most California Community Colleges. Full time students who have successfully completed these lower division courses prior to transferring into the department can usually anticipate graduating in six or seven quarters. Transfer students should work closely with their assigned advisors before registering for classes every quarter to ensure efficient progress to degree.

Laptop Requirement

The department has a requirement that all students have a laptop computer. Most Construction Management classes emphasize cooperative projects/assignments, and a laptop computer provides the required mobility to facilitate collaboration. Most construction management software packages are designed to operate on a PC platform, so it is highly recommended that student laptop computers are loaded with the Windows operating system regardless of the manufacturer of the computer. See <https://construction.calpoly.edu/content/prospective/laptop-requirements> (<https://construction.calpoly.edu/content/prospective/laptop-requirements/>) for the current departmental laptop recommendations. Financial aid may be available to help cover the cost of the laptop computer - contact the Financial Aid Office (<http://financialaid.calpoly.edu/>) for more information.

Undergraduate Programs

BS Construction Management

The Construction Management Department is the only one of its kind housed in a college that includes all of the other planning and design professions that define the built environment: Architecture, Architectural Engineering, Landscape Architecture, and City and Regional Planning.

Construction Management Minor

The Construction Management Minor provides students with an introduction to the body of knowledge expected of persons pursuing careers in the construction industry. This minor focuses on the materials, means and methods which encompass the construction process.

The Construction Management Minor will give students a competitive edge when applying for certain jobs in the built environment and is recommended for majors in architecture, architectural engineering, business, civil engineering, mechanical engineering, and electrical engineering. Contact the department for more information.

Cross Disciplinary Studies Minor in Heavy Civil

The Heavy Civil Minor is designed to prepare Construction Management and Civil Engineering students for careers in the heavy civil sector of the construction industry. Graduates in this field will have careers in the heavy civil sector of the construction industry, where they will help manage heavy civil projects such as highways, bridges, dams, water treatment facilities, power plants, and other large-scale infrastructure throughout the US and the world.

This minor is intended for students in the CM and CEENV Departments and acceptance to the minor is competitive. Contact the departmental offices of either major for more information about the application process. Application is normally made during a student's second year of study at Cal Poly. Coursework will be completed in both departments leading to common upper division courses, two courses specific for the heavy civil minor, and a heavy civil internship required in the summer of the student's second or third year.

Real Property Development Minor

The department offers a Real Property Development Minor. Please see the College of Architecture and Environmental Design (p. 148) for more information.

BS Construction Management Program Learning Outcomes

1. Create written communications appropriate to the construction discipline.
2. Create oral presentations appropriate to the construction discipline.
3. Create a construction project safety plan.
4. Create construction project cost estimates.
5. Create construction project schedules.
6. Analyze professional decisions based on ethical principles.
7. Analyze construction documents for planning and management of construction processes.
8. Analyze methods, materials, and equipment used to construct projects.
9. Apply construction management skills as a member of a multidisciplinary team.
10. Apply electronic-based technology to manage the construction process.
11. Apply basic surveying techniques for construction layout and control.
12. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
13. Understand construction risk management.
14. Understand construction accounting and cost control.
15. Understand construction quality assurance and control.
16. Understand construction project control processes.
17. Understand the legal implications of contract, common, and regulatory law to manage a construction project.
18. Understand the basic principles of sustainable construction.
19. Understand the basic principles of structural behavior.
20. Understand the basic principles of mechanical, electrical and piping systems.
21. Understand the role construction managers play in enhancing the needs of society.
22. Understand the importance of creating and planning for continuing education and lifelong learning.
23. Understand the key leadership characteristics that are successful in building and strengthening construction management teams.
24. Understand the importance of recognizing cultural differences and the role culture plays in influencing project success for a construction team.
25. Understand the benefits of respecting the unique and diverse backgrounds individuals bring to a construction team.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

CM 102	Introduction to Construction Management	2
CM 113	Construction Materials and Assemblies	2
CM 114	Construction Materials and Assemblies Lab	2
CM 115	Fundamentals of Construction Management	6
CM 214	Residential Construction Management	5
CM 232	Evaluation of Cost Alternatives	3
CM 280	Building Information Modeling	2
CM 313	Commercial Construction Management	5
CM 314	Heavy Civil Construction Management	5
CM 317	Sustainability and the Built Environment (Upper-Division B) ¹	4
CM 318	Housing and Communities (Upper-Division D) ¹	4
CM 334	Construction Law	2
CM 335	Construction Accounting	2
CM 411	Specialty Contracting Construction Management	5
CM 413	Jobsite Construction Management	5

CM 443	Management of the Construction Firm	3
CM 450	Integrated Project, Design and Program Management	5
CM 460	Senior Project Methodology	2
CM 461	Senior Project I	1
CM 462	Senior Project II	1

Technical Electives

Select from the following:		8
CE 413	Advanced Civil Computer-Aided Site Design	
CE 429	Highway Pavement Designs	
CE 474	Environmental Compliance and Permitting	
CM 420	Service / Experiential Learning	
CM 421	Emerging Trends	
CM 422	Professional Preparation	
CM 423	Construction Materials / Assemblies	
CM 424	Construction Technology	
CM 425	Sustainability and Environment	
CM 426	International Construction Studies	
CM 475	Real Property Development Principles	
CM 485	Cooperative Education Experience (6 units maximum)	

SUPPORT COURSES

Select from the following:		6
ARCE 211 & ARCE 212	Structures I and Structures II (3, 3)	
ME 211 & CE 204	Engineering Statics and Mechanics of Materials I (3, 3)	
ARCE 226	Introduction to Structural Systems	3
ARCE 315	Introduction to Structural Design	4
ARCE 421	Soil Mechanics	3
BRAE 239 or CM 239	Engineering Surveying / Construction Surveying	4
BUS 207	Legal Responsibilities of Business	4
BUS 212 or BUS 214	Financial Accounting for Nonbusiness Majors / Financial Accounting	4
BUS 215	Managerial Accounting	4
ECON 201	Survey of Economics (D2) ¹	4
EDES 123	Principles of Environmental Design (E) ¹	4
ENGL 310	Corporate Communication (GWR)	4
GEOL 201	Physical Geology	3
MATH 141	Calculus I (B4) ¹	4
MATH 182	Calculus for Architecture and Construction Management (GE Electives) ^{1,2}	4
PHYS 141	General Physics I	4
Select from the following:		4
PHYS 142	General Physics II (B1 & B3) ¹	
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ¹	

CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ¹	
STAT 251 or STAT 312	Statistical Inference for Management I / Statistical Methods for Engineers	4

Select any upper-division (300-400 level) BUS, ECON, ITP course 4

GENERAL EDUCATION (GE)		
(See GE program requirements below.)		44

FREE ELECTIVES		
Free Electives		0

Total units 189

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² MATH 142 Calculus II substitutes for MATH 182.

General Education (GE) Requirements

- 72 units required, 28 of which are specified in Major and/or Support.
- If any of the remaining 44 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	

D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Support) ¹	0
Upper-Division D (4 units in Major) ¹		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Support) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		44

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Construction Management Minor

Required Courses

CM 102	Introduction to Construction Management	2
CM 113	Construction Materials and Assemblies	2
CM 114	Construction Materials and Assemblies Lab	2
CM 115	Fundamentals of Construction Management ¹	4-6
or CM 371	Construction Management and Project Planning	
CM 310	Construction Means and Methods	4
Select from the following (at least 4 units must be at the 300-400 level): ²		10
CM 232	Evaluation of Cost Alternatives	
CM 280	Building Information Modeling	
CM 317	Sustainability and the Built Environment	
CM 334	Construction Law	
CM 335	Construction Accounting	
CM 420	Service / Experiential Learning ²	
CM 421	Emerging Trends ²	
CM 422	Professional Preparation ²	
CM 423	Construction Materials / Assemblies ²	
CM 424	Construction Technology ²	
CM 425	Sustainability and Environment ²	
CM 426	International Construction Studies ²	
CM 485	Cooperative Education Experience (3 units maximum)	
Total units		24-26

¹ Students who complete this requirement with CM 115 need to take at least 9 units of 300-400 level courses in electives.

² Course availability varies from quarter to quarter.

Cross Disciplinary Studies Minor in Heavy Civil

Select from the following: 4-6

CM 113 & CM 114	Construction Materials and Assemblies and Construction Materials and Assemblies Lab	
CE 259 & CM 310	Civil Engineering Materials and Construction Means and Methods	

Select from the following: 6

CM 115	Fundamentals of Construction Management	
CE/CM 371 & CE 113	Construction Management and Project Planning and Computer Aided Drafting in Civil Engineering	

BRAE 239 or CM 239 Engineering Surveying Construction Surveying 4

CE 222 Introductory Experiments in Transportation Engineering 1

CM 232 Evaluation of Cost Alternatives 3

CM 314 Heavy Civil Construction Management 5

CE 321 Fundamentals of Transportation Engineering 3

CE 413 Advanced Civil Computer-Aided Site Design 2

CE 429 Highway Pavement Designs 4

CE 474 Environmental Compliance and Permitting 2

CM 280 Building Information Modeling 2

CE/CM 436 Heavy Civil Temporary Structures and Shoring 4

CE/CM 437 Heavy Civil Projects and Equipment 4

CM 422 Professional Preparation or CM 485 Cooperative Education Experience 3

Total units 47-49

Landscape Architecture

Dexter Bldg.(34), Room 251
Phone: 805.756.1319
<https://landscape.calpoly.edu>

Department Head: Beverly Bass

Academic Program

Program name	Program type
Landscape Architecture	BLA, Minor

The profession of landscape architecture is primarily involved with the design, planning, and protection of the natural and developed environments. The five-year program in landscape architecture is accredited by the Landscape Architectural Accreditation Board and recognized by the Landscape Architects Technical Committee of the California Board of Architectural Examiners.

An emphasis is placed on a process oriented approach to design and planning while developing an awareness and sensitivity to community and human values as they relate to environmental conditions. Students majoring in landscape architecture acquire technical competencies and creative design skills through a range of projects which represent the breadth of the profession.

Graduates of the program are prepared for positions in private practice, consulting, governmental agencies at the national, state or local levels, industry and construction firms. Graduate study is encouraged for those students interested in pursuing advanced studies or academic positions.

Majors who are in their last two years of study and have at least a 3.2 grade point average may have the opportunity to join Theta Chapter of Sigma Lambda Alpha, the national scholastic honor society for landscape architecture.

Laptop Requirement

The department has a requirement that all freshmen or transfer students have a notebook computer when they enter the program. In the profession of landscape architecture, computing is an integral component, and developing the ability to critically integrate hand and digital tools is a fundamental aspect of landscape architecture education. A notebook computer is the key to having computing capabilities available at all times and all locations. Financial aid may be available to cover the cost of the notebook computer (contact the Financial Aid Office (<http://financialaid.calpoly.edu/>) for more information).

Undergraduate Program Bachelor of Landscape Architecture

The five-year program in landscape architecture is accredited by the Landscape Architectural Accreditation Board and recognized by the Landscape Architects Technical Committee of the California Board of Architectural Examiners. The program offers transfer students an accelerated curriculum to speed their time to graduation while fulfilling degree requirements. Contact the department for more information.

Landscape Architecture Minor

This minor is designed for students who want to expand their knowledge of the role landscape architecture plays in the planning,

conceptualization, and design of the natural and built environment. The program is structured to expose students to issues facing our society on global and local levels while reinforcing concepts of sustainability. From the perspective of landscape architecture, students will have the opportunity to either explore a variety of environmental issues or examine a specific topic area in greater depth. They will gain a clearer understanding of the interdisciplinary contributions, and leadership role that landscape architects take in addressing societal and environmental concerns.

Bachelor of Landscape Architecture Program Learning Objectives

1. Integrate natural and cultural systems in projects at multiple scales.
2. Incorporate sustainable practices throughout the design, planning and implementation process.
3. Comprehend and demonstrate the relationships among analysis, concept development, design development, and implementation.
4. Apply critical thinking and analytical problem solving throughout planning, design and implementation.
5. Demonstrate knowledge of theory, history and contemporary practices of landscape architecture.
6. Apply professional communication skills including written, oral, graphic and digital formats.
7. Identify the role of landscape architects in professional interdisciplinary settings.
8. Apply technical skills in site engineering, material explorations and detailing, construction documents, plant materials, and planting design.
9. Apply professional standards, ethics and practices in the field of landscape architecture.
10. Integrate diversity, equity, and inclusion into landscape architecture related projects.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

LA 101	Introduction to Landscape Architecture	4
LA 170	Principles of Design Communication	4
LA 171	Principles of Digital Communication	4
LA 202	Design Fundamentals I	4
LA 203	Design Fundamentals II	4
LA 204	Design Fundamentals III	4

LA 211	History of Landscape Architecture: Ancient Civilizations through Colonial America (C1) ¹	4	LA 438	GIS Application to Design Projects (ILC)	
LA 212	History of Modern and Contemporary Landscape Architecture (GE Electives) ¹	4	LA 439	Planting Design (ILC)	
LA 220	Landscape Ecology: Concepts, Issues, and Interrelationships	4	LA 461	Senior Design Project Focus Studio (4,4)	8
LA 221	California Plants and Plant Communities	4	LA upper-division electives (300-500 level) ^{3,4}		6
or PLSC 381	Native Plants for California Landscapes		SUPPORT COURSES		
LA 241	Site Engineering Techniques and Applications	4	BOT 121	General Botany (B2 & B3) ¹	4
LA 242	Implementation Strategies	4	or BIO 114	Plant Diversity and Ecology	
LA 243	Materials and Techniques of Landscape Construction	4	CRP 212	Introduction to Urban Planning	4
LA 320	Design Theory for Landscape Architects	4	EDES 123	Principles of Environmental Design (E) ^{1,5}	4
LA 330	Cultural Landscapes: People, Places and Ethical Decisions	4	MATH 118	Precalculus Algebra (B4) ¹	4
LA 349	Advanced Planting Design	4	MATH 119	Precalculus Trigonometry (GE Electives) ¹	4
LA 370	Professional Practice	4	PLSC 233	Plant Materials I	4
LA 371	Internship	3	PLSC 234	Plant Materials II	4
LA 401	Research Project	2	Select from the following:		8
LA 402	Design Theory and Exploration Focus Studio	4	BIO 227	Wildlife Conservation Biology	
LA 403	Natural Environments Design Focus Studio	4	BRAE 337	Landscape Irrigation	
LA 404	Cultural Environments Design Focus Studio	4	SS 120	Introductory Soil Science	
LA 405	Project Design and Implementation Focus Studio	4	STAT 217	Introduction to Statistical Concepts and Methods	
Select from the following:		4	or STAT 218	Applied Statistics for the Life Sciences	
LA 402	Design Theory and Exploration Focus Studio		Professional Electives ⁴		8
LA 403	Natural Environments Design Focus Studio		GENERAL EDUCATION (GE)		
LA 404	Cultural Environments Design Focus Studio		(See GE program requirements below.)		
LA 405	Project Design and Implementation Focus Studio		FREE ELECTIVES		
LA 406	Interdisciplinary Design Studio		Free Electives ⁶		
Integrated Learning Course (ILC) topics			Total units		
Select from the following: ²		20	219		
LA 431	CAD and Digital Media Communications (ILC)		¹ Required in Major or Support; also satisfies General Education (GE) requirement.		
LA 432	Landscape Ecology Applications (ILC)		² At least three (3) different Integrated Learning Courses must be chosen. (ILCs are repeatable to 12 units).		
LA 433	Cultural Environments (ILC)		³ At least 4 units must be either LA 350 or any LA 400-500 level course.		
LA 434	Project Design and Implementation (ILC)		⁴ May include any course in: College of Architecture and Environmental Design; Art and Design Department; TH 330; any minor in the College of Architecture and Environmental Design.		
LA 435	Professional Practice (ILC)		⁵ May substitute 4 units of any GE Lower-Division E course.		
LA 436	Traditional and Digital Media Communications (ILC)		⁶ If General Education (GE) courses is used to satisfy a Major or Support requirements, additional units of Free Electives may be needed to complete the total units required for the degree.		
LA 437	3D Digital Design Communications (ILC)				

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater (4 units in Major) ¹	0
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Support) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (8 units in GE Electives fulfilled by 4 units in Major and 4 units in Support) ¹		0
Total units		48

LA 330	Cultural Landscapes: People, Places and Ethical Decisions	4
Approved Electives ¹		
Select from the following:		12
ARCH 445	Urban Design in Architecture	
BRAE 337	Landscape Irrigation	
BRAE 345	Aerial Photogrammetry and Remote Sensing	
EDES 350	The Global Environment	
EDES 406	Sustainable Environments	
LA 320	Design Theory for Landscape Architects	
LA 370	Professional Practice	
LA 400	Special Problems for Advanced Undergraduates	
LA 432	Landscape Ecology Applications (ILC)	
LA 433	Cultural Environments (ILC)	
LA 435	Professional Practice (ILC)	
NR 306	Natural Resource Ecology and Habitat Management	
NR 323	Human Dimensions in Natural Resources Management	
NR/CRP 408	Water Resource Law and Policy	
PLSC 381	Native Plants for California Landscapes	
PLSC 437	Park and Public Space Management	
Total units		28

¹ Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Landscape Architecture Minor

Required Courses

LA 101	Introduction to Landscape Architecture	4
LA 212	History of Modern and Contemporary Landscape Architecture	4
LA 220	Landscape Ecology: Concepts, Issues, and Interrelationships	4

Orfalea College of Business

Business Bldg. (03), Room 455
Phone: 805.756.2705
<https://www.cob.calpoly.edu/>

Dean: Damon Fleming
Interim Associate Dean: Stern Neill
Assistant Dean: Amy Carter
Assistant Dean, Advancement: Mary Kelting

Academic Programs

Program name	Program type
Accounting	Minor
Business Administration	BS, MBA
Business Analytics	MS
Economics	BS, Minor
Entrepreneurship	Minor
Industrial Technology	Minor
Industrial Technology and Packaging	BS
Packaging	Minor
Packaging Value Chain	MS
Quantitative Economics	MS
Sales	Minor
Taxation	MS

Mission Statement

We prepare career-ready, global business leaders through hands-on discovery and application.

The BS degree program and the graduate programs in Business Administration are accredited by the AACSB—The International Association to Advance Collegiate Schools of Business. The BS degree program in Industrial Technology and Packaging is accredited by the Association of Technology, Management, and Applied Engineering (ATMAE). The objective of accreditation is to foster high-quality educational programs.

The college's educational philosophy follows the Cal Poly tradition—that of enlisting maximum student involvement in the learning process through case analysis, special projects, internships, computer simulations and other learn by doing exercises. The college has state-of-the-art computer facilities which are available to students to meet their coursework needs. Educational programs are designed to challenge highly motivated students to become tomorrow's socially responsible business leaders through a learn-by-doing technology-oriented education. The curricula include general education requirements and specialized studies in the student's major field. Optional areas of concentration within each major enable the student to select the program most closely suited to the chosen career field.

The college is organized into six areas:

- Accounting and Business Law
- Economics
- Finance
- Industrial Technology and Packaging

- Marketing
- Management, Human Resources, and Information Systems

This organizational structure allows for programs of study that blend broad-based knowledge of the functional disciplines of Business and Economics with an in-depth study of particular discipline(s).

Accounting and Business Law

Business Bldg. (03), Room 403
Phone: 805.756.1543

Area Chair: Li Dang

Accounting provides information for making informed business decisions by decision makers both external and internal to the firm. The Accounting and Business Law Area works closely with the accounting profession to help ensure curriculum relevancy and technical competency.

Economics Area

Business Bldg. (03), Room 407
Phone: 805.756.2783

Area Chair: Aric Shafran

The mission of the economics program is to educate students in the models and problem-solving tools of economics. The Economics Area offers a bachelor of science degree, a master of science degree, and a minor in Economics.

Finance Area

Business Bldg. (03), Room 407
Phone: 805.756.1472

Area Chair: Ziemowit Bednarek

The Finance Area offers the Financial Management (FM) concentration which provides a rigorous, coherent, real-world-based, and up-to-date curriculum to prepare students for rewarding careers. The FM students gain in-depth knowledge of Fixed Income Securities (Bond Markets), Security Analysis and Portfolio Management (Equity and Derivative Markets), Corporate Finance (Mergers and Acquisitions and Initial Public Offerings), Alternative Investments (Foreign Exchange, Commodities and Real Estate), and Quantitative Methods.

Finance classes are taught in the **Financial Analysis Resource Center**, a special-purpose classroom with data terminals, and real time display of stock prices. The computers are equipped with financial data and software, which permits students to work on real-world problems - individually and in teams.

Finance students have outstanding internship and senior project opportunities, including the ability to pursue the Chartered Financial Analyst (CFA) designation; the ability to participate in the Student Managed Portfolio Project, where they assume an active role in investing Cal Poly Corporation endowment funds; and the opportunity to intern with major corporations, investment banks, and money management firms. Our graduates pursue careers in Financial Services, Corporate Finance, and as Financial Analysts, working for investment banks, brokerage firms, the asset management industry, the real estate industry, consulting firms, and other facets of business.

Industrial Technology and Packaging Area

Business Bldg. (03), Room 405

Phone: 805.756.2676

Area Chair: Javier de la Fuente

The Industrial Technology Area offers a bachelor of science degree in Industrial Technology and Packaging, with concentrations in Industrial Technology, and Packaging, and minors in Industrial Technology and in Packaging. IT is also the administrative home for the interdisciplinary Entrepreneurship concentration and minor, and the Consumer Packaging Solutions concentration.

Management, Human Resources, and Information Systems Area

Business Bldg. (03), Room 405
Phone: 805.756.2012

Area Chair: Leida Chen

The Management, Human Resources, and Information Systems Area's goals are fourfold:

1. to provide students with management theories, strategies, and practices essential for understanding how modern organizations operate and succeed in a complex and global environment,
2. to introduce students to the information technologies that enable the success of critical business processes and enhance worker creativity and productivity,
3. to engage students in learning about team dynamics and team leadership, and
4. to prepare our graduates, through a focus on experiential learning, for rewarding careers in a myriad of industries.

The Management, Human Resources, and Information Systems Area offers all business students coursework in organizational behavior, information systems, international management, and business strategy. We offer concentration specific courses in both of the concentrations that are housed in the Management, Human Resources, and Information Systems Area: (1) Management and Human Resources, and (2) Information Systems.

Marketing Area

Business Bldg. (03), Room 403
Phone: 805.756.1543

Area Chair: Jeff Hess

The Marketing Area offers the Marketing Management concentration which cultivates agile marketers, who integrate data analytics, critical thinking and creativity. The curriculum is a conscious balance among the technical rigors of data, the nuance of creative strategy, and the finesse of customer relationship management. Students engage in hands-on projects that provide experience and confidence. From market research to communications strategies, students have opportunities to provide data-driven guidance and creative solutions to local startups, Cal Poly organizations, and the community.

As a discipline with broad applications, the Marketing Management concentration offers flexible career paths and work styles. Graduates are in demand for positions in market research and analytics; business development and sales; and marketing communications, advertising, digital and product marketing.

Orfalea Student Services

Business Bldg. (03), Room 100

Phone: 805.756.2601

<https://newscully.cob.calpoly.edu/studentservices/>

Mission Statement

Orfalea Student Services empowers future global business leaders to forge their unique path to success. We cultivate a dynamic and inclusive environment that supports student needs through advising, mentoring, and connection to industry. We deliver comprehensive programming that encourages exploration, leadership, and exposure beyond the classroom, resulting in career ready graduates who add value to their communities and industry.

Services Provided

- Professional Advisors that provide advising and counseling addressing areas of personal, academic, and career success
- Peer Advisors that provide assistance with progress to degree, study abroad, change of major and other administrative issues
- Peer Tutors
- Peer, Young Alumni, and Executive Mentors
- Career readiness programs and initiatives, including career coaching, and connection with employers and industry
- BUS 100 (Student Orientation & College Success)
- Enrollment management
- Student scholarships and grants
- Orfalea OutREACH, a Faculty & Staff student referral system
- Diversity & Inclusivity initiatives, including the Multicultural Business Program
- Ambassadors, who provide prospective student and executive tours
- International student support
- Quarterly workshops, events and programs focused on student success

Transfer Students

Transfer students to the Orfalea College of Business should refer to the curricula listed for the appropriate major. Please note that all lower division courses may be completed at most California Community Colleges. Full time students who have successfully completed all lower division courses prior to transferring to the College of Business can usually anticipate graduating in six quarters. Admitted transfer students should seek immediate advising assistance from Orfalea Student Services.

BS Business Administration

The undergraduate business program provides students with the knowledge and the analytical skills essential for employment in all sectors of business, industry, governmental and non-profit organizations. Graduates of the business program will understand the fundamentals of how a successful enterprise operates, and will have sufficient depth in an area of study to begin a successful career by providing immediate value to an organization.

The Orfalea College of Business engages in a comprehensive assessment plan to ensure student achievement of these objectives.

The Business Administration degree program consists of five components: Major, Concentration, Support, General Education, and Electives.

Concentrations

Students may choose from the following concentrations:

- Accounting Concentration
- Consumer Packaging Concentration
- Entrepreneurship Concentration
- Financial Management Concentration
- Information Systems Concentration
- Management and Human Resources Concentration
- Marketing Management Concentration
- Real Estate Finance Concentration
- Quantitative Analysis Concentration

BS Economics

Economics is the study of how people choose to use resources.

Economics is a way of thinking, and students can apply this way of thinking to nearly any aspect of the world. The undergraduate curriculum in economics is designed to:

- provide a firm grounding in modern economic theory;
- instill the capacity for independent thought about economic policies and problems;
- develop the capacity for quantitative research, and
- provide basic descriptive knowledge about the US and the world economy.

An undergraduate major in economics opens many possibilities for employment. Many large firms, including banks, other financial institutions, and manufacturing companies, accept economists in substantial numbers. There are also many opportunities for employment in government at the state, federal, or international levels. In addition, a growing number of research and consulting firms employ large numbers of economists in such areas as forecasting, industry analysis, and litigation.

An undergraduate economics training also provides excellent preparation for business school, the study of law, or for pursuing doctoral studies in economics, business and public policy.

Concentrations

Students may elect to complete curriculum in General Economics or choose from the following concentrations:

- Accounting Concentration
- Consumer Packaging Concentration
- Entrepreneurship Concentration
- Financial Management Concentration
- Information Systems Concentration
- Management and Human Resources Concentration
- Marketing Management Concentration
- Real Estate Finance Concentration
- Quantitative Analysis Concentration

BS Industrial Technology and Packaging

The Industrial Technology and Packaging program incorporates a broad range of technical skills and business management to prepare individuals for positions in technology management or as entrepreneurs.

The curriculum is particularly suited for careers that involve working with people and technology. The collaborative, project-based classes/laboratories create well-rounded, problem solving graduates that would be successful and quickly functional in a variety of industries including manufacturing and packaging. Students develop a strong foundation in science, liberal arts, business and management disciplines; a technical core including industrial power systems, materials and processes, quality management, lean six sigma, safety management, packaging, and product development. The curriculum includes extensive hands-on coursework in two concentrations: Industrial Technology and Packaging Technology. The Industrial Technology concentration offers courses pertinent to general operations management, supply chain management and lean processes, while the Packaging Technology concentration offers specialized courses in design and testing of packaging products and systems.

Concentrations

- Industrial Technology Concentration
- Packaging Technology Concentration

Accounting Minor

The minor is designed to provide students from other majors a basic foundation in accounting. Upon successful completion of the minor, students will have coursework that can be applied towards the requirements for licensure as a Certified Public Accountant in California and most other states. Students wishing to pursue such licensure are encouraged to pursue a Master of Science in Accounting or a Master of Science in Taxation upon completion of their undergraduate education.

Students applying to the minor must be at sophomore level standing with a minimum GPA of 3.0. Acceptance into the Accounting minor is not guaranteed and capacity is limited. The Accounting Area will select only the most qualified applicants with an interest in pursuing licensure. Not open to Business and Economics majors.

Economics Minor

This minor is designed to give students from other majors a general competency in economics. Students are encouraged to meet with the advisor of the Economics Minor to develop a course of study that complements their major curriculum. For more information, contact the Economics Area office.

Entrepreneurship Minor

The goal of the Entrepreneurship minor is to empower students to create economic and social value in any discipline. Students in the Entrepreneurship minor will acquire the tools, develop the skills, and cultivate the mindset of an entrepreneur. This minor comprises a set of courses chosen to provide a balanced and interdisciplinary approach to entrepreneurship. While the Entrepreneurship minor is open to students from all colleges, it is not open to Business Administration or Economics majors, since those majors are able to choose an Entrepreneurship concentration. There is an application process and students must be in good standing in their majors.

Industrial Technology Minor

The Industrial Technology minor offers a choice of courses in technology, design, operations, quality, and supply chain for non-Industrial

Technology and Packaging majors. These courses provide supplemental knowledge and skills for non-technical majors who wish to obtain a position related to operations in a company.

Packaging Minor

The purpose of this interdisciplinary minor is to complement the non-Industrial Technology and Packaging majors with a planned curriculum in packaging. The program is designed to capitalize on theories and skills learned in other disciplines thereby uniquely preparing students for success as packaging professionals in positions ranging from highly technical research and development through purchasing, production, sales and management.

Students gain the skills needed for the design of package forms and graphics, the specifications of materials and machinery to be used, the evaluation of package systems, as well as the planning and coordinating of packaging requirements. These specialized skills result from an integration of knowledge gained through the packaging curriculum with that of the major discipline. A significant understanding of packaging issues and their impact on the industry is also gained.

Sales Minor

Through the Sales minor, students learn how to build and maintain business relationships, sell, manage, and lead. Students develop important career building connections through mentors, internships and a practicum to receive the knowledge and experience necessary to succeed in their career. The program is open to all Cal Poly undergraduate majors.

Graduate Programs

Master of Business Administration

Business Bldg. (03), Room 409
Phone: 805.756.2637
cobgmp@calpoly.edu
<https://gradbusiness.calpoly.edu/>

Program Director: Beena Khurana

Programs of Study/Specializations Available

MBA - General Management Specialization
MBA - Graphic Communication Document Systems Management Specialization

Architecture or Landscape Architecture Pathway

This pathway is only available to students who are enrolled in Cal Poly's Bachelor of Architecture (BArch) program or Bachelor of Landscape Architecture (BLA) program. Students may request permission to enroll in MBA courses during their fifth/final year of study. Upon completion of the BArch or BLA degree, students are eligible to formally apply for admission to the MBA program. Students who fulfill all the requirements first receive their bachelor's degree and then the MBA. Contact the Graduate Programs Office in the Orfalea College of Business for additional information.

Option to Simultaneously Pursue MBA & Another Master's Degree

The Orfalea College of Business permits students to develop an individualized program of study that incorporates the required elements

of two distinct Cal Poly graduate degree programs. This option offers graduate students the opportunity to simultaneously pursue an MBA degree in the Orfalea College of Business and a Master's Degree in any one of Cal Poly's other colleges.

To participate in this option, students must apply to, meet the qualifications for, and be accepted into each program independently. Students must first apply for formal admission to one specific Cal Poly graduate program such as the MBA program. After enrollment in a specific graduate program, the student must apply to, meet the qualifications for, and be accepted into the second program. The two degrees must be awarded in the same quarter.

General Characteristics

Cal Poly's MBA programs are designed to prepare students to enter successful management positions in industry, government, and not-for-profit organizations. The programs give graduates a broad management foundation. Cal Poly's MBA programs are 60 to 64 units in length, depending on specialization, and consist of core courses and elective courses.

Tuition and Fees

The MBA programs have separate professional fees associated with them. Please see Financial Aid (<https://www.calpoly.edu/financial-aid/costs-and-affordability/>) for more information.

Admission/Acceptance Requirements

Admission to the MBA programs is based upon:

- successful completion of an accredited undergraduate program of study
- prior academic performance
- Graduate Management Admission Test (GMAT) or Graduate Records Examination general test (GRE) scores, with particular emphasis on performance on the quantitative portion
- prior work experience (desirable).

Culminating Experience

In order to satisfy the culminating experience requirement, students must satisfactorily pass a comprehensive examination.

PROGRAMS OF STUDY

MBA – General Management Specialization

This program allows students to take electives of particular interest that fit their specific needs or career objectives. The program consists of 36-quarter-units of required courses with the remaining elective units selected from a focused group of advanced courses.

MBA - Graphic Communication Document Systems Management Specialization

This specialization is offered in conjunction with the Graphic Communication Department in the College of Liberal Arts, and is designed for those interested in graphic communication-related management careers. The program, focused on document systems management, contains a strong research component, including research assignments relevant to an individual company and the document

industry as a whole. Students participate in research and development projects for the Graphic Communication Institute at Cal Poly.

MS Business Analytics

Business Bldg. (03), Room 409
Phone: 805.756.2637
cobgmp@calpoly.edu
<https://gradbusiness.calpoly.edu/>

Program Director: Brennan Davis

General Characteristics

The MS in Business Analytics is a comprehensive interdisciplinary business degree program that encompasses economics, statistics, cloud computing, ethics, marketing, human resources, and information systems. The program offers a holistic approach to data analytics, combining qualitative reasoning with quantitative tools to identify key business problems and translate data analytics into decisions that improve business performance. Students will acquire broad training in all aspects of business analytics with particular emphasis on industry projects, statistical modeling, and communication. Students will work on collaborative industry projects to engage with real-world problems, and gain valuable experience working for a client in a team. Program may be offered in a classroom-based or hybrid format.

Tuition and Fees

The MS Business Analytics program is offered through Extended Education. As such, the program carries a separate tuition and fee schedule available in the Office of the Associate Dean, Orfalea College of Business.

Admission/Acceptance Requirements

To qualify for admission to a Master's program, you must meet the Cal Poly university admission requirements for graduate standing, which are described in the Graduate Education (p. 431) section of the Cal Poly Catalog, as well as professional, personal, scholastic, and other standards as prescribed by the program. The program-specific requirements for admission are as follows:

- Official transcripts of all course work
- Competitive GMAT or GRE score (valid for five years)
- Statement of purpose
- Two letters of recommendation
- Completion of GSB 512 Quantitative Analysis with a grade of B or better, or:
 - Completion of at least two undergraduate college-level courses in statistics
 - Completion of at least one undergraduate college-level course in calculus
- Applicants whose native language is not English must have taken TOEFL within the last two years with a minimum score of 550 (paper version) and 213 (computerized version) or 80 (internet based). The TOEFL requirement is waived for certain applicants; see https://admissions.calpoly.edu/applicants/international/toefl_ielts.html for details.

Culminating Experience

The culminating experience for the MSBA program takes the form of a collaborative industry project, in which students synthesize ideas and

techniques learned throughout the program, and apply these to a real business challenge. Each student's completed project is evaluated by a three-member faculty panel, in consultation with industry partners and program administration, to complete this requirement.

MS Packaging Value Chain

Business Bldg. (03), Room 409
Phone: 805.756.2637
cobgmp@calpoly.edu
<https://gradbusiness.calpoly.edu/>

Program Director: Jay Singh

General Characteristics

The MS in Packaging Value Chain program is a fully online, interdisciplinary degree program that encompasses packaging science, design, marketing, finance, supply chain, operations and statistics. The focus of the program is to present how the package can be used to create value addition and includes courses that build on each other towards a holistic understanding of the global packaging diaspora. The program develops competencies in essential packaging abilities and related business acumen, promotes transference of learning to the workplace for professionals, and provides opportunities for leadership roles.

Recent bachelor's degree graduates in packaging or related disciplines can also seek to significantly enhance their learning towards a high-order perspective of packaging's impact across the global value chains.

Tuition and Fees

The MS Packaging Value Chain program is offered through Extended Education. As such, the program carries a separate tuition and fee schedule available in the Office of the Associate Dean, Orfalea College of Business.

Admission/Acceptance Requirements

To qualify for admission to a Master's program, you must meet the Cal Poly university admission requirements for graduate standing, which are described in the Graduate Education (p. 431) section of the Cal Poly Catalog, as well as professional, personal, scholastic and other standards as prescribed by the program. The program specific requirements for admission to the MS Packaging Value Chain program must be submitted via the Cal Poly Graduate Education (<http://www.grad.calpoly.edu/>) website and are as follows:

- Completion of a bachelor's degree in packaging or a related field from an accredited college or university
- Official transcripts of all course work
- Statement of purpose
- Two letters of recommendation
- Completion of at least two college level courses in physics, chemistry (including organic chemistry), and statistics
- Completion of at least one college level course in calculus
- Applicants whose native language is not English must have taken TOEFL within the last two years with a minimum score of 550 (paper version) and 213 (computerized version) or 80 (internet based). The TOEFL requirement is waived for certain applicants; see https://admissions.calpoly.edu/applicants/international/toefl_ielts.html for details.

Culminating Experience

The Applied Industry Project course, completed during the last quarter of the program, will provide students with the opportunity to synthesize the ideas and methods they have learned over the duration of the MS Packaging Value Chain program, fulfilling the requirements for a culminating experience as specified in the California Code of Regulations.

MS Quantitative Economics

Business Bldg. (03), Room 409
Phone: 805.756.2637
cobgmp@calpoly.edu
<https://gradbusiness.calpoly.edu/>

Program Director: Steve Hamilton

General Characteristics

The master of science degree program in economics is a full-time, four-quarter program designed to provide advanced preparation in econometrics and applied microeconomics for individuals desiring careers as economists or data analysts in the business, financial, or government sectors. The program provides the technical skills required to engage in economic analyses that involve economic modeling, forecasting, numerical optimization, and data analysis.

Tuition and Fees

The MS Economics program is offered through Extended Education. As such, the program carries a separate tuition and fee schedule available in the Office of the Associate Dean, Orfalea College of Business.

Admission/Acceptance Requirements

For admission to the program with a classified or conditionally classified status, a student should hold a bachelor's degree from an accredited institution with a minimum grade point average of 2.5 in the last 90 quarter units (60 semester units) attempted and have completed coursework in intermediate microeconomics, intermediate macroeconomics, econometrics, calculus, and statistics. Applicants are required to submit scores for the General Test of the Graduate Record Examination. An applicant who meets these standards but lacks the prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies before advancement to classified graduate standing.

Culminating Experience

Students are required to pass a written comprehensive exam in economics.

MS Taxation

Business Bldg. (03), Room 409
Phone: 805.756.2637
cobgmp@calpoly.edu
<https://gradbusiness.calpoly.edu/>

Program Director: Rodney P. Mock

General Characteristics

The Master of Science in Taxation at Cal Poly is recognized by the accounting firms as one of the elite programs in taxation. The program is a one-year, full-time comprehensive program, that covers a broad range

of specialized tax curriculum; such as, partnership taxation, corporate taxation, state and local taxation, international tax and tax research. The degree program provides students with the opportunity to learn from nationally recognized tax scholars, major industry players and seasoned tax practitioners. Students graduating from the masters are highly sought after by recruiters, and are promoted early in public accounting, government and industry as a result of their tax expertise. The program satisfies CPA accounting study requirements in the state of California.

Winter quarter requires an internship for class credit, where students engage in learn-by-doing at the accounting firms on sophisticated tax transactions.

Tuition and Fees

The MS Taxation program is offered through Extended Education. As such, the program carries a separate tuition and fee schedule available in the Office of the Associate Dean, Orfalea College of Business.

Admission/Acceptance Requirements

Acceptance to the program is based upon an applicant's:

- submission of an application for graduate admission via <https://calstate.edu/apply> (<https://calstate.edu/apply/>),
- successful completion of an accredited undergraduate program of study and (i) four (4) quarter units in federal taxation *and* (ii) eight (8) quarter units in accounting or two (2) years of equivalent experience in accounting,
- prior academic performance with particular emphasis placed on performance during the last 90 graded quarter units completed prior to application (or equivalent)

Culminating Experience

All students are required to pass a comprehensive examination, which is normally given during the final quarter of the program.

BS Business Administration Program Learning Objectives

Students graduating from our program will be able to:

- 1.1 Apply knowledge to identify opportunities and solve business problems.
- 2.1 Evaluate the social and ethical responsibilities of business organizations.
- 3.1 Exhibit the ability to work in a diverse environment.
- 3.2 Illustrate an understanding of business activities in a global environment.
- 4.1 Demonstrate effective written communication skills.
- 4.2 Demonstrate effective oral communication skills.
- 4.3 Demonstrate effective participation in teams.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA

- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

BUS 206	Business Professionalism and Career Readiness	2
BUS 207	Legal Responsibilities of Business	4
BUS 214	Financial Accounting	4
BUS 215	Managerial Accounting	4
BUS 342	Fundamentals of Corporate Finance	4
BUS 346	Principles of Marketing	4
BUS 387	Organizational Behavior	4
BUS 391	Information Systems	4
BUS 401 & BUS 411	General Management and Strategy and Business Knowledge Exit Exam	4
BUS 404	Governmental and Social Influences on Business	4
Technology Management - Select from the following:		4
ITP 303	Lean Six Sigma Green Belt	
ITP 326	Product Design and Development	
ITP 330	Packaging Fundamentals	
ITP 341	Packaging Polymers and Processing	
ITP 371	Supply Chain Management in Manufacturing and Services	
International Business - Select from the following:		4
BUS 301	Global Financial Institutions and Markets	
BUS 302	International and Cross Cultural Management	
BUS 303	Introduction to International Business	
BUS 304	International Supply Chains	
BUS 410	The Legal Environment of International Business	
BUS 446	International Marketing	
ECON 330	International Trade Theory	
Senior Project - Select from the following:		4
BUS 416	Volunteer Income Tax Assistance - Senior Project	
BUS 461 & BUS 462	Senior Project I and Senior Project II	
BUS 463	Senior Project: Low Income Taxpayer Clinic	
BUS 464	Applied Senior Project Seminar	
ECON 464	Applied Senior Project	
Concentration courses (see below)		28
SUPPORT COURSES		
ECON 221	Microeconomics	4
ECON 222	Macroeconomics (D2) ¹	4
MATH 221	Calculus for Business and Economics (B4) ^{1,2}	4

STAT 251	Statistical Inference for Management I (GE Electives) ^{1,3}	4
STAT 252	Statistical Inference for Management II ³	5

GENERAL EDUCATION (GE)

(See GE program requirements below.)		60
FREE ELECTIVES		
Free Electives ⁴		21
Total units		180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Students should follow the advising footnote under the SUPPORT section (p. 184) of the Economics major. "Students pursuing the Quantitative Analysis concentration should take MATH 141 and MATH 142 instead of MATH 221".
- ³ STAT 301 (4 units) and STAT 302 (4 units) may be used as a substitute for STAT 251 (4 units) and STAT 252 (5 units). All students must still complete GE Area B requirements. STAT 301 and STAT 302 are not GE courses.
- ⁴ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentrations

Students may elect to complete curriculum from the following concentrations:

- Accounting (p. 181)
- Consumer Packaging (p. 181)
- Entrepreneurship (p. 182)
- Financial Management (p. 182)
- Information Systems (p. 182)
- Management and Human Resources (p. 183)
- Marketing Management (p. 183)
- Quantitative Analysis (p. 185)
- Real Estate Finance (p. 184)

General Education (GE) Requirements

- 72 units required, 12 of which are specified in Major and/or Support.
- If any of the remaining 60 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	

B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ^{1,2}	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Support) ¹	0
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ^{1,3}		4
Total units		60

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Students should follow the advising footnote under the SUPPORT section (p. 184) of the Economics major. "Students pursuing the Quantitative Analysis concentration should take MATH 141 and MATH 142 instead of MATH 221".

³ STAT 301 (4 units) and STAT 302 (4 units) may be used as a substitute for STAT 251 (4 units) and STAT 252 (5 units). All students must still complete GE Area B requirements. STAT 301 and STAT 302 are not GE courses.

Accounting Concentration

The Accounting Concentration prepares students for careers in public accounting (tax and audit), private industry, government, and not-for-profit organizations.

BUS 319	Accounting Information Systems	4
BUS 320	Federal Income Taxation for Individuals	4
BUS 321	Intermediate Accounting I	4

BUS 322	Intermediate Accounting II	4
BUS 424	Accounting Ethics	4
BUS 425	Auditing	4

Accounting Elective

Select from the following:		4
BUS 323	Intermediate Accounting III	
BUS 412	Advanced Managerial Accounting	
BUS 417	Taxation of Corporations and Partnerships	
BUS 422	Accounting for Government and Not-For-Profit Entities	
BUS 474	Independent Study in Accounting	

Total units **28**

Consumer Packaging Concentration

Concentration Coordinator: Javier de la Fuente

This concentration provides business majors entry into a rapidly expanding and dynamic field, packaging, that has been fueled by the globalization of manufacturing and customer-supplier relationships. This trend has been enabled by new approaches to value chain management, product development, and packaging technology. This concentration will allow the students to:

1. Conceptualize packaging designs that meet customer needs
2. Validate designs with data and customer insight
3. Gain familiarity with packaging materials and related test equipment
4. Conduct qualitative and quantitative marketing analysis for products
5. Comprehend packaging costs, sustainability issues and industry trends and
6. Understand supply chain management and logistics related issues

Lessons are drawn from a range of established and emerging industries such as food, automotive, healthcare, and electronics.

BUS 396	Consumer Insights	4
BUS 418	Listening to the Customer	4
BUS 419	Strategic Marketing Measurement	4
ITP 234	Packaging Design Fundamentals	4
ITP 330	Packaging Fundamentals	4
ITP 475	Distribution Packaging Dynamics	4

Approved Electives

Select from the following:		4
GRC 337	Consumer Packaging	
ITP 233	Product Modeling and Communication	
ITP 341	Packaging Polymers and Processing ¹	
ITP 408	Fiber-Based Packaging	
ITP 411	Packaging Sustainability	
ITP 414	Packaging Laws & Regulations	
ITP 415	Supply Chain and Logistics	
ITP 430	Healthcare Packaging	
ITP 485	Packaging Development	

Total units **28**

¹ If course is taken to meet a Major or Support requirement, it cannot be double-counted in the concentration.

Entrepreneurship Concentration

Concentration Coordinator: Lynn Metcalf

The goal of the Entrepreneurship concentration is to empower students to create economic and social value either for a startup or as part of a high-performing entrepreneurial team within an existing organization. Students in the Entrepreneurship concentration will acquire the tools, develop the skills, and cultivate the mindset of an entrepreneur. The Entrepreneurship concentration comprises a carefully-curated set of required and elective courses, leading to a hands-on, balanced and interdisciplinary approach to entrepreneurial leadership that is applicable in for-profit and non-profit contexts; local and global settings; and service-, product-, or technology- based companies.

BUS 310	Introduction to Entrepreneurship	4
BUS 330	Funding and Managing Startup Companies	4
BUS 418	Listening to the Customer	4
BUS 488	Building a Startup Skill Set	4
ITP 428	Commercialization of New Technologies	4
or ITP 406	Professional Technical Selling	
or BUS 347	Professional Selling Skills	

Approved Electives

Select from the following:		8
BUS 311	Managing Technology in the International Legal Environment	
BUS 392	Business Application Development	
BUS 408	Innovation and Entrepreneurship Through Disruptive Technologies	
BUS 451	New Product Development and Launch	
BUS/COMS 458	Solving Big World Challenges	
BUS 476	Leading Social Innovation in Organizations	
BUS 487	Launching and Growing the Technology Start-Up	
BUS 489	Negotiation	
ITP 326	Product Design and Development ¹	

Total units **28**

¹ If course is taken to meet a Major or Support requirement, it cannot be double-counted in the concentration.

Financial Management Concentration

The Financial Management concentration has three required courses, which provide the students with fundamentals of asset valuation, and applies these principles to different securities (bonds, equity, derivatives, and corporate and real assets). The Finance electives enable the students to specialize and deepen their training.

BUS 431	Security Analysis and Portfolio Management	4
BUS 438	Advanced Corporate Finance	4

BUS 439	Fixed Income Securities Market	4
Select from the following:		12
BUS 433	International Finance	
BUS 434	Real Estate Finance	
BUS 435	Real Estate Investment	
BUS 436	Entrepreneurial Finance	
BUS 437	Retirement and Estate Planning	
BUS 441	Computer Applications in Finance	
BUS 442	Introduction to Futures and Options	
BUS 443	Case Studies in Real Estate Finance	
BUS 444	Financial Engineering and Risk Management	
BUS 445	Ethics and Behavior Finance	
BUS 448	The Finance of Mergers and Acquisitions	
ECON 339	Econometrics ¹	

Approved Electives

Select from the following		4
BUS 320	Federal Income Taxation for Individuals	
BUS 321	Intermediate Accounting I	
BUS 322	Intermediate Accounting II	
BUS 412	Advanced Managerial Accounting	
BUS 417	Taxation of Corporations and Partnerships	
BUS 425	Auditing	
BUS/ITP 468	Blockchain in Business	
ECON 311	Intermediate Microeconomics I	
ECON 313	Intermediate Macroeconomics	
ECON 330	International Trade Theory	
ECON 337	Money, Banking and Credit	
ECON 339	Econometrics ¹	
ECON 405	International Monetary Economics	
ECON 406	Applied Forecasting	
ECON 408	Mathematical Economics	
ECON 409	Probability Models for Economic Decisions	
ECON 424	Monetary Economics	
ECON 440	Advanced Econometrics	

Total units **28**

¹ ECON 339 cannot be double-counted.

Information Systems Concentration

Concentration Coordinator: Barry D. Floyd

The Information Systems (IS) Concentration prepares students to enter the exciting world of information technology in business. Students learn to integrate key IS concepts and technologies through coursework in database systems, application development, systems analysis and design, infrastructure and security management, project management, and business analytics. The IS faculty develop students for professional careers by focusing on teamwork, strong interpersonal skills, turning theory into practice, and employing state-of-the-art technologies in the classroom. IS graduates are in high demand by recruiters because

of their ability to apply an understanding of technology to problems while maintaining a focus on the business context. IS graduates enjoy exciting career opportunities as analytics specialists, social media and web application developers, business consultants, IT infrastructure designers, business analysts, project managers, and data and database administrators, among many others.

BUS 392	Business Application Development	4
BUS 393	Database Systems in Business	4
BUS 394	Systems Analysis and Design	4
BUS 399	IT Infrastructure and Security Management	4
BUS 497	Business Analytics	4

Approved Electives

Select from the following: 8

BUS 395	Information Systems Project Management	
BUS 480	People Analytics	
BUS 490	Data Visualization	
BUS 491	Decision Support Systems	
BUS 492	Technology-Supported Collaboration	
BUS 493	User Experience Analysis and Design	
BUS 495	Software Testing	
BUS 496	Electronic Commerce	
BUS 498	Directed Topics in Information Systems	
BUS 499	Data Communications and Networking	

Total units 28

Management and Human Resources Concentration

Concentration Coordinators: Benjamin Alexander and Allison M. Ellis

The Management and Human Resources (MHR) concentration prepares students for general leadership and management positions, and careers in more specific Human Resources (HR) positions. The HR portion of the curriculum prepares students to hit the ground running as an HR generalist and in specific HR functions such as recruitment, staffing, and training and development. The Management portion of the curriculum prepares students for entry-level leadership and management positions, such as management training programs in large corporations, management consulting, and managerial positions in family businesses and other small organizations. Students will develop management skills such as leadership, organizational design, development, and change, global management, and negotiation.

BUS 382	Leadership and Organizations	4
BUS 384	Human Resources Management	4
BUS 388	Cultivating Human Capital	4
BUS 477	Management Consulting and Change Management	4
BUS 489	Negotiation	4

Approved Electives

Select from the following: 8

BUS/ENGR 310	Introduction to Entrepreneurship	
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BUS 471	Managing and Rewarding Employee Performance	
BUS 476	Leading Social Innovation in Organizations	
BUS 480	People Analytics	
BUS 497	Business Analytics	
ITP 303	Lean Six Sigma Green Belt ¹	
ITP 371	Supply Chain Management in Manufacturing and Services ¹	
ITP 403	Lean and Quality Systems Management	
ITP 428	Commercialization of New Technologies	

Total units 28

¹ If a course is taken to meet a Major or Support requirement, it cannot be double-counted in the concentration.

Marketing Management Concentration

The Marketing Management concentration is a conscious balance between the technical rigors of data analysis, the nuances of creative strategy, and the subtleties of relationship management with clients and consumers.

Through hands-on student projects, graduates gain experience and confidence needed to lead in an ever-changing marketing environment. From market research to marketing strategies, students have an array of opportunities to provide data-driven guidance, critical thinking, and creativity for all kinds of situations and organizations.

As a discipline with broad applications, the Marketing Management concentration offers flexible career paths and work styles. Graduates are in demand for positions in market research and analytics; business development and sales; and marketing communications, advertising, digital and product marketing.

BUS 396	Consumer Insights	4
BUS 418	Listening to the Customer	4
BUS 455	Marketing Strategy	4
Select from the following:		16
BUS 347	Professional Selling Skills	
BUS 419	Strategic Marketing Measurement	
BUS 421	Marketing Analytics and Business Intelligence	
BUS 423	Digital Marketing Metrics and Management	
BUS 430	Internship/Cooperative Education	
BUS 450	Current Topics in Marketing	
BUS 451	New Product Development and Launch	
BUS 452	Product Management	
BUS 453	Digital and New Media Marketing	

BUS 454	Marketing Projects	
Total units		28

Real Estate Finance Concentration

The Real Estate Finance concentration provides a program of study that focuses on emerging trends and issues in real estate markets. Students in the Real Estate Finance concentration learn to apply economic techniques to real estate markets, and to describe, explain, and predict patterns of real estate prices, building production, and real estate consumption. The program prepares real estate professionals for public sector and private industry jobs in real estate analysis, appraisal, corporate asset management, development, insurance, and investment.

BUS 434	Real Estate Finance	4
BUS 435	Real Estate Investment	4
BUS 439	Fixed Income Securities Market	4
ECON 434	Urban Economics ¹	4

Approved Electives

Select from the following: ¹ 12

AGB 326	Rural Property Appraisal	
BUS 342	Fundamentals of Corporate Finance ²	
BUS 409	Law of Real Property	
BUS 443	Case Studies in Real Estate Finance	
CM 475	Real Property Development Principles	
CRP 412	Plan Implementation	
CRP 446	Development Review and Entitlement	
ECON 311	Intermediate Microeconomics I ^{1,3}	
ECON 339	Econometrics	
ECON 435	Economics of Land and Water	

Total units 28

¹ ECON 434 has a prerequisite of ECON 311.

² BUS majors cannot count BUS 342 as an elective in the Real Estate Concentration because it is a required course in the BUS major.

³ ECON majors cannot count ECON 311 as an elective in the Real Estate Concentration because it is a required course in the ECON major.

BS Economics

Program Learning Objectives

1. Apply economic reasoning to evaluate everyday problems.
2. Demonstrate correct use of economic analyses to evaluate specific business proposals, economic policy proposals and current events.
3. Recognize the role of assumptions about the structure of the economy as well as ethical assumptions in arguments made for and against economic policy issues.
4. Describe how to use empirical evidence to evaluate an economic argument.
5. Summarize statistical methodology and interpret statistical evidence.
6. Conduct appropriate statistical analysis of data, and explain the statistical problems involved.
7. Communicate effectively about specific economics issues.

8. Identify and examine diverse perspectives when evaluating business, economic and social policy reform.

Degree Requirements and Curriculum

In addition to the program requirements on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

ECON 221	Microeconomics	4
ECON 222	Macroeconomics (D2) ¹	4
ECON 311 & ECON 312	Intermediate Microeconomics I and Intermediate Microeconomics II	8
ECON 313	Intermediate Macroeconomics	4
ECON 339	Econometrics	4
ECON 460	Research Methodology in Applied Economics	4

Select from the following: 4

ECON 461 & ECON 462	Senior Project I and Senior Project II	
ECON 464	Applied Senior Project	
ECON electives (ECON 202 or a 300-400 level)		4
ECON electives (400 level)		16
General Curriculum in Economics or Concentration ²		28

SUPPORT COURSES

BUS 207	Legal Responsibilities of Business	4
BUS 214	Financial Accounting	4
BUS 215	Managerial Accounting	4
MATH 141	Calculus I (B4) ^{1,3}	4
STAT 301 & STAT 302	Statistics I and Statistics II	8

Select from the following: 4-8

BUS 391 & BUS 392	Information Systems and Business Application Development	
CSC 101	Fundamentals of Computer Science	
ECON 395	Programming for Economics and Analytics	

GENERAL EDUCATION (GE)

(See GE program requirements below.) 64

FREE ELECTIVES

Free Electives 4-8

Total units 180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Economics majors may choose a concentration. Students who choose not to declare a concentration follow the General Curriculum in Economics: Complete at least 8 units of upper-division (300-400 level) ECON courses plus 20 units of any upper-division courses.

³ Students pursuing the Quantitative Analysis concentration should take MATH 141 and MATH 142, instead of just MATH 141.

General Curriculum in Economics, or Concentration

Students who choose to follow the General Curriculum in Economics must complete at least 8 units of upper-division (300-400 level) ECON courses plus 20 units of any upper-division courses.

Alternatively, students select from the following concentrations:

- Accounting (p. 181)
- Consumer Packaging
- Entrepreneurship
- Financial Management (p. 182)
- Information Systems (p. 182)
- Management and Human Resources
- Marketing Management
- Quantitative Analysis (p. 185)
- Real Estate Finance (p. 184)

General Education (GE) Requirements

- 72 units required, 8 of which are specified in Major and/or Support.
- If any of the remaining 64 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4

Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Major) ¹	0
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives		8
Total units		64

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Quantitative Analysis Concentration

Emphasizes the skills needed to analyze market data in fast-paced industries such as manufacturing, financial services, and advertising, and provides the technical training required to engage in consulting. There is also a continued need for quantitative analysis by lawyers, accountants, engineers, health service administrators, urban planners, and local, national, and international government agencies. The concentration prepares students for jobs that entail forecasting, data analysis and quantitative economics, and provides a solid foundation for graduate study in economics and business.

ECON 440	Advanced Econometrics	4
STAT 331	Statistical Computing with R	4
Approved Electives:		
Select from the following courses: ¹		20
Analytics		
BUS 393	Database Systems in Business	
BUS 421	Marketing Analytics and Business Intelligence	
BUS 441	Computer Applications in Finance	
BUS 491	Decision Support Systems	
ECON 339	Econometrics ²	
ECON 395	Programming for Economics and Analytics ³	
or BUS 392	Business Application Development	
or CSC 101	Fundamentals of Computer Science	
Statistics and Decision Analysis		
ECON 406	Applied Forecasting	
ECON 409	Probability Models for Economic Decisions	
IME 301	Operations Research I	

IME 305	Operations Research II
STAT 323	Design and Analysis of Experiments I
STAT 324	Applied Regression Analysis
STAT 330	Statistical Computing with SAS
STAT 416	Statistical Analysis of Time Series
STAT 419	Applied Multivariate Statistics
STAT 425	Probability Theory
STAT 426	Estimation and Sampling Theory
STAT 427	Mathematical Statistics

Mathematical Foundations

ECON 408	Mathematical Economics
MATH 142	Calculus II
MATH 143	Calculus III
MATH 206	Linear Algebra I
MATH 241	Calculus IV
MATH 242	Differential Equations I
MATH 244	Linear Analysis I
MATH 248	Methods of Proof in Mathematics
MATH 304	Vector Analysis
MATH 306	Linear Algebra II
MATH 344	Linear Analysis II
MATH 406	Linear Algebra III
MATH 412	Introduction to Analysis I
MATH 413	Introduction to Analysis II
MATH 414	Introduction to Analysis III
MATH 416	Differential Equations II
MATH 418	Partial Differential Equations
MATH 437	Game Theory
MATH 451	Numerical Analysis I
MATH 452	Numerical Analysis II
MATH 453	Numerical Optimization

Total units **28**

¹ Consultation with an advisor is recommended prior to choosing Approved Electives. Courses in Analytics or in Statistics and Decision Analysis provide a focus in analytics. Courses in Statistics and Decision Analysis or in Mathematical Foundations are recommended for students pursuing post-baccalaureate studies.

² Economics majors cannot count ECON 339 toward electives in the Quantitative Analysis concentration.

³ Economics majors cannot count ECON 395 or BUS 392 or CSC 101 toward electives in the Quantitative Analysis concentration.

BS Industrial Technology and Packaging

Program Learning Objectives

1. Apply fundamental knowledge and skills to solve management, technology and applied engineering problems.
2. Evaluate the ethical responsibilities in a business or technology context.
3. Relate knowledge of sustainability to practices in industry.

4. Apply decision tools and methods and make recommendations based on their outcome.
5. Demonstrate effective participation and leadership in teams.
6. Demonstrate effective writing and speaking skills.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

ITP 100	Student Orientation, College Success and Career Readiness	1
ITP 125	Introduction to Supply Chain and Packaging Systems	3
ITP 150	Industrial Power Systems	4
ITP 211	Industrial Safety and Quality Program Leadership	4
ITP 233	Product Modeling and Communication	4
ITP 303	Lean Six Sigma Green Belt	4
ITP 326	Product Design and Development	4
ITP 330	Packaging Fundamentals (Upper-Division B) ¹	4
ITP 341	Packaging Polymers and Processing	4
ITP 371	Supply Chain Management in Manufacturing and Services	4
ITP 406	Professional Technical Selling	4
ITP 409	Packaging Machinery and Processes	4
ITP 411	Packaging Sustainability	4
ITP 415	Supply Chain and Logistics	4
ITP 461	Senior Project I	2
ITP 462	Senior Project II	2
Concentration courses (see below)		40

SUPPORT COURSES

BUS 346	Principles of Marketing	4
BUS 391	Information Systems	4
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ¹	4
or CHEM 127	General Chemistry for Agriculture and Life Science I	
ECON 201	Survey of Economics (D2) ¹	4
MATH 141	Calculus I (B4) ¹	4
or MATH 221	Calculus for Business and Economics	
PHYS 121	College Physics I	4
PHYS 123	College Physics III	4
STAT 217	Introduction to Statistical Concepts and Methods (GE Electives) ¹	4
or STAT 218	Applied Statistics for the Life Sciences	

or STAT 251	Statistical Inference for Management I	
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		52
FREE ELECTIVES		
Free Electives		0
Total units		180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Concentrations

- Industrial Technology (p. 187)
- Packaging Technology (p. 188)

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4

D2	Lower-Division D (4 units in Support) ¹	0
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		52

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Industrial Technology Concentration

The Industrial Technology Concentration offers students a broad education in business and technology management that makes them versatile contributors in a wide variety of industries. Students develop knowledge and skills in operations, supply chain, quality assurance, planning, materials, automation, technology commercialization, and project management. In their selection of approved electives students can specialize or further broaden their education with courses in value chain management, facilities management, lean six sigma, packaging, accounting, business, new technology commercialization, and entrepreneurship.

ITP 260	Manufacturing Processes and Materials	4
ITP 390	Industrial Automation	4
ITP 403	Lean and Quality Systems Management	4
ITP 410	Operations Planning and Control	4
ITP 428	Commercialization of New Technologies	4
ITP 467	Applied Business and Production Management	4
Approved Electives		
Select from the following: ¹		16
BUS 215	Managerial Accounting	
BUS 304	International Supply Chains	
BUS 310	Introduction to Entrepreneurship	
BUS 313	Customer Development	
or BUS 418	Listening to the Customer	
BUS 384	Human Resources Management	
BUS 389	Introduction to Business Negotiation for Entrepreneurs	
or BUS 489	Negotiation	
BUS/ITP 468	Blockchain in Business	
ITP 203	Personal Leadership - 7 Habits	
ITP 234	Packaging Design Fundamentals	
ITP 275	Industrial Facility Systems and Equipment	

ITP 302	Developing and Presenting New Enterprise Strategies	
ITP 400	Special Problems for Advanced Undergraduates	
ITP 404	Lean Six Sigma Green Belt Certification Project	
ITP 408	Fiber-Based Packaging	
ITP 412	Instrumental Analysis of Packaging Polymers	
ITP 413	Packaging Quality Assessment	
ITP 414	Packaging Laws & Regulations	
ITP 419	Cooperative Education/Internship	
ITP 430	Healthcare Packaging	
ITP 475	Distribution Packaging Dynamics	
ITP 485	Packaging Development	
Total units		40

¹ Consultation with an advisor is recommended prior to selecting Approved Electives; note your selections may impact pursuit of post-baccalaureate studies and/or goals.

Packaging Technology Concentration

Packaging continues to grow beyond being a logistical or materials issue to a strategic business function aimed at creating value. The Packaging Technology concentration emphasizes the entire packaging value chain and includes the disciplines of engineering, material science, design, and business. Students are encouraged to leverage their personal interests to focus on a multitude of industry sectors such as food, automotive, healthcare, and electronics. The highly sought out graduates are provided with opportunities to engage with a multitude of groups ranging from R&D through purchasing, production, sales, and management.

ITP 234	Packaging Design Fundamentals	4
ITP 408	Fiber-Based Packaging	4
ITP 412	Instrumental Analysis of Packaging Polymers	4
ITP 430	Healthcare Packaging	4
ITP 475	Distribution Packaging Dynamics	4
ITP 485	Packaging Development	4

Approved Electives

Select from the following: ¹		16
FSN 319	The Science of Food for the Consumer	
FSN 354	Packaging Function in Food Processing	
ITP 400	Special Problems for Advanced Undergraduates	
ITP 403	Lean and Quality Systems Management	
ITP 410	Operations Planning and Control	
ITP 413	Packaging Quality Assessment	
ITP 414	Packaging Laws & Regulations	
ITP 419	Cooperative Education/Internship	

ITP 428	Commercialization of New Technologies	
Total units		40

¹ Consultation with an advisor is recommended prior to selecting Approved Electives; note your selections may impact pursuit of post-baccalaureate studies and/or goals.

Accounting Minor

BUS 214	Financial Accounting ¹	4
BUS 215	Managerial Accounting ²	4
BUS 319	Accounting Information Systems	4
BUS 320	Federal Income Taxation for Individuals	4
BUS 321	Intermediate Accounting I	4
BUS 322	Intermediate Accounting II	4
Select from the following:		4
BUS 323	Intermediate Accounting III	
BUS 417	Taxation of Corporations and Partnerships	
BUS 425	Auditing	
BUS 424	Accounting Ethics	

Total units **28**

¹ Students may substitute AGB 214 Agribusiness Financial Accounting towards BUS 214 Financial Accounting.

² Students may substitute AGB 323 Agribusiness Managerial Accounting towards BUS 215 Managerial Accounting.

Economics Minor

Required Courses

ECON 221	Microeconomics	4
ECON 311	Intermediate Microeconomics I	4
ECON 312	Intermediate Microeconomics II	4

Select from one of the following sequences: 8

ECON 222 & ECON 313	Macroeconomics and Intermediate Macroeconomics	
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or

ECON 202 & ECON 339	Using Big Data to Solve Economic and Social Problems and Econometrics	
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Electives

400 level ECON courses: 8

Total units **28**

Entrepreneurship Minor

Required Courses

BUS 220	Business Basics for Entrepreneurs	4
BUS 310	Introduction to Entrepreneurship	4
ENGR/BUS 234	Introduction to Design Thinking	4

Approved Electives

Select from the following (at least 8 units must be 300 or 400 level courses) 12

AGB 304	Innovation and Entrepreneurship in Agriculture
BMED 401	Biomedical Entrepreneurship
BUS 311	Managing Technology in the International Legal Environment
BUS 313	Customer Development
BUS 330	Funding and Managing Startup Companies
BUS 389	Introduction to Business Negotiation for Entrepreneurs
BUS 408	Innovation and Entrepreneurship Through Disruptive Technologies
BUS/COMS 458	Solving Big World Challenges
BUS 487	Launching and Growing the Technology Start-Up
or ENGR 464 & ENGR 465	Interdisciplinary Entrepreneurial Senior Design Project II and Interdisciplinary Entrepreneurial Senior Design Project III
JOUR 385	Media Innovation and Entrepreneurship
PHIL 323	Ethics, Science and Technology
Total units	24

Industrial Technology Minor

Approved Technology Electives

Select from the following:	4
ITP 303	Lean Six Sigma Green Belt
ITP 326	Product Design and Development
ITP 371	Supply Chain Management in Manufacturing and Services

Approved Industrial Technology Electives

At least 4 units must be upper division.

A course taken from this list cannot be double counted for Approved Technology Electives.

Select from the following:	16
ITP 150	Industrial Power Systems
ITP 211	Industrial Safety and Quality Program Leadership
ITP 233	Product Modeling and Communication
ITP 275	Industrial Facility Systems and Equipment
ITP 302	Developing and Presenting New Enterprise Strategies
ITP 303	Lean Six Sigma Green Belt
ITP 326	Product Design and Development
ITP 371	Supply Chain Management in Manufacturing and Services
ITP 400	Special Problems for Advanced Undergraduates
ITP 403	Lean and Quality Systems Management
ITP 406	Professional Technical Selling

ITP 410	Operations Planning and Control
ITP 415	Supply Chain and Logistics
ITP 428	Commercialization of New Technologies
ITP 467	Applied Business and Production Management
Approved Organizational Electives	
Select from the following:	4
BUS 310	Introduction to Entrepreneurship
BUS 311	Managing Technology in the International Legal Environment
BUS 382	Leadership and Organizations
BUS 387	Organizational Behavior
PHIL 337	Business Ethics
PSY 350	Teamwork
Total units	24

Integrated Marketing Communications Minor

BUS 396	Consumer Insights	4
or BUS 418	Listening to the Customer	
BUS 453	Digital and New Media Marketing	4
BUS 459	Social Media's Role in Integrated Marketing Communications	4
or GRC 420	Graphic Communication in Integrated Marketing Communications	
or JOUR 415	Senior Project: Public Relations Practicum	
GRC 338	Web Development and Content Management	4
or GRC 377		
or JOUR 390	Visual Communication for the Mass Media	
JOUR 312	Public Relations	4
JOUR 331	Contemporary Advertising	4
JOUR 342	Public Relations Writing and Editing	4
Total units		28

MBA - General Management Specialization

Program Learning Objectives

The learning objectives of the MBA programs are for students to be able to:

- 1.1 Demonstrate competency in the following areas of business: management, quantitative methods, economics, accounting, finance, marketing, operations, and strategy.
- 1.2 Demonstrate strategic integration of the above areas.
- 1.3 Demonstrate the ability to apply analytics to decision making.
- 2.1 Recognize issues and create solutions using an approach that reflects ethical values.
- 3.1 Demonstrate knowledge of the issues involved in conducting business in a diverse, global environment.
- 4.1 Demonstrate professional written communications skills.

4.2 Demonstrate professional oral communication and presentation skills.

5.1 Recognize leadership skills and link to leadership theory.

5.2 Demonstrate effective team behaviors.

MBA Core Courses 36

GSB 511	Accounting for Managers
GSB 512	Quantitative Analysis
GSB 513	Organizational Behavior
GSB 523	Managerial Economics
GSB 524	Marketing Management
GSB 531	Managerial Finance
GSB 533	Aggregate Economics Analysis and Policy
GSB 534	Lean Operations Management
GSB 562	Seminar in General Management and Strategy

Approved Electives

Select from the following: 24

GSB 500	Independent Study
GSB 501	Individual Research
GSB 503	Collaborative Industry Project
GSB 510	Data Visualization and Communication in Business
GSB 514	The Legal and Regulatory Environment of Business
GSB 516	Strategic Marketing Analytics
GSB 520	Data Management for Business Analytics
GSB 522	Advanced Management Information Systems
GSB 529	Effective Communication Skills for Managers
GSB 530	Data Analytics and Mining for Business
GSB 536	Data Ethics for Business Analytics
GSB 539	Graduate Internship in Business
GSB 555	Negotiation
GSB 556	Entrepreneurship and New Venture Management
GSB 564	Entrepreneurial Finance
GSB 569	Managing Technology in the International Legal Environment
GSB 570	Selected Advanced Topics
GSB 583	Management of Human Resources
GSB 595	Managing Change
GSB 597	Seminar in Selected Economic Problems

Total units 60

MBA - Graphic Communication Documents Systems Management Specialization

Program Learning Objectives

1. Demonstrate competency in the following areas of business: management, quantitative methods, economics, accounting, finance, marketing, operations, and strategy.
2. Demonstrate strategic integration of the above areas.
3. Demonstrate the ability to apply analytics to decision making.
4. Recognize issues and create solutions using an approach that reflects ethical values.
5. Demonstrate knowledge of the issues involved in conducting business in a diverse, global environment.
6. Demonstrate professional written communications skills.
7. Demonstrate professional oral communication and presentation skills.
8. Recognize leadership skills and link to leadership theory.
9. Demonstrate effective team behaviors.

MBA Common Required Courses

Select from the following: 36

GSB 511	Accounting for Managers
GSB 512	Quantitative Analysis
GSB 513	Organizational Behavior
GSB 523	Managerial Economics
GSB 524	Marketing Management
GSB 531	Managerial Finance
GSB 533	Aggregate Economics Analysis and Policy
GSB 534	Lean Operations Management
GSB 562	Seminar in General Management and Strategy

Specialization Required Courses

Select from the following: 16

GRC 595	Cooperative Education Experience (8)
GRC 500	Special Problems in Graphic Communication for Graduate Students (8)

Advisor approved Business electives 12

Total units 64

MS Accounting

Program Learning Objectives

Graduates are prepared to:

- 1.1 Analyze financial statement data and conduct business valuations.
- 2.1 Research issues related to accounting standards including international financial reporting standards.
- 3.1 Demonstrate the ability to use databases and develop advanced spreadsheets to analyze financial and auditing information.
- 4.1 Demonstrate the ability to diagram data models and perform risk assessment of internal controls that apply to data/processes.

5.1 Recognize and apply ethical and fraud-related concepts in accounting and financial reporting.

6.1 Demonstrate effective writing communication skills.

6.2 Demonstrate effective oral communication skills.

GSA 540	Taxation of Corporations and Partnerships	4
GSA 541	Advanced Financial Reporting Issues I ¹	4
or GSB 510	Data Visualization and Communication in Business	
GSA 543	Advanced Financial Reporting Issues II	5
GSA 545	Applied Accounting Research and Communications	4
GSA 552	Fraud Auditing and Examination	4
GSA 554	Advanced Spreadsheet Modeling for Accounting	4
GSA 555	Database Modeling and Analysis for Accounting	4
GSA 556	Financial Accounting and Valuation	4
GSB 512	Quantitative Analysis	4
GSB 529	Effective Communication Skills for Managers	4
GSB 530	Data Analytics and Mining for Business ¹	4
or GSA 544	Advanced Enterprise Wide Business Processes for Accounting	
Comprehensive Examination		
Total units		45

¹ Students will choose between GSA 541 and GSB 510 in the fall quarter and between GSB 530 and GSA 544 in the spring quarter.

MS Business Analytics

Program Learning Objectives

1. Employ key aspects of data management - retrieval, integration, and enrichment
2. Apply high ethical standards toward the collection, storage, analysis, and reporting of data
3. Apply modeling tools to data of various types and sizes
4. Visualize data to infer and communicate insights
5. Use data to analyze, inform and solve fundamental business problems

Required Courses

GSB 503	Collaborative Industry Project ¹	4
GSB 518	Essential Statistics for Business Analytics	4
GSB 520	Data Management for Business Analytics	4
GSB 530	Data Analytics and Mining for Business	4
GSB 544	Computing and Machine Learning for Business Analytics	4
GSE 519	Econometrics and Data Analysis	4

Approved Electives

Select from the following: 21

GSB 501	Individual Research ²	
GSB 503	Collaborative Industry Project ³	
GSB 510	Data Visualization and Communication in Business	
GSB 516	Strategic Marketing Analytics	
GSB 517	Strategic People Analytics	
GSB 521	Cloud Services & Applications for Business Analytics	
GSB 536	Data Ethics for Business Analytics	
GSB 545	Advanced Machine Learning for Business Analytics	
GSB 550	Bayesian Econometrics	
GSB 551	Prescriptive Analytics	
GSB 570	Selected Advanced Topics ²	
GSB 575	Career Readiness in Data Analytics	

Total units 45

¹ GSB 503 satisfies the culminating experience requirement for the degree. To meet the requirement of this course, program advisor may require GSB 503 to be completed in a particular term.

² Not all topics will be taught online, depending on the proposal review process; requires advisor approval prior to enrolling

³ 1-4 additional units of GSB 503 may be taken as an elective beyond the core requirement to work on continuing or new client projects.

MS Packaging Value Chain Program Learning Objectives

1. Specify holistic, efficient and effective solutions in the realm of packaging and its impact across the global value chains.
2. Develop analytical and critical thinking skills towards assessing the value addition proposition of packaging.
3. Analyze and explain local, national, and global ethical issues related to the packaging value chains.
4. Infer the present and anticipated future packaging needs of the global society.
5. Effectively compose written and oral texts for a variety of scholarly, professional, and creative purposes.

Required Courses

GSP 530	Packaging Value Chain	2
GSP 532	Packaging Materials	4
GSP 533	Advanced Packaging Laws and Regulations	3
GSP 535	Packaging Value in Logistics and Supply Chain Management	3
GSP 536	Packaging Design	4
GSP 539	Marketing and Sales for Packaged Products	4
GSP 540	Quantitative Analysis for Packaging	4
GSP 591	Applied Industry Project I	5

Approved Electives

Select from the following: 16

GSB 520	Data Management for Business Analytics	
GSB 534	Lean Operations Management	
GSB 563	International Business Tour	
GSP 541	Corporate Finance for Packaging	
GSP 537	Distribution Packaging for Business Managers	
GSP 538	Quality Evaluation of Packaged Products	
Total units		45

MS Quantitative Economics Program Learning Objectives

Graduates are prepared to:

1. Exhibit sufficient knowledge of the main quantitative methods of economic analysis (both theoretical and empirical).
2. Are proficient at applying quantitative economics techniques in new and unfamiliar circumstances and will develop the ability to adapt and innovate to solve relevant economic problems.
3. Are able to effectively communicate the implications of their analyses to their relevant audience.

Required Courses

GSE 510	Essential Mathematics for Economic Analysis	4
GSE 511	Microeconomic Analysis	4
GSE 512	Dynamic Stochastic Modeling	4
GSE 518	Essential Statistics for Econometrics	4
GSE 520	Advanced Econometrics I	4
GSE 522	Advanced Econometrics II	4
GSE 524	Computing and Machine Learning for Economics	4
GSE 526	Microeconometrics	4
Approved Electives (400-500 level) ¹		13
Comprehensive Exam		
Total units		45

¹ To be selected with advisor's approval from economics or other courses in masters programs, such as: Master of Business Administration (GSB), Agribusiness (AGB), Master of City and Regional Planning (CRP), Engineering, Mathematics, Master of Public Policy. Maximum 12 units from 400 level courses. Maximum 12 units from courses other than GSE/ECON.

MS Taxation

Program Learning Objectives

Graduates Are Prepared To:

- 1.1 Demonstrate competency in tax research and identify potential solutions to tax issues.
- 1.2 Analyze and solve tax compliance issues through the application of analytic/critical thinking skills.
- 1.3 Apply substantive knowledge in a variety of tax preparation projects during a professional internship experience.

2.1 Recognize and apply ethical and professional responsibility requirements to tax practice.

3.1 Professionally communicate in writing.

3.2 Professionally communicate information through oral presentations.

BUS 417	Taxation of Corporations and Partnerships ¹	4
GSB 529	Effective Communication Skills for Managers	4
GSA 536	Taxation of Trusts, Estates, and Transfer Taxes	4
GSA 537	State and Local Taxation	4
GSA 538	Current Developments in Taxation	4
GSA 539	Clinical Tax Education Internship	9
GSA 546	Tax Research and Administrative Procedures	4
GSA 548	Advanced Individual Taxation and Tax Planning	4
GSA 549	Advanced Taxation of Flow-Through Entities	4
GSA 550	Advanced Corporate Taxation	4
GSA 551	International Taxation	4
Total units		45/49

¹ Students who, prior to admission to the program have not successfully completed BUS 417 at Cal Poly (or an identical course elsewhere) will be required to take BUS 417 as a part of this degree program.

Packaging Minor

Required Courses

CHEM 110	World of Chemistry	4
FSN 334	Food Packaging	3-4
or FSN 354	Packaging Function in Food Processing	
or GRC 337	Consumer Packaging	
or ITP 234	Packaging Design Fundamentals	
ITP 330	Packaging Fundamentals	4
PHYS 104	Introductory Physics	4
or PHYS 121	College Physics I	
or PSC 101	Matter and Energy	

Approved Electives

Select from the following:		11-12
FSN 354	Packaging Function in Food Processing ¹	
ITP 341	Packaging Polymers and Processing	
ITP 400	Special Problems for Advanced Undergraduates	
ITP 408	Fiber-Based Packaging	
ITP 409	Packaging Machinery and Processes	
ITP 411	Packaging Sustainability ²	
ITP 412	Instrumental Analysis of Packaging Polymers	
ITP 413	Packaging Quality Assessment	
ITP 414	Packaging Laws & Regulations	
ITP 430	Healthcare Packaging ²	

ITP 475	Distribution Packaging Dynamics ²	
ITP 485	Packaging Development	
Total units		26-28

¹ If a course is taken to meet a requirement in the minor, it cannot be double-counted as an approved elective.

² ITP 411, ITP 430, and ITP 475 do not count for Graphic Communication majors with a concentration in Graphics for Packaging.

Sales Minor

Required Courses

BUS 347	Professional Selling Skills	4
BUS 348	Technology-Based Professional Sales	4
BUS 466	Sales Practicum	4

Approved Electives

Select from the following (at least 2 units must be 300-400 level): 16

BUS 396	Consumer Insights	
BUS 489	Negotiation	
GRC 361	Marketing and Sales Management for Print and Digital Media	
IME 401	Sales Engineering	
ITP 406	Professional Technical Selling	
RPTA 114	Introduction to Hospitality and Travel	
RPTA 393	Hospitality Sales and Service	
WVIT 343	Branded Wine Marketing	
WVIT 344	Direct to Consumer Wine Sales	
WVIT 433	Wine Sales and E-Commerce	

Select no more than two courses from the following:

AGB 202	Introduction to Sales	
AGB 309	Advanced Sales Techniques	
AGB 404	Food Retail Management	
AGB 406	Agribusiness Marketing Planning	

Select no more than two courses from the following:

COMS 101	Public Speaking	
or COMS 102	Principles of Oral Communication	
COMS 211	Interpersonal Communication	
COMS 213	Organizational Communication	
COMS 217	Small Group Communication	
COMS 322	Persuasion	

Total units **28**

College of Engineering

Engineering Bldg. (192), Room 301
Phone: 805.756.2131
<https://engineering.calpoly.edu>

Dean: Amy Fleischer
Executive Associate Dean: Rakesh K. Goel
Associate Dean: Robert Crockett
Associate Dean: Eric Mehiel

Academic Programs

Program name	Program type
Aerospace Engineering	BS*, MS
Biomedical Engineering	BS, MS, Specialization
Civil and Environmental Engineering	MS
Civil Engineering	BS*
Computer Engineering	BS*
Computer Science	BS**, MS, Minor
Electrical Engineering	BS*, MS
Engineering Management	MS
Environmental Engineering	BS*
Fire Protection Engineering	MS
General Engineering	BS
Industrial Engineering	BS*, MS
Manufacturing Engineering	BS*
Materials Engineering	BS*
Mechanical Engineering	BS*, MS
Software Engineering	BS*

Joint Programs

Program name	Program type
Cross Disciplinary Studies Minor in Bioinformatics	Minor
Cross Disciplinary Studies Minor in Computing for Interactive Arts	Minor
Cross Disciplinary Studies Minor in Data Science	Minor
Cross Disciplinary Studies Minor in Heavy Civil	Minor
Environmental Studies	Minor
Liberal Arts & Engineering Studies	BA
Specialization in Transportation Planning	Concurrent CE-MS/ MCRP

Graduate Certificate Programs

Program name	Program type
Fire Protection Engineering Applications	Certificate
Fire Protection Engineering Science	Certificate

* Engineering programs accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org/>

** BS Computer Science program accredited by the Computing Accreditation Commission of ABET, <http://www.abet.org/>

Engineering and computer science programs at Cal Poly are strongly oriented toward preparing graduates for immediate entry into professional practice. Students declare their majors when they enter as

freshmen, and they generally take at least one course in that major each quarter. This early introduction better motivates and prepares students to master the foundational mathematics, basic science, and engineering science or computer science central to success in all the engineering disciplines.

The undergraduate bachelors of science engineering disciplines listed above provide the education needed for entry to the engineering profession and for continued academic work toward advanced degrees. Many of our graduates enter graduate programs at Cal Poly or other institutions. Cal Poly engineering and computer science graduates are highly desired by industry and find a variety of professional opportunities awaiting them, such as engineering design, computer hardware and software engineering, test and evaluation, systems analysis, modeling and simulation, manufacturing, applied research, development, sales and field engineering. Graduates pursue careers in a broad cross-section of industry, government agencies, public utilities, marketing groups, and educational institutions.

The College of Engineering is an internationally-recognized, premier undergraduate engineering college. Its mission is to provide an excellent Learn by Doing education and to graduate in-demand, Day One-ready professionals. The College vision is to transform students into world class, innovative and collaborative engineers to meet the challenges of the 21st century.

State-of-the-art facilities and laboratories form the core of Engineering's project-centered curriculum. Ranging from the Aircraft Design Lab to the Rotor Dynamics Laboratory, these facilities offer advanced technological systems that allow students to link theory with practice. College buildings also promote interdisciplinary project activities, including the Advanced Technology Laboratories, Bonderson Projects Center, and Engineering IV. With 19,000 square feet of space for individual and team-based projects, the Bonderson Center offers enriched opportunities for multidisciplinary projects and collaboration with industry. Engineering IV, a 104,000-square-foot building includes modern classrooms and laboratories for aerospace, mechanical, civil, environmental, industrial and manufacturing engineering programs.

Engineering Student Services

Engineering South (40), Room 115
Phone: 805.756.1461
Director: Kim Marsalek

Engineering Student Services provides an inclusive, respectful, encouraging environment that fosters the retention and graduation of all undergraduate engineering students. Through our Advising, Multicultural Engineering (MEP), and International Exchange Program (IEP) our staff provides comprehensive services to guide and empower students to achieve their goals.

Advising Center

Engineering South (40), Room 115
Phone: 805.756.1461
<https://eadvice.calpoly.edu>

Senior Academic Advisor: Dawn Sirois
Academic Advisor: Ashlee Burt
Academic Advisor: Greg Roldan
Academic Advisor: Jamey Stamets
Academic Advisor: Maria Zavala

As a division of Engineering Student Services, the Advising Program is dedicated to providing accurate and timely academic resources and guidance to undergraduate engineering students. Through a welcoming and inclusive environment, advising's services promote student success and development while assisting students in navigating the curricula and university policies to reach their goals.

Multicultural Engineering Program (MEP)

Engineering South (40), Room 115
Phone: 805.756.1433
<https://mep.calpoly.edu>

Coordinator: Meghan Schuler-Jones
MEP Advisor: Candy Janiam
Retention Advisor: Katie McGuire

As a division of Engineering Student Services the Multicultural Engineering Program (MEP) is an academic support program designed to retain and graduate students who continue to remain underrepresented in engineering. MEP leverages a strong support network to build a community and provide the necessary bridges for students academic, personal, and professional success.

International Exchange Program (IEP)

Engineering South (40), Room 115
Phone: 805.756.1461
<https://eadvise.calpoly.edu/International-Exchange-Program> (<https://eadvise.calpoly.edu/International-Exchange-Program/>)

IEP Advisor: Maria Zavala

As a division of Engineering Student Services, the International Exchange Program (IEP) partners with engineering universities around the world. IEP strives to expose engineering students to the increasing demands of our global economy while allowing students to make progress towards their engineering degree.

Women's Engineering Program (WEP)

Engineering South (13), Room 216
Phone: 805.756.2350
<http://wep.calpoly.edu>

Director: Helene Finger

The mission of the Women's Engineering Program (WEP) is to recruit and retain women engineering and computer science students by focusing on outreach, on-campus support and professional preparation objectives. To meet these objectives, WEP works closely with the Society of Women Engineers (SWE) Cal Poly student section, one of the top student sections in the nation, in supporting a variety of programs directed at pre-college, undergraduate and graduate students.

Outreach activities are directed at students from kindergarten through community college. These programs are designed to encourage pre-university women and girls to consider engineering as a career choice. Outreach recruitment activities include: Building an Engineer workshops, High School Shadow an Engineering Student day, Girl Scout Engineering Badge day, robotics competitions, elementary school workshops, and career fairs.

The Women's Engineering Program provides on-campus support to Cal Poly women engineering students through a variety of academic, leadership and social activities. These activities help students connect

to their peers while concurrently assisting them in achieving their educational goals.

On-campus support activities include: scholarships, academic counseling and referrals, pre-registration counseling, big sibling program, test files, SWE meetings, social events, and community service activities.

Professional preparation activities are designed to prepare students for a productive career by facilitating networking with professionals and corporations. Professional preparation activities include: Evening With Industry banquet, Team Tech national design competition, Industry Tours, Resume Book, bi-weekly industry presentations and corporate information sessions.

Graduate Programs

MS Fire Protection Engineering

General Characteristics

The profession of Fire Protection Engineering is directed toward the identification, analysis and mitigation of fire hazards and risks across a broad spectrum of applications, including buildings, consumer products, industrial processes, transportation vehicles, infrastructure facilities and the wildland-urban interface.

The Master of Science in Fire Protection Engineering prepares individuals to assess and reduce the potential for property and human loss from fire in these and other settings. Students learn to analyze how buildings are used, how fires start, how fires grow, and how fire and smoke affect people, buildings and property. Fire protection engineers use the latest engineering and construction technologies to:

1. Design systems that control fires, alert people to danger and provide means for escape;
2. Evaluate buildings to identify fire risks of and the means to prevent or mitigate them;
3. Conduct fire safety research on consumer products and construction materials; and
4. Investigate fires to discover how fires start, how they spread, why protective measures fail, and how those measures could be designed more effectively.

To meet these program goals, the fire protection engineering curriculum requires that students successfully complete a total of 45 units including a fire protection engineering project as the culminating experience (FPE 596). The culminating experience will be innovative and require independent thinking. Typically, the students will perform a detailed fire and life safety evaluation of a selected building, the preparation of a comprehensive report documenting the results of this evaluation and the presentation of their analysis and findings in an oral defense to a review committee. Other innovative culminating experiences of similar scope and complexity may be submitted for approval.

Program Goals

The Fire Protection Engineering program is designed to build on the skills, knowledge, and broad engineering principles students acquire in an undergraduate engineering program. The required and elective courses composing the Master of Science degree in Fire Protection Engineering address the specific body of knowledge required by the fire protection engineering profession. Students completing the program will possess the technical knowledge, skills and tools required to practice fire protection engineering in a variety of local, national and international settings. Upon completion of this program, students should possess

the necessary knowledge and skills to pursue professional certification and licensure in the fire protection engineering discipline. Furthermore, the program addresses unique fire challenges faced by California and other western states, including wildland-urban interface fires and post-earthquake fires.

Prerequisites

For admission as a classified graduate student, an applicant should hold a bachelor's degree in engineering or a closely related field from a regionally accredited institution, college, or university. An undergraduate grade point average of 3.0 is required. On occasion, where other credentials are exceptionally strong, a GPA in the 2.5-3.0 range may be accepted.

Tuition and Fees

As a special session program through Extended Education, the MS Fire Protection Engineering program is administratively and academically completely self-supporting. As such, the program carries a separate tuition and fee schedule. Please refer to <http://www.fpe.calpoly.edu/> for the current cost of the program.

Graduate Certificate Programs Fire Protection Engineering Applications

General Characteristics

The courses offered in the Fire Protection Engineering Applications graduate certificate program will prepare students for a specialized career in fire protection engineering. Students completing the certificate program will be prepared for careers in:

- Consulting/Design Engineering Firms
- Fire Equipment and Systems Manufacturers
- Hospitals and Health Care Facilities
- Insurance Industry
- Research and Testing Laboratories
- Fire Departments
- Government

The fire protection engineering applications curriculum requires that students successfully complete a total of 16 units.

Fire Protection Engineering Science

General Characteristics

The courses offered in the Fire Protection Engineering Science graduate certificate program will prepare students for a specialized career in fire protection engineering. Students completing the certificate program will be prepared for careers in:

- Forensic Investigations;
- Nuclear Fire Safety;
- Fire Science Research (R&D facility, Testing Lab, etc.)
- Government
- Fire Departments

The fire protection engineering science curriculum requires that students successfully complete a total of 16 units.

Fire Protection Engineering Science & Fire Protection Engineering Applications

Tuition and Fees

As a special session programs through Extended Education, the MS Fire Protection Engineering program and Fire Protection Engineering graduate certificate are administratively and academically completely self-supporting. As such, the programs carry a separate tuition and fee schedule. Please refer to <http://www.fpe.calpoly.edu/> for the current cost of the program.

MS Fire Protection Engineering Program Learning Objectives

1. Identify relevant fire safety codes, standards and regulations, comprehend the fire safety performance objectives and criteria associated with these documents, and apply these fire safety objectives and criteria to a broad range of applications.
2. Analyze the flammability characteristics of different materials, interpret the results of standard and non-standard fire test methods and evaluate the fire hazards associated with different materials in a range of anticipated settings.
3. Analyze the dynamics of fires in and around buildings and other structures through the application of fundamental principles and the use of state-of-the-art computer-based fire simulation models.
4. Understand how people interact with fire conditions in buildings and calculate evacuation times through the application of fundamental principles of people movement and the use of state-of-the-art computer-based evacuation models.
5. Design fire detection and alarm systems, fire suppression systems, smoke management systems, egress systems and structural fire protection to achieve specified performance objectives.
6. Perform comprehensive fire and life safety evaluations of buildings and other structures through application of the knowledge, skills and tools acquired in this program and effectively communicate the results and findings of such evaluations.

Required Courses

FPE 501	Fundamental Thermal Sciences	4
FPE 502	Fire Dynamics	4
FPE 503	Flammability Assessment Methods	4
FPE 504	Fire Modeling	4
FPE 521	Egress Analysis and Design	4
FPE 522	Fire Detection, Alarm and Communication Systems	4
FPE 523	Water-based Fire Suppression	4
FPE 524	Structural Fire Protection	4
FPE 596	Culminating Experience in Fire Protection Engineering ¹	5

Technical Electives

Select from the following:		8
FPE 551	Fire Safety Regulation and Management	
FPE 552	Smoke Management and Special Hazards	
FPE 554	Forensic Fire Analysis	
ME 541	Advanced Thermodynamics	

ME 554 Computational Heat Transfer

Total units 45

¹ FPE 599 Design Thesis can substitute for FPE 596 and one technical elective for a total of 9 units.

Fire Protection Engineering Applications Graduate Certificate

Program Learning Objectives

1. Identify relevant fire safety codes, standards and regulations, comprehend the fire safety performance objectives and criteria associated with these documents, and apply these fire safety objectives and criteria to a broad range of applications.
2. Understand how people interact with fire conditions in buildings and calculate evacuation times through the application of fundamental principles of people movement and the use of state-of-the-art computer-based evacuation models.
3. Design fire detection and alarm systems, fire suppression systems, structural fire protection systems, and egress systems to achieve specified performance objectives.

Prerequisites

For admission as a classified graduate student, an applicant should hold a bachelor's degree in engineering, fire science, fire protection and safety, or a closely related field from a regionally accredited institution, college, or university. An undergraduate grade point average of 3.0 is required. On occasion, where other credentials are exceptionally strong, a GPA in the 2.5-3.0 range may be accepted.

Core Courses

FPE 521	Egress Analysis and Design	4
FPE 522	Fire Detection, Alarm and Communication Systems	4
FPE 523	Water-based Fire Suppression	4
FPE 524	Structural Fire Protection	4
Total units		16

grade point average of 3.0 is required. On occasion, where other credentials are exceptionally strong, a GPA in the 2.5-3.0 range may be accepted.

FPE 501	Fundamental Thermal Sciences	4
FPE 502	Fire Dynamics	4
FPE 503	Flammability Assessment Methods	4
FPE 504	Fire Modeling	4
Total units		16

Fire Protection Engineering Science Graduate Certificate

Program Learning Objectives

1. Apply concepts associated with the thermal sciences, including thermodynamics, fluid mechanics, and heat transfer, to the analysis of fire protection engineering problems.
2. Analyze the flammability characteristics of different materials, interpret the results of standard and non-standard fire test methods and evaluate the fire hazards associated with different materials in a range of anticipated settings.
3. Analyze the dynamics of fires in and around buildings and other structures through the application of fundamental principles and the use of state-of-the-art computer-based fire simulation models.

Prerequisites

For admission as a classified graduate student, an applicant should hold a bachelor's degree in engineering or a closely related field from a regionally accredited institution, college, or university. An undergraduate

Aerospace Engineering

Engineering III Bldg. (41A), Room 134
Phone: 805.756.7172
<https://aero.calpoly.edu>

Department Chair: David Marshall

Engineering Student Services
Engineering South (40), Room 115
Phone: 805.756.1461

Academic Programs

Program name	Program type
Aerospace Engineering	BS, MS

The mission of the Aerospace Engineering Department is to collaborate with the Aerospace Industry to build partnerships which promote excellence and innovation to serve diverse communities. We work as a team to provide an excellent Learn-by-Doing, systems and design focused engineering education; graduating Day One-ready professionals.

We accomplish our mission using a laboratory-based, hands-on approach to education students. This approach, coupled with a systems view of engineering, is encouraged through coursework and a group-based capstone design experience. This educational philosophy yields engineers capable of working in positions of technical responsibility and leadership in a modern multidisciplinary, systems-based industry.

The Bachelor of Science degree in Aerospace Engineering prepares students for engineering work in the exciting aerospace industry. The problems faced by the aerospace industry offer an unusual engineering challenge. Much of the analysis and testing must be accomplished at the very frontiers of technology and performance. Nevertheless, complex aerospace systems must be designed and manufactured; thus, an exceptionally wide range of engineering and problem solving abilities is required. Aerospace Engineering graduates obtain employment in all areas of the aerospace industry with a strong focus on aircraft and spacecraft design.

Aerospace Engineering students can choose between an Aeronautics or Astronautics concentration. Within Aeronautics, students learn the fundamentals of aerodynamics, flight mechanics, materials, structures, propulsion, and stability and control. Within Astronautics, students learn the fundamentals of orbital mechanics, space environment, space structures, telecommunications, attitude dynamics and control, and rocket propulsion. Both concentrations culminate with a Senior Design capstone course where students put theory into practice using a disciplined systems engineering approach to either aircraft or spacecraft design.

The BS degree program in Aerospace Engineering is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org/>. It places emphasis on both analysis and design, with supplementary basic work in laboratory projects. Throughout the entire program there is constant interplay between theory and application. Opportunities are available for advanced elective work in the student's field of special interest.

The program maintains laboratory facilities for fabrication, air breathing and space propulsion, structures and composites,

aerodynamics, dynamics and control, flight simulation and flight test, aerothermodynamics, advanced computation, and design.

Aerospace students may participate in two student chapters of national professional societies—the American Institute of Aeronautics and Astronautics and the Society for the Advancement of Material and Process Engineering. There is also a student chapter of the national aerospace engineering honor society, Sigma Gamma Tau. In addition, students have the opportunity to work on CubeSats and Autonomous Flight Systems, through other club activities or faculty research.

Undergraduate Program BS Aerospace Engineering

The Bachelor of Science degree in Aerospace Engineering prepares students for engineering work in the exciting aerospace industry. The aerospace industry is known for designing and building complex systems which push the limits of technology. Therefore a strong emphasis is placed on turning theory into practice and problem solving using a disciplined systems engineering approach. The program's faculty have developed a number of educational objectives to support this mission. These objectives are:

- Be life-long learners who continue to pursue professional development;
- Participate and thrive in a multi-disciplinary, systems-oriented work environment;
- Contribute to the solution of complex technical problems that exist in the global aerospace industry; and
- Understand their ethical role as a professional engineer and strive to promote a practice of integrity and foster diversity, equity, and inclusion in the workplace.

Concentrations

Aeronautics
Astronautics

Graduate Program

MS Aerospace Engineering

Characteristics

Emphasizes engineering science and research activity. Graduates have an increased capability for complex research, development, and innovative design, and are prepared for further study in engineering, leading to the Doctor of Engineering or Ph.D. or advanced positions within industry.

Program of Study

A thesis is required as a culminating experience. Students work with their advisor and the Department Graduate Coordinator to develop a program of study which supports their thesis topic. A thesis topic would typically be in an area such as: dynamics and control, fluid dynamics and aerodynamics, multidisciplinary design and optimization, aerospace propulsion, aerospace structures, and systems engineering.

For the most recent, comprehensive list of courses offered by the department, please contact the Department Graduate Coordinator or see the listing at <https://aero.calpoly.edu> (<http://aero.calpoly.edu/>).

Blended BS + MS Aerospace Engineering Program

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

A blended program is available for MS Aerospace Engineering.

Eligibility

Students majoring in BS Aerospace Engineering are eligible for the blended program in MS Aerospace Engineering.

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Aerospace Engineering department for any additional eligibility criteria.

BS Aerospace Engineering Program Learning Outcomes

ABET-Defined Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA

- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

AERO 121	Aerospace Fundamentals	2
AERO 215	Introduction to Aerospace Design	2
AERO 220	Aerospace Systems Engineering and Integration	1
AERO 299	Aerospace Thermodynamics	4
AERO 300	Aerospace Engineering Analysis	5
AERO 302	Aerospace Fluid Mechanics	4
AERO 303	Aerospace Gas Dynamics and Heat Transfer	4
AERO 320	Fundamentals of Dynamics and Control	4
AERO 321	Experimental Sensors, Actuators and Control	1
AERO 331	Aerospace Structural Analysis I	4
AERO 350	Fundamentals of Systems Engineering	2
AERO 431	Aerospace Structural Analysis II	4
AERO 433	Experimental Stress Analysis	1
AERO 460	Aerospace Engineering Professional Preparation	1
AERO 465	Aerospace Systems Senior Laboratory	1
CE 204 & CE 207 or CE 208	Mechanics of Materials I and Mechanics of Materials II and Mechanics of Materials	5
EE 201 & EE 251	Electric Circuit Theory and Electric Circuits Laboratory	4
Concentration courses (see below)		40

SUPPORT COURSES

CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ¹	4
IME 144	Introduction to Design and Manufacturing	4
MATE 210	Materials Engineering	3
MATH 141	Calculus I (B4) ¹	4
MATH 142	Calculus II (B4) ¹	4
MATH 143	Calculus III (Area B Electives) ¹	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
ME 211	Engineering Statics	3
ME 212	Engineering Dynamics	3
PHYS 141	General Physics I (Area B Electives) ¹	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
STAT 312	Statistical Methods for Engineers (Upper-Division B) ¹	4

GENERAL EDUCATION (GE)

(See GE program requirements below.) 48

FREE ELECTIVES

Free Electives	0
Total units	190

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Concentrations (select one)

- Aeronautics (p. 200)
- Astronautics (p. 201)

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4

Area F

F	Ethnic Studies	4
Total units		48

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Aeronautics Concentration

AERO 306	Aerodynamics and Flight Performance	4
AERO 307	Experimental Aerodynamics	2
AERO 401	Propulsion Systems	5
AERO 405	Supersonic and Hypersonic Aerodynamics	4
AERO 420	Aircraft Dynamics and Control	4
AERO 443	Aircraft Design I	3
AERO 444	Aircraft Design II	3
AERO 445	Aircraft Design III	3

Aeronautics Approved Electives. ¹

Select from the following:		12
AERO 351	Introduction to Orbital Mechanics	
AERO 360	Creative Problem Solving in Engineering Design ²	
AERO 355	Space Environments I	
AERO 356	Space Environments II	
AERO 406	Applied Computational Fluid Dynamics	
AERO 407	Reentry Aerodynamics	
AERO 408	Plasma Applications in Aerospace	
AERO 409	Flight Test	
AERO 421	Spacecraft Attitude Dynamics and Control	
AERO 425	Aircraft Performance	
AERO 432	Advanced Composite Structures Analysis	
AERO 434	Aerospace Structural Analysis III	
AERO 435	Aerospace Numerical Analysis	
AERO 450	Introduction to Aerospace Systems Engineering	
AERO 452	Spaceflight Dynamics II	
AERO 455	Introduction to Human Spaceflight	
AERO 446	Spacecraft Electrical and Electric Systems	
AERO 470	Selected Advanced Topics	
AERO 471	Selected Advanced Laboratory	
AERO 513	Applications of Remotely Piloted Aircraft Systems	
AERO 515	Continuum Mechanics	
AERO 522	Boundary-Layer Theory	
AERO 525	Computational Fluid Dynamics	
AERO 526	Spacecraft Thermal/Fluid Control	
AERO 532	Advanced Aerospace Composite Design	

AERO 533	Finite Elements for Aerospace Structural Analysis	
AERO 534	Aerospace Structural Dynamics Analysis	
AERO 535	Advanced Aerospace Structural Analysis	
AERO 540	Elements of Rocket Propulsion	
AERO 541	Air Breathing Propulsion	
AERO 548	Complexity in Engineered Systems	
AERO 549	Systems Engineering Applications	
AERO 553	Advanced Control Theory	
AERO 557	Advanced Orbital Mechanics	
AERO 560	Advanced Spacecraft Dynamics and Control	
AERO 561	Vehicle Integration and Testing	
AERO 562	Space Operations	
AERO 565	Advanced Topics in Aircraft Design	
AERO 568	Aerodynamic Research and Development I	
AERO 569	Aerodynamic Research and Development II	
AERO 570	Selected Advanced Topics ²	
AERO 571	Selected Advanced Topics Laboratory ²	
Total units		40

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² May require a petition depending on the topic. Please consult with your advisor.

Astronautics Concentration

AERO 351	Introduction to Orbital Mechanics	4
AERO 355	Space Environments I	3
AERO 356	Space Environments II	3
AERO 402	Spacecraft Propulsion Systems	5
AERO 421	Spacecraft Attitude Dynamics and Control	4
AERO 446	Spacecraft Electrical and Electric Systems	4
AERO 447	Spacecraft Design I	3
AERO 448	Spacecraft Design II	3
AERO 449	Spacecraft Design III	3
Astronautics Approved Electives¹		
Select from the following: 8		
AERO 306	Aerodynamics and Flight Performance	
AERO 360	Creative Problem Solving in Engineering Design ²	
AERO 405	Supersonic and Hypersonic Aerodynamics	
AERO 406	Applied Computational Fluid Dynamics	

AERO 407	Reentry Aerodynamics	
AERO 408	Plasma Applications in Aerospace	
AERO 409	Flight Test	
AERO 420	Aircraft Dynamics and Control	
AERO 425	Aircraft Performance	
AERO 432	Advanced Composite Structures Analysis	
AERO 434	Aerospace Structural Analysis III	
AERO 435	Aerospace Numerical Analysis	
AERO 450	Introduction to Aerospace Systems Engineering	
AERO 452	Spaceflight Dynamics II	
AERO 455	Introduction to Human Spaceflight	
AERO 470	Selected Advanced Topics	
AERO 471	Selected Advanced Laboratory	
AERO 513	Applications of Remotely Piloted Aircraft Systems	
AERO 515	Continuum Mechanics	
AERO 522	Boundary-Layer Theory	
AERO 525	Computational Fluid Dynamics	
AERO 526	Spacecraft Thermal/Fluid Control	
AERO 532	Advanced Aerospace Composite Design	
AERO 533	Finite Elements for Aerospace Structural Analysis	
AERO 534	Aerospace Structural Dynamics Analysis	
AERO 535	Advanced Aerospace Structural Analysis	
AERO 540	Elements of Rocket Propulsion	
AERO 541	Air Breathing Propulsion	
AERO 548	Complexity in Engineered Systems	
AERO 549	Systems Engineering Applications	
AERO 553	Advanced Control Theory	
AERO 557	Advanced Orbital Mechanics	
AERO 560	Advanced Spacecraft Dynamics and Control	
AERO 561	Vehicle Integration and Testing	
AERO 562	Space Operations	
AERO 566	Advanced Topics in Spacecraft Design	
AERO 568	Aerodynamic Research and Development I	
AERO 569	Aerodynamic Research and Development II	
AERO 570	Selected Advanced Topics ²	
AERO 571	Selected Advanced Topics Laboratory ²	
Total units		40

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals. Only 4 units of 300-level coursework is allowed as an Approved Elective.

² May require a petition depending on the topic. Please consult with your advisor.

MS Aerospace Engineering

Program Learning Objectives

1. Competency in advanced mathematics, science, and aerospace engineering knowledge.
2. Ability to apply advanced mathematics, science, and aerospace engineering knowledge to a project that is conducted independently.
3. Make a specific contribution to a field that is relevant to aerospace professionals.
4. Ability to convey effectively engineering ideas and results both orally and in writing.
5. Awareness of professional and ethical responsibility.
6. Awareness of global, contemporary issues related to aerospace engineering and the society at large.
7. Awareness of rapid advancement of modern technology and ability for life-long learning.

Required Courses

MATH 501	Analytic Methods in Applied Mathematics	4
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MATH 502 or approved numerical methods elective		4
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Advisor Approved Electives

500-level AERO courses		16
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400-500 level courses from the College of Engineering or College of Science and Mathematics		12
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Culminating Experience

AERO 599	Thesis (Design Project) (2, 2, 5)	9
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Total units		45
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Biomedical Engineering

Engineering Bldg. (13), Room 260
Phone: 805.756.6400
<https://bmed.calpoly.edu>

Department Chair: Lily Laiho

Engineering Student Services
Engineering South (40), Room 115
Phone: 805.756.1461

Academic Programs

Program name	Program type
Biomedical Engineering	BS, MS

Biomedical Engineering

Biomedical engineering is an interdisciplinary field in which the principles and tools of traditional engineering fields, such as mechanical, materials, electrical, and chemical engineering, are applied to biomedical problems. Engineering plays an increasingly important role in medicine in projects that range from basic research in physiology to advances in biotechnology and the improvement of health care delivery. By its very nature, biomedical engineering is broad and requires a foundation in the engineering sciences as well as in physiology and other biological sciences.

The BS degree program in Biomedical Engineering is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org/>.

Undergraduate Program BS Biomedical Engineering

Program Mission and Goals

The mission of the Biomedical Engineering program is to maintain an effective learning environment that enables and empowers graduates for careers of service, leadership and distinction in engineering or other fields. Our approach is to use a participatory, learn-by-doing, "hands-on" laboratory, projects and design centered approach to achieve this end.

To succeed in this mission, the educational objectives of the program are to facilitate graduates to:

1. Utilize a knowledge base with a core foundation in engineering, physical and biological sciences, which will enable them to apply their skills to a variety of challenges in their chosen field. Our graduates will demonstrate innovation, creativity, adaptability and critical thinking to solve problems in disciplines related to biomedical engineering that are relevant to industry, academia, or medicine, and health related fields.
2. Demonstrate leadership in their chosen fields and make decisions that are socially and ethically responsible. Our graduates will function effectively in multidisciplinary team environments and communicate effectively to a variety of audiences.
3. Build and expand upon their undergraduate foundations by engaging in learning opportunities throughout their careers.

The program offers a four-year curriculum leading to a B.S. degree. The main educational objectives of the program are to prepare graduates who will excel in the biomedical engineering profession, understand that their education is a continuous enterprise, and seek graduate

degrees for increased flexibility and mobility. The curriculum provides a sound theoretical background, practical engineering knowledge and solid laboratory exposure. It highlights an immediate introduction to the major, strong personal interaction with faculty, strong partnerships with industrial participants and a signature laboratory emphasis.

The application of engineering to medicine and biology underpins a strong and growing segment of the industrial sector and continues to be an area of inherent interest to students. The need for well educated professionals in this interdisciplinary area has become more acute as the technology being applied has become more sophisticated. Evolution in computing, electronics, signal analysis and mechatronic systems have resulted in dramatic improvements in diagnostic efforts, therapeutic approaches and bioindustrial applications. Studies of biological materials, physiological mechanisms, biochemical kinetics and heat and mass transport in biological systems require engineering expertise. With the advent of research into artificial organs, prosthetic devices and tissue engineering, applied medical research and applied biological research has taken on a distinct engineering aspect.

Biomedical engineering combines engineering expertise with medical needs for the enhancement of health care. It is a branch of engineering in which knowledge and skills are developed and applied to define and solve problems in biology and medicine. Students choose the biomedical engineering field to be of service to people; for the excitement of working with living systems; and to apply advanced technology to the complex problems of medical care.

Some well established specialty areas exist within the field of biomedical engineering: *bioinstrumentation*, *biomechanics*, *biomaterials*, *systems physiology*, *tissue engineering*, *clinical engineering*, and *rehabilitation engineering*.

Bioinstrumentation is the application of electronics and measurement principles and techniques to develop devices used in diagnosis and treatment of disease. Computers are becoming increasingly important in bioinstrumentation, from the microprocessor used to do a variety of small tasks in a single purpose instrument to the extensive computing power needed to process the large amount of information in a medical imaging system. *Biomechanics* is mechanics applied to biological or medical problems. It includes the study of motion, of material deformation, of flow within the body and in devices, and transport of chemical constituents across biological and synthetic media and membranes. *Biomaterials* describes both living tissue and materials used for implantation. Understanding the properties of the living material is vital in the design of implant materials. *Systems physiology* is the term used to describe that aspect of biomedical engineering in which engineering strategies, techniques and tools are used to gain a comprehensive and integrated understanding of the function of living organisms ranging from bacteria to humans. *Tissue engineering* is a rapidly developing field that combines engineered materials with living cells to restore or replace lost organ function. *Clinical engineering* is the application of technology for health care in hospitals. The clinical engineer is a member of the health care team along with physicians, nurses and other hospital staff. *Rehabilitation engineering* is a new and growing specialty area of biomedical engineering. Rehabilitation engineers expand capabilities and improve the quality of life for individuals with physical impairments.

In addition to the objectives for all engineering programs, the goal of the BS program in Biomedical Engineering is the preparation of engineering professionals who have: (1) an understanding of biology and physiology; (2) an ability to apply advanced mathematics to problems at the interface of engineering and biology; (3) an ability to measure and interpret

data from living systems; and (4) an ability to address the problems associated with the interaction between living and nonliving systems.

Concentrations

Bioinstrumentation

The bioinstrumentation concentration prepares students for entry level jobs in the biomedical devices industry where a deeper understanding of electrical engineering skills are necessary.

Mechanical Design

The mechanical design concentration prepares students for employment in the product development, design, or manufacturing fields in the biomedical device industry.

General Curriculum in Biomedical Engineering

A General Curriculum in Biomedical Engineering is also an option. It is not a formal concentration. Students are encouraged to select from one of the concentrations listed above, but those who do not declare a concentration will default to the General Curriculum.

Graduate Programs

MS Biomedical Engineering

General Characteristics

The Master of Science degree program in Biomedical Engineering is well-suited for those individuals who desire depth in engineering application to living systems, with a strong pragmatic and rigorous, hands-on educational experience. Graduates will be well-equipped to make significant contributions to the biomedical field.

Prerequisites

For admission as a classified graduate student, an applicant must possess a bachelor's degree in engineering or a closely related physical science with a minimum grade point average of 3.0 in the last 90 quarter units (60 semester units) attempted. Applicants for graduate engineering programs are required to submit scores for the General Test of the Graduate Record Examination. Applicants are also required to submit 3 letters of reference in support of their application. A college level biology course, with laboratory, for biology majors is highly recommended. Applicants who meet these standards but lack prerequisite coursework may be admitted as conditionally classified students and must make up any deficiencies before advancement to candidacy. Applicants from other academic disciplines, such as biology or chemistry are encouraged to apply and may be admitted to the program conditionally in order to make up deficiencies in prerequisite coursework. Information regarding specific admission requirements and classification as a graduate student may be obtained from the Graduate Coordinator, Biomedical Engineering.

Program of Study

Graduate students must file formal study plans with their advisor, department, college, and university graduate studies office no later than the end of the first quarter in residence. The formal program of study must include a minimum of 45 units with:

1. At least 27 units of the 45 unit program at the 500 level.
2. A thesis or project as the required culminating experience.

MS Biomedical Engineering, Specialization in Regenerative Medicine Characteristics

Prepares students for careers in regenerative medicine and related fields. Specifically, our graduates are prepared for immediate employment in cell therapy, tissue engineering, biopharma, or medical technology companies, and as research specialists/laboratory managers at universities or research institutes. Program graduates are also well-prepared to matriculate into bioengineering doctoral programs or graduate programs in the health professions.

Culminating Experience

Students who obtain a degree in the Master of Science in Biomedical Engineering with a specialization in Regenerative Medicine are not required to complete a "thesis" through BMED 599. In place of the thesis as a culminating experience, students complete a Project during a 9-month internship at a company or research laboratory¹ (ASCI/ BIO/BMED 593). The Project Report is evaluated by their Cal Poly and Internship Mentor; their Project Presentation is evaluated by their Cal Poly and Internship Mentors, and Program Director.

¹Students will complete their internship at one of our partner institutions. An updated list of our current partners can be found on our program website - regenmed.calpoly.edu.

Blended BS + MS Biomedical Engineering Program

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

A blended program is available for MS Biomedical Engineering.

Eligibility

Majors that are eligible for the blended program in MS Biomedical Engineering are:

- BS Biomedical Engineering
- BS Chemistry
- BS Computer Engineering
- BS Electrical Engineering
- BS Mechanical Engineering
- BS Materials Engineering

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Biomedical Engineering department for any additional eligibility criteria.

BS Biomedical Engineering

Program Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objective
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Furthermore, our program prepares graduates with experience in:

- Applying principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations) and statistics
- Solving bio/biomedical engineering problems, including those associated with the interaction between living and non-living systems
- Analyzing, modeling, designing, and realizing bio/biomedical engineering devices, systems, components, or processes
- Making measurements on and interpreting data from living systems

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

BMED 101	Introduction to the Biomedical Engineering Major	1
BMED 102	Introduction to Biomedical Engineering Analysis	1
BMED 212	Introduction to Biomedical Engineering Design	3
BMED 310	Biomedical Engineering Measurement and Analysis	4
BMED 410	Biomechanics	4
BMED 420	Principles of Biomaterials Design	4

BMED 425	Biomedical Engineering Transport	4
BMED 430	Biomedical Modeling and Simulation	2
BMED 440	Bioelectronics and Instrumentation	4
BMED 450	Contemporary Issues in Biomedical Engineering	4
BMED 455	Biomedical Engineering Design I ¹	4
BMED 456	Biomedical Engineering Design II: Senior Project ¹	4
BMED 460	Engineering Physiology	4
General Curriculum in BS Biomedical Engineering or Concentration		28-33

SUPPORT COURSES

BIO 161	Introduction to Cell and Molecular Biology (B2 & B3) ²	4
BIO 231 or BIO 232	Human Anatomy and Physiology I or Human Anatomy and Physiology II	5
CE 204	Mechanics of Materials I ³	3
CHEM 124	General Chemistry for Physical Science and Engineering I (B1) ²	4
CHEM 125	General Chemistry for Physical Science and Engineering II	4
CSC 231	Programming for Engineering Students	2
EE 201	Electric Circuit Theory	3
ENGL 147	Writing Arguments about STEM (A3) ²	4
MATE 210	Materials Engineering	3
MATH 141	Calculus I (B4) ²	4
MATH 142	Calculus II (B4) ²	4
MATH 143	Calculus III (Area B Electives) ²	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
ME 211	Engineering Statics	3
ME 212	Engineering Dynamics	3
ME 302	Thermodynamics I	3
ME 341	Fluid Mechanics I	3
PHYS 141	General Physics I (Area B Electives) ²	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
STAT 312	Statistical Methods for Engineers (Upper-Division B) ²	4

GENERAL EDUCATION (GE)

(See GE program requirements below.) 40

FREE ELECTIVES

Free Electives 0

Total units 191-196

¹ ENGR 459, ENGR 460, ENGR 461 and BMED 400 (8); or ENGR 463, ENGR 464, ENGR 465, and BMED 400 (8) may substitute for BMED 455 and BMED 456 (8).

² Required in Major or Support; also satisfies General Education (GE) requirement.

³ For students following the General Curriculum or Mechanical Design Concentration in BS Biomedical Engineering, CE 208 (5) may substitute for both CE 204 (3) and CE 207 (2).

General Curriculum in BS Biomedical Engineering or Concentrations

- General Curriculum (p. 207)
- Bioinstrumentation (p. 206)
- Mechanical Design (p. 206)

General Education (GE) Requirements

- 72 units required, 32 of which are specified in Major and/or Support.
- If any of the remaining 40 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking (4 units in Support) ¹	0
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4

Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		40

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Bioinstrumentation Concentration

BMED 355	Electrical Engineering Concepts for Biomedical Engineering	4
BMED 445	Biopotential Instrumentation	4
EE 228	Continuous-Time Signals and Systems	4
EE 251	Electric Circuits Laboratory	1
EE/CPE 328	Discrete Time Signals and Systems	3
EE/CPE 368	Signals and Systems Laboratory	1
IME 156	Basic Electronics Manufacturing	2
MATH 344	Linear Analysis II	4
Approved Technical Electives		
Select from the following:		3-5
BMED 434	Micro/Nano Fabrication	
BMED 515	Introduction to Biomedical Imaging	
BMED 555	Neural Systems Simulation and Modeling	
EE 302 & EE 342	Classical Control Systems and Classical Control Systems Laboratory	
EE 335 & EE 375	Electromagnetic Fields and Transmission and Electromagnetic Fields and Transmission Laboratory	
Approved Electives		
Select from the following:		3-5
BIO 232	Human Anatomy and Physiology II	
BIO 302	Human Genetics	
BIO 303	Survey of Genetics	
BIO/CHEM 441	Bioinformatics Applications	
CHEM 312	Organic Chemistry: Fundamentals and Applications	
CHEM 446	Surface Chemistry of Materials	
Total units		29-33

Mechanical Design Concentration

BMED 330 or ME 329	Intermediate Biomedical Design Mechanical Systems Design	4
CE 207	Mechanics of Materials II ¹	2
IME 141	Manufacturing Processes: Net Shape	1
MATH 344	Linear Analysis II	4
ME 228	Engineering Design Communication	2
ME 251	Introduction to Detailed Design with Solid Modeling	2
ME 328	Design for Strength and Stiffness	4
Approved Technical Electives		

Select from the following: 7-8

BMED/CE/ME 404	Applied Finite Element Analysis
BMED 525	Skeletal Tissue Mechanics
IME 418	Product-Process Design
IME 430	Quality Engineering
IME 435	Reliability for Design and Testing
IME 527	Design of Experiments
ME 318	Mechanical Vibrations
ME 326	Intermediate Dynamics
ME 401	Stress Analysis
ME 402	Orthopedic Biomechanics
ME 403	Access by Design: Introduction to Rehabilitation Engineering
ME 410	Experimental Methods in Mechanical Design I
ME 412	Composite Materials Analysis and Design

Approved Electives

Select from the following: 3-5

BIO 232	Human Anatomy and Physiology II
BIO 302	Human Genetics
BIO 303	Survey of Genetics
CHEM 312	Organic Chemistry: Fundamentals and Applications
CHEM/MATE 446	Surface Chemistry of Materials

Total units 29-32

¹ For students following the General Curriculum or Mechanical Design Concentration in BS Biomedical Engineering, CE 208 (5) may substitute for both CE 204 (3) and CE 207 (2).

General Curriculum in Biomedical Engineering

This is the default curriculum required for students who do not declare a concentration.

CE 207	Mechanics of Materials II ¹	2-3
or EE 321	Electronics	
ME 228	Engineering Design Communication	2
Approved Technical Electives		12
BMED 355	Electrical Engineering Concepts for Biomedical Engineering	
BMED/CE/ME 404	Applied Finite Element Analysis	
BMED 422	Medical Device Evaluation and the FDA Approval Process	
BMED 432	Micro/Nano System Design	
BMED 434/MATE 430	Micro/Nano Fabrication	
BMED 435	Microfabrication Laboratory	
BMED 436	Characterization of Micro/Nano Scale Structures	
BMED 445	Biopotential Instrumentation	

BMED 459	Senior Thesis
BMED 510	Principles of Tissue Engineering
BMED 515	Introduction to Biomedical Imaging
BMED 525	Skeletal Tissue Mechanics
BMED/MATE 530	Biomaterials
BMED 535	Bioseparations and Clinical Diagnostics
BMED 550	Current and Evolving Topics in Biomedical Engineering
IME 420	Simulation
IME 430	Quality Engineering
IME 435	Reliability for Design and Testing
IME 527	Design of Experiments
MATE 380	Thermodynamics and Physical Chemistry
MATE 401	Materials Characterization Techniques
MATE 410	Nanoscale Engineering
MATE 425	Corrosion Engineering
MATE/CHEM 446	Surface Chemistry of Materials
ME 305	Introduction to Mechatronics
ME 326	Intermediate Dynamics
ME 403	Access by Design: Introduction to Rehabilitation Engineering

Approved Support Electives 12

BIO 232	Human Anatomy and Physiology II
BIO 302	Human Genetics
BIO 303	Survey of Genetics
BIO 351	Principles of Genetics
BIO/CHEM 441	Bioinformatics Applications
BIO 452	Cell Biology
BUS 310	Introduction to Entrepreneurship
CHEM 312	Organic Chemistry: Fundamentals and Applications
CHEM 314	Biochemistry: Fundamentals and Applications
IME 327	Test Design and Analysis in Manufacturing Engineering
MATE 215	Materials Laboratory I
MATE 222	Materials Selection Life Cycle
MATH 344	Linear Analysis II
MCRO 224	General Microbiology I

Total units 28-29

¹ For students following the General Curriculum or Mechanical Design Concentration in BS Biomedical Engineering, CE 208 (5) may substitute for both CE 204 (3) and CE 207 (2).

MS Biomedical Engineering

Program Learning Objectives

1. Analyze contemporary challenges in biomedical engineering, discover knowledge gaps, and assess needs to formulate research and development opportunities.

- Demonstrate understanding of biomedical engineering practice in a regulated environment.
- Utilize modern techniques and technologies to generate data of significance to biomedical innovations/challenges.
- Apply advanced engineering methods – such as theoretical, computational, or manufacturing tools – to the design and/or evaluation of biomedical systems.
- Employ statistical approaches to design experiments, and analyze & interpret data to form data-driven conclusions.
- Communicate engineering, biological, and medical concepts in both written and oral forms.
- Demonstrate independence and initiative in acquiring the knowledge and skills necessary to complete biomedical engineering projects at the interface between biology, medicine, and engineering.

- Describe how research & development efforts are motivated by and impact physician & patient experiences.
- Design and execute independent research projects.

Required Courses

BMED 520 or BMED 530	Modeling of Biomedical Systems Biomaterials	4
BMED 505 or BMED 515	Biomedical Signal Transduction and Data Acquisition Introduction to Biomedical Imaging	4
BMED 563	Biomedical Engineering Graduate Seminar	2
STAT 513 or IME 527	Applied Experimental Design and Regression Models ¹ Design of Experiments	4
BMED 599 or BMED 593	Design Project (Thesis) ² Regenerative Medicine Internship	9
Approved Engineering, Science and Mathematics Electives Course selection requires advisor approval. ³		22
Total units		45

¹ Masters Students who have not had the pre-requisite statistics courses will be required to take either IME 503 or STAT 511 prior to enrolling in IME 527 or STAT 513, respectively. IME 503 or STAT 511 can count towards Approved Electives.

² Masters Students on the Project Track will be required to take BMED 591 (2), BMED 592 (2), and BMED 599 (5).

³ 60% or more of the total 45 units must be from approved 500 level courses, the balance being approved 400 level courses.

Required Courses

BMED 520 or BMED 530	Modeling of Biomedical Systems Biomaterials	4
BMED 505 or BMED 515	Biomedical Signal Transduction and Data Acquisition Introduction to Biomedical Imaging	4
STAT 513 or IME 527	Applied Experimental Design and Regression Models Design of Experiments	4
BMED 510	Principles of Tissue Engineering	4
BMED 560	Cell Transplantation and Biotherapeutics	2
BMED 561	Cell Transplantation and Biotherapeutics Laboratory	2
BIO/CHEM 475 or ASCI 403	Molecular Biology Laboratory Applied Biotechnology in Animal Science	3-5
BIO 534	Principles of Stem Cell Biology	2
ASCI 581	Graduate Seminar in Animal Science	1
BIO 590	Seminar in Biology	1
BMED 563	Biomedical Engineering Graduate Seminar	2
BIO 509	Communicating Biology to General Audiences	1
BIO/ASCI/BMED 583	Research Experience for Regenerative Medicine Students	2
ASCI/BIO/BMED 593	Regenerative Medicine Internship	9
Approved Electives ¹		4
Total units		45

¹ The range of elective units reflects differences in the Molecular Techniques Course options (BIO 475; ASCI 403) and inclusion of BMED 500, such that the total required units for the program are 45.

MS Biomedical Engineering, Specialization in Regenerative Medicine

Program Learning Objectives

- Perform fundamental laboratory skills involved in regenerative medicine research & development.
- Discuss and critically evaluate biomedical primary literature.
- Effectively communicate technical topics to both peer and lay audiences.
- Explain the process of biotechnology development & commercialization.

Civil & Environmental Engineering

Engineering Bldg. (13), Room 266
 Phone: 805.756.2947
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Department Chair: Misgana Muleta

Engineering Student Services
 Engineering South (40), Room 115
 Phone: 805.756.1461

Academic Programs

Program name	Program type
Civil and Environmental Engineering	MS
Civil Engineering	BS
Cross Disciplinary Studies Minor in Heavy Civil	Minor
Environmental Engineering	BS
Specialization in Transportation Planning	Concurrent CE-MS/ MCRP

The Civil and Environmental Engineering Department at Cal Poly, San Luis Obispo offers a rigorous and engaging educational experience that fully embraces Cal Poly's "Learn by Doing" approach.

Undergraduate Programs

BS Civil Engineering

Graduates of a civil engineering program must have the engineering skills needed to plan, design, construct, and maintain infrastructure and industrial facilities. In addition, graduates must have the broad education necessary to communicate effectively with other engineers, architects, planners, administrators, government officials, and the general public. The faculty and staff of the Civil Engineering program at Cal Poly understand these needs and take pride in preparing their students for the challenges associated with engineering practice.

The Civil Engineering program at Cal Poly has quickly grown into one of the largest and most respected programs in California and the nation. The program consistently attracts top student candidates because of its modern, well-equipped laboratories, the close interaction that occurs between undergraduates and full-time faculty, and a strong reputation among employers in the civil engineering and construction industries. Scientific depth is included within the curriculum for those students who are interested in graduate study.

The Civil Engineering program recognizes the importance of student organizations and strongly supports the American Society of Civil Engineers (ASCE) Student Chapter, the Institute of Transportation Engineers (ITE), Engineers Without Borders (EWB), and Chi Epsilon (the national civil engineering honor society). These student groups, along with others, sponsor opportunities for professional development, community service, and social activities which help to complement the formal academic program. The ASCE, ITE, and EWB Student Chapters have been recognized and awarded nationally on multiple occasions for their outstanding work and efforts in leadership and scholarship.

The Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>. The program's mission is to prepare students for successful careers in civil engineering

by providing a high quality, practice-oriented education that emphasizes design project experiences, "hands-on" laboratory activities, and teamwork. The program's faculty, in consultation with civil engineering practitioners and alumni, have developed a number of educational objectives to support this mission. These objectives are:

1. Integrate principles of sustainability, resilience, and restoration into engineering solutions.
2. Communicate and collaborate with diverse stakeholders in an inclusive, effective, equitable, and professional manner.
3. Implement systems thinking in engineering designs and solutions that promote public health, safety, and welfare on a local and global scale.
4. Pursue life-long professional development through study, licensure, certification, leadership, and service.
5. Acknowledge, understand, and incorporate the needs of diverse and vulnerable populations in outreach and engineering practice.

The undergraduate curriculum in civil engineering is designed to support the educational objectives. Therefore, the curriculum includes broad coverage of mathematics, engineering and basic sciences, liberal arts, humanities, and social sciences. The program also includes a number of required engineering courses designed to ensure students become proficient in a breadth of civil engineering sub-disciplines: geotechnical, construction, structural, transportation, environmental, and water resources.

All CE majors must complete a quarter course in professional practice and a two quarter senior design capstone sequence that focuses on current civil engineering design procedures, standards and multiple realistic constraints. The professional practice course includes topics on interpersonal communication, teamwork, leadership, and ethics. Together, the three quarters promote an understanding of the issues and skills to become a successful design professional.

Flexibility within the curriculum allows students to select from a wide range of upper division civil engineering technical electives. Students use these technical electives to focus in one of the five areas of civil engineering noted above or to design a "general" curriculum that allows for a broad range of civil engineering interests. Students should consult with a faculty advisor prior to selecting and enrolling in upper division civil engineering technical electives.

BS Environmental Engineering

The BS program in Environmental Engineering is concerned with the interrelation of people, materials, and processes in a complex and changing environment. The broad field of environmental engineering includes control of air and water pollution, environmental health and safety, solid waste, hazardous waste management, and pollution prevention.

The program offers a sound background in the fundamentals of thermodynamics, fluid mechanics, mass transfer, water resources, and geotechnical engineering. The problem-oriented approach to instruction, in modern well-equipped laboratories, provides an excellent opportunity to gain understanding and experience of the discipline. The program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

The main focus of the program is to prepare graduates for practice in professional engineering. Thus, Cal Poly's "learn by doing" philosophy is emphasized by integrating design throughout the curriculum, especially

in the numerous design-centered laboratories. In the required senior design project, which is completed in a two-quarter set of capstone courses, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

The Environmental Engineering program educational objectives are that its graduates will:

1. Integrate principles of sustainability, resilience, and restoration into engineering solutions.
2. Communicate and collaborate with diverse stakeholders in an inclusive, effective, equitable, and professional manner.
3. Implement systems thinking in engineering designs and solutions that promote public health, safety, and welfare on a local and global scale.
4. Pursue life-long professional development through study, licensure, certification, leadership, and service.
5. Acknowledge, understand, and incorporate the needs of diverse and vulnerable populations in outreach and engineering practice.

An engineering approach to the subject enables graduates of the program to pursue careers in industry, consulting firms, and public agencies concerned with air and water pollution control, groundwater, potable water treatment, solid waste management, and hazardous waste management.

Various program constituencies, such as graduates and employers, are consulted periodically for input on the appropriateness as well as the attainment of the educational objectives. Other indicators such as student/alumni placement and success rates in the statewide fundamentals in engineering examination are also used to evaluate attainment.

The Society of Environmental Engineers offers technical programs and other activities, including field trips to study typical installations of systems. Student memberships also are available in the Air and Waste Management Association, the California Water Pollution Control Association, and the Water Environment Federation.

Cross Disciplinary Studies Minor in Heavy Civil

An interdisciplinary minor sponsored by the Civil and Environmental Engineering department and the Construction Management Department. For more information, see the Construction Management (p. 167) section of the catalog.

Graduate Programs MS Civil and Environmental Engineering General Characteristics

The Master of Science program in Civil and Environmental Engineering has the following objectives:

- Job-entry education for the more complex areas of engineering, such as research and development, innovative design, systems analysis and design, and managerial engineering;
- Updating opportunities for practicing engineers;

- Graduate preparation for further study in engineering, leading to the Doctor of Engineering or Ph.D. degree.

Prerequisites

For admission as a classified graduate student, an applicant must hold a bachelor's degree in engineering or a closely related physical science with a minimum GPA of 3.0 in the last 90 quarter units (60 semester) attempted. Applicants are required to submit satisfactory scores for the General (Aptitude) Test of the Graduate Record Examination. An applicant who meets these standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must make-up any deficiencies before advancement to classified graduate standing.

Information pertaining to specific requirements for admission to graduate standing (classified or conditionally classified) may be obtained from the Graduate Program Coordinator of the MS in Civil and Environmental Engineering program.

Program of Study

Graduate students must file a formal study plan with their advisor, department, college and university graduate studies office by no later than the end of the quarter in which the 12th unit of approved courses is completed. The formal program of study must include a minimum of 45 units (at least 60% must be at the 500 level). With the graduate advisor's approval, students select their elective units in one of the following areas of study: geotechnical engineering, structural engineering, transportation and planning, or water resources and environmental engineering.

The broad curriculum requirements for the MS in Civil and Environmental Engineering are:

- 45 total units of 400 and 500 level courses;
- 2 units of Graduate Seminar (CE 591 and CE 592)
- a minimum of 20 units of advisor approved electives within the major;
- at least 60% of the 45 unit program at the 500 level;
- a comprehensive examination (non-thesis option) or a written thesis with an oral defense (thesis option).

Two program options are available:

Thesis option

36 units of advisor-approved coursework and 9 units of research/design resulting in a written thesis and oral defense examination administered by a panel of at least three faculty.

Non-thesis option

44 units of advisor-approved coursework and 1-unit comprehensive examination consisting of written and oral components administered by a panel of three faculty (maximum of two opportunities to pass this examination). Not an option for the blended BS+MS program.

Joint Interdisciplinary Program Concurrent CE-MS/MCRP with Specialization in Transportation Planning

The Concurrent CE-MS/MCRP with Specialization in Transportation Planning (p. 429) is a joint interdisciplinary program between the Civil and Environmental Engineering Department in the College of Engineering and the City and Regional Planning Department in the College of Architecture and Environmental Design. Participation in the

program requires enrollment in both Colleges. Participants successfully completing the program are awarded both the Master of Science in Civil and Environmental Engineering (CE-MS) and the Master of City and Regional Planning (MCRP) with a Specialization in Transportation Planning.

Blended BS + MS Civil and Environmental Engineering Program

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

A blended program is available for MS Civil and Environmental Engineering.

Eligibility

Majors that are eligible for the blended program are:

- BS Civil Engineering
- BS Environmental Engineering

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Civil and Environmental Engineering department for any additional eligibility criteria.

Program of Study

The blended program allows students to earn graduate credit for several of their senior electives (up to 9 units) effectively decreasing the summed unit requirements for both degrees. Students in the blended program are required to complete both a senior project (ENVE or CE) and a thesis. All other requirements stated above for the MS thesis-option are the same.

BS Civil Engineering

Program Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism

No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

CE 111	Introduction to Civil Engineering	1
CE 112	Design Principles in Civil Engineering	2
CE 113	Computer Aided Drafting in Civil Engineering	2
Select one of the following two options: ¹		5
CE 204 & CE 207 or CE 208	Mechanics of Materials I and Mechanics of Materials II Mechanics of Materials	
CE 222	Introductory Experiments in Transportation Engineering	1
CE 251	Programming Applications in Engineering	2
CE 259	Civil Engineering Materials	2
CE 321 & CE 322	Fundamentals of Transportation Engineering and Fundamentals of Transportation Engineering Laboratory	4
CE 336 & CE 337	Water Resources Engineering and Hydraulics Laboratory	5
CE 352	Structural Engineering	4
CE 355	Reinforced Concrete Design	4
CE/CM 371	Construction Management and Project Planning	4
CE 381 & CE 382	Geotechnical Engineering and Geotechnical Engineering Laboratory	5
CE 465	Civil Engineering Professional Practice	1
CE 466 & CE 467	Senior Design Project I and Senior Design Project II	6
Technical Electives ^{2, 3, 4}		24

In consultation with faculty advisor, select from CE 356, ENVE 325, CE/CM 436 and any 400-500 level CE and ENVE courses not required in Major Courses (a maximum of 4 units may be selected from the following list):

ARCE 305	Masonry Design
ARCE 372	Steel Structures Design Laboratory
BIO/NR/SS 421	Wetlands
BMED/CE/ME 404	Applied Finite Element Analysis

BRAE 345	Aerial Photogrammetry and Remote Sensing
BRAE 447	Advanced Surveying with GIS Applications
BRAE 532	Water Wells and Pumps
CHEM 341	Environmental Chemistry: Water Pollution
CM 310	Construction Means and Methods
CM 334	Construction Law
CRP 420	Land Use Law
CRP 435	Transportation Theory
CRP/NR 404	Environmental Law
CRP/NR 408	Water Resource Law and Policy
ERSC 442	Applied Environmental Groundwater Hydrology
ERSC/GEOL 416	Field-Geology Methods
ERSC/GEOL 417	Geologic Mapping
GEOL 415	Structural Geology
IME 314 or IME 315	Engineering Economics Financial Decision Making for Engineers
MATE 425	Corrosion Engineering
MATE 450	Fracture and Failure Analysis
MATH 344	Linear Analysis II
SS 423	Environmental Soil and Water Chemistry

SUPPORT COURSES

BIO 213 & BMED 213	Life Science for Engineers and Bioengineering Fundamentals (B2) ⁵	4
BRAE 239	Engineering Surveying	4
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ⁵	4
CHEM 125	General Chemistry for Physical Science and Engineering II	4
ENVE 331	Fundamentals of Environmental Engineering	4
GEOL 201	Physical Geology	3
MATE 210	Materials Engineering	3
MATE 215	Materials Laboratory I	1
MATH 141	Calculus I (B4) ⁵	4
MATH 142	Calculus II (B4) ⁵	4
MATH 143	Calculus III (Area B Electives) ⁵	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
ME 211	Engineering Statics	3
ME 212	Engineering Dynamics	3
ME 341	Fluid Mechanics I	3
PHYS 141	General Physics I (Area B Electives) ⁵	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
STAT 312	Statistical Methods for Engineers (Upper-Division B) ⁵	4
Approved Engineering Science Elective ^{2, 4, 6}		
Select from the following:		2-4

CM 280	Building Information Modeling
CSC 231	Programming for Engineering Students
CSC 234	C and Unix
EE 201	Electric Circuit Theory
IME 314 or IME 315	Engineering Economics Financial Decision Making for Engineers
MATH 304	Vector Analysis
MATH 344	Linear Analysis II
ME 302	Thermodynamics I
GENERAL EDUCATION (GE)	
(See GE program requirements below.)	44
FREE ELECTIVES	
Free Electives	0
Total units	190-192

- Transfer students take CE 208 in the Fall Quarter.
- Consultation with advisor is recommended prior to selecting Technical or Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- Additional guidelines for Technical Electives:
 - More than 4 units of coursework outside CE/ENVE is only permitted in special/ unusual cases and requires written justification by the student, and approval by the Department Chair.
 - No more than 4 combined units of CE 400, CE 500 and ENVE 400, ENVE 500 can count towards the degree.
 - No more than 8 combined units of CE 470 / ENVE 470, CE 471 / ENVE 471, CE 570 / ENVE 570, CE 571 / ENVE 571 can be credited.
 - Co-op, graduate seminar, senior project/design, and thesis courses are not permitted.
 - Only one course can be credited for CE 459 / CE 556.
- Degree credit will only be given to one of the following courses: IME 314 or IME 315.
- Required in Major or Support; also satisfies General Education (GE) requirement.
- If a course is taken to meet the Approved Engineering Science Elective requirement, it cannot be double-counted as another Major or Support requirement.

General Education (GE) Requirements

- 72 units required, 28 of which are specified in Major and/or Support.
- If any of the remaining 44 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/ Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	

B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		44

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

BS Environmental Engineering

Program Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factor.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

CE 113	Computer Aided Drafting in Civil Engineering	2
Select one of the following two options: ¹		5
CE 204 & CE 207 or CE 208	Mechanics of Materials I and Mechanics of Materials II and Mechanics of Materials	
CE 251	Programming Applications in Engineering	2
CE 336	Water Resources Engineering	4
CE 337	Hydraulics Laboratory	1
CE 381	Geotechnical Engineering	4
CE 434	Groundwater Hydraulics and Hydrology	4
CE 465	Civil Engineering Professional Practice	1
ENVE 111	Introduction to the Environmental Engineering Profession	1
ENVE 264	Environmental Fluid Mechanics	4
ENVE 304	Process Thermodynamics	3
ENVE 309	Noise and Vibration Control	3
ENVE 325	Air Quality Engineering	4
ENVE 331	Fundamentals of Environmental Engineering	4
ENVE 421	Mass Transfer Operations	4
ENVE 426	Air Quality Measurements	3
ENVE 434	Water Chemistry and Water Quality Measurements	4
ENVE 438	Water and Wastewater Treatment Design	3
ENVE 450	Industrial Pollution Prevention	4
ENVE 466 & ENVE 467	Senior Project Design Laboratory I and Senior Project Design Laboratory II	4
Select from the following:		12
ENVE 411	Air Pollution Control	
ENVE 436	Introduction to Hazardous Waste Management	
ENVE 439	Sustainable Solid Waste Engineering	
ENVE 443	Bioremediation Engineering	
ENVE 455	Environmental Health and Safety	

ENVE 480	Environmental Engineering of Energy	
Technical Electives ^{2,3}		10
Select from the below Technical Electives list		
SUPPORT COURSES		
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ⁴	4
CHEM 125	General Chemistry for Physical Science and Engineering II	4
CHEM 126	General Chemistry for Physical Science and Engineering III	4
CHEM 312	Organic Chemistry: Fundamentals and Applications ⁵	5
MATH 141	Calculus I (B4) ⁴	4
MATH 142	Calculus II (B4) ⁴	4
MATH 143	Calculus III (Area B Electives) ⁴	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
MCRO 221	Microbiology (B2) ⁴	4-5
or MCRO 224	General Microbiology I	
ME 211	Engineering Statics	3
PHYS 141	General Physics I (Area B Electives) ⁴	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
STAT 312	Statistical Methods for Engineers (Upper-Division B) ⁴	4
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		44
FREE ELECTIVES		
Free Electives		0
Total units		190-191

¹ Transfer students take CE 208 in the Fall Quarter.

² To be selected in consultation with your academic advisor.

³ A student may petition to take a course not included in the list of electives and receive Technical Elective credit, but they must first obtain approval from a faculty advisor, before taking the course.

⁴ Required in Major or Support; also satisfies General Education (GE) requirement.

⁵ CHEM 212 substitutes, but will not be counted as upper-division units.

Technical Electives

Technical Electives may be chosen from any 300-500 level CE/ENVE courses not taken to satisfy other curriculum requirements, with the following exceptions: senior project, co-op, graduate seminar, comprehensive exam, and thesis; and ENVE 324, ENVE 323, ENVE 570, ENVE 571.

Technical Electives cannot be used to satisfy other Major or Support requirements. No double counting is allowed.

No more than 4 units in total from CE 400/ENVE 400, CE 500/ENVE 500, ENVE 405, ENVE 407, and ENVE 471 combined can be counted towards Technical Electives.

No more than 4 units of coursework other than CE/ENVE may be used to satisfy the Technical Electives degree requirement.

Air Quality and Climate

ERSC/GEOG 414	Global and Regional Climatology
PHYS 313	Introduction to Atmospheric Physics

Appropriate Technology

PSC/UNIV 492	Appropriate Technology for the World's People: Design
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Biology/Biochemistry/Microbiology

BIO 363	Principles of Conservation Biology
ENGR/ENVE 581	Biochemical Engineering
MCRO 342	Public Health Microbiology

Computer Applications and Computations

LA/NR 317	The World of Spatial Data and Geographic Information Technology
STAT 313	Applied Experimental Design and Regression Models
STAT 323	Design and Analysis of Experiments I

Chemistry

CHEM 314	Biochemistry: Fundamentals and Applications
CHEM 341	Environmental Chemistry: Water Pollution

Energy

BRAE 448	Bioconversion
PHYS 310	Physics of Energy

Hydrology and Soils

BRAE 532	Water Wells and Pumps
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Law and Policy

CRP/NR 404	Environmental Law
CRP/NR 408	Water Resource Law and Policy
IME 314	Engineering Economics
or IME 315	Financial Decision Making for Engineers

General Education (GE) Requirements

- 72 units required, 28 of which are specified in Major and/or Support.
- If any of the remaining 44 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A English Language Communication and Critical Thinking

A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4

Area B Scientific Inquiry and Quantitative Reasoning

B1	Physical Science (4 units in Support)	0
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B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		44

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

MS Civil and Environmental Engineering

Program Learning Objectives

1. Apply and synthesize technical knowledge to solve solutions to advanced Civil and Environmental Engineering problems in a chosen subject area of mastery (Environmental, Geotechnical, Structural, Water Resources, or Transportation Engineering).
2. Demonstrate the ability for lifelong learning necessary for the constantly evolving nature of engineering design and practice.
3. Effectively communicate technical information orally and in writing.
4. Demonstrate independent thinking and decision making skills.
5. Integrate ethical and professional components into the solutions of complex engineering problems.
6. Evaluate engineering systems for sustainable performance and create solutions to encompass a project's full lifecycle.

Required Courses

CE 591	Graduate Seminar I	1
CE 592	Graduate Seminar II	1
Select one of the following options:		9
CE/ENVE 599	Design Project (Thesis)	

Or 9 units of advisor approved analysis and design electives within the major (nonthesis option)	
Advisor approved analysis and design electives within Civil and Environmental Engineering ³	
Select from the following: ¹ 20-34	
CE 400	Special Problems ²
CE 407	Structural Dynamics
CE 421	Traffic Engineering
CE 422	Highway Geometrics and Design
CE 423	Intelligent Transportation Systems
CE 424	Public Transportation
CE 429	Highway Pavement Designs
CE 431	Coastal Hydraulics I
CE 432	Coastal Hydraulics II
CE 433	Open Channel Hydraulics
CE 434	Groundwater Hydraulics and Hydrology
CE 440	Hydraulic Systems Engineering
CE 454	Integrated Structural Design
CE 455	Design of Timber Structures
CE 457	Bridge Engineering
CE 459	FRP Strengthening of Reinforced Concrete Structures
CE 475	Civil Infrastructure and Building Systems
CE 481	Analysis and Design of Shallow Foundations
CE 486	Introduction to Geological Engineering
CE 488	Engineering Risk Analysis
CE 500	Individual Study ²
CE 501	Advanced Matrix Analysis of Structures
CE 504	Finite Element Analysis
CE 523	Transportation Systems Planning
CE 525	Airport Planning and Design
CE 527	Sustainable Mobility
CE 528	Transportation Economics and Analysis
CE 529	Modeling and Simulation in Transportation
CE 533	Advanced Water Resources Engineering
CE 537	Groundwater Contamination
CE 539	Environmental Hydraulics
CE 552	Analysis and Seismic Design of Reinforced Concrete
CE 553	Ductile Design of Steel Structures
CE 555	Advanced Civil Engineering Materials Laboratory
CE 557	Seismic Analysis and Design
CE 559	Prestressed Concrete Design
CE 571	Selected Advanced Laboratory
CE 572	Engineering Project Management

CE 581	Advanced Geotechnical Engineering
CE 583	Geotechnical Earthquake Engineering
CE 584	Lateral Support Systems
CE 585	Slope Stability Analysis
CE 586	Analysis and Design of Deep Foundations
CE 588	Ground Improvement
CE 589	Geosynthetics Engineering
ENVE 400	Special Problems ²
ENVE 411	Air Pollution Control
ENVE 421	Mass Transfer Operations
ENVE 434	Water Chemistry and Water Quality Measurements
ENVE 436	Introduction to Hazardous Waste Management
ENVE 438	Water and Wastewater Treatment Design
ENVE 439	Sustainable Solid Waste Engineering
ENVE 443	Bioremediation Engineering
ENVE 450	Industrial Pollution Prevention
ENVE 455	Environmental Health and Safety
ENVE 466	Senior Project Design Laboratory I
ENVE 467	Senior Project Design Laboratory II
ENVE 480	Environmental Engineering of Energy
ENVE 500	Individual Study ²
ENVE 535	Physico-Chemical Water and Wastewater Treatment
ENVE 536	Biological Wastewater Treatment Processes Engineering
ENVE 537	Decentralized Wastewater Management
ENVE 540	Advanced Membrane Technology and Applications
ENVE 542	Sustainable Environmental Engineering

Advisor approved electives outside of Civil and Environmental Engineering³

Non-CE/ENVE advisor approved electives ¹	0-14
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Total units	45
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¹ To be selected after consultation with your academic advisor and the CE/ENVE graduate coordinator

² No more than 4 total units of technical elective credit from CE 400, CE 500 and ENVE 400, ENVE 500 combined.

³ In total, at least 27 units of advisor approved electives (both within and outside of Civil and Environmental Engineering) must be at the 500 level.

Computer Engineering

Engineering East Building (20), Room 215
Phone: 805.756.1229
<https://cpe.calpoly.edu>

Director: Lynne Slivovsky

Engineering Student Services
Engineering South (40), Room 115
Phone: 805.756.1461

Academic Program

Program name	Program type
Computer Engineering	BS

The mission of the Computer Engineering Program (CPE) is to provide students with a well-rounded education encompassing the theory and practice of selected, balanced topics in electrical engineering and computer science, to enable students to contribute and continue their education in a wide range of computer-related engineering careers. The program seeks to emphasize “hands-on” experience, problem solving skills, the creative process and responsible action. Through professional development activities, faculty contribute to the advancement of the state-of-the-art, and strive to directly incorporate this experience in the classroom.

Four educational objectives inspire alumni of the Cal Poly Computer Engineering program to excel professionally:

1. Make positive contributions to society and the practice of computer engineering by applying foundational knowledge and the engineering process to solve engineering problems.
2. Work in an individual or team environment in a socially responsible manner.
3. Engage in lifelong learning through continued professional development or graduate studies.
4. Communicate effectively and demonstrate leadership.

The program prepares graduates for professional practice in industry, as well as continued study in graduate school. Cal Poly’s “learn by doing” philosophy is emphasized by integrating design throughout the curriculum, especially in the numerous design-centered laboratories. In the required senior capstone experience, which is a group-project based course completed over two quarters, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

This integrated approach allows students to work effectively in such diverse areas as digital systems simulation and digital control systems. Knowledge and laboratory experience in computer architecture and structures provide the understanding necessary to design and build computer systems, computer networks and digital communications systems. A thorough knowledge of modern microprocessors and microcontrollers enables the graduate to apply these technologies in applications such as robotics, medical and data acquisition. Twelve units of technical electives allow students the option to specialize in an area of special interest. Current areas of special interest include:

- robotics
- embedded systems
- computer architecture

- computer networks
- computer based controls
- software systems
- graphics and multimedia
- electronics implementation and VLSI

In addition to a sound theoretical background in computer engineering concepts, students experience practical design courses intended to build problem solving skills. Laboratory courses supplement the program to develop “hands on” skills in all areas of study. Students are exposed to a wide variety of computing equipment: microprocessor development systems, workstations and personal computers, and advanced network hardware and software.

Active student groups of interest to computer engineering majors include the Computer Engineering Society, the IEEE Student Branch, the Association for Computing Machinery, the Society of Women Engineers, Women Involved in Software and Hardware, and many other project-oriented student clubs and activities.

For more information about the CPE program, please visit <https://eadvice.calpoly.edu>.

Undergraduate Program BS Computer Engineering

The Bachelor of Science in Computer Engineering prepares students interested in the design and application of computers and computer-based systems. The program incorporates a firm foundation in both electrical engineering and computer science, with a focus on the integration of hardware and software systems.

Blended and Graduate Programs

Graduates of the Computer Engineering Program are qualified for admission to Cal Poly master’s degree programs in electrical engineering, computer science, general engineering, and biomedical engineering.

The opportunity also exists for advanced students to begin graduate study in these areas prior to completion of the BS degree, via a blended program. This provides a number of advantages to qualified students, and makes it possible for completion of both the BS and MS degrees in as little as five years. Computer engineering students participating in a blended program are permitted to fulfill the computer engineering senior project requirement with the master’s degree thesis. Students must be prepared for engineering practice via the curriculum which culminates in a major design experience based on the knowledge and skills acquired in earlier coursework and incorporating engineering standards and realistic constraints, as listed in the ABET Engineering Criteria. Further details are provided in the graduate study sections for each of these programs.

BS Computer Engineering Program Learning Outcomes

In addition to the general abilities expected of College of Engineering graduates, computer engineering students are expected to graduate with:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety,

and welfare, as well as global, cultural, social, environmental, and economic factors.

3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

In addition to the general abilities expected of College of Engineering graduates, computer engineering students are expected to graduate with:

- Knowledge of probability and statistics, including applications appropriate to CPE program objectives.
- Knowledge of mathematics through differential and integral calculus, basic sciences, and engineering sciences necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components, as appropriate to CPE program objectives.
- Knowledge of advanced mathematics, typically including differential equations, linear algebra, complex variables, and discrete mathematics.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

CPE 100	Computer Engineering Orientation	1
CPE/CSC 101	Fundamentals of Computer Science	4
CPE/CSC 123	Introduction to Computing ¹	4
CPE/EE 133	Digital Design	4
CPE/CSC 202	Data Structures	4
CPE/CSC 203	Project-Based Object-Oriented Programming and Design	4
CPE/EE 233	Computer Design and Assembly Language Programming	4
CPE 315	Computer Architecture	4
or CPE 333	Computer Hardware Architecture and Design	
CPE/EE 329	Microcontroller-Based Systems Design	4
or CPE 316	Microcontrollers and Embedded Applications	
CPE/CSC 357	Systems Programming	4

CPE 350	Capstone I ²	4
CPE 450	Capstone II ²	3
CPE/CSC 453	Introduction to Operating Systems	4
Select from the following: ³		4-5
CPE 461 & CPE 462	Senior Project I and Senior Project II	
or		
CSC 497 & CSC 498	Research Senior Project I and Research Senior Project II	
CPE 464	Introduction to Computer Networks	4
CSC 248	Discrete Structures	4
CPE 327 & CPE 367	Digital Signals and Systems and Digital Signals and Systems Laboratory	4
or EE 228	Continuous-Time Signals and Systems	
CPE 321 or CPE 422 or CPE 426	Introduction to Computer Security Network Security Introduction to Hardware Security	4
EE 115 & EE 145	Electrical and Electronic Circuits I and Electrical and Electronic Circuits I Laboratory	4
EE 215 & EE 245	Electrical and Electronic Circuits II and Electrical and Electronic Circuits II Laboratory	4
EE 315	Electrical and Electronic Circuits III	4
Technical Electives ^{3,4,5}		
Select from the following:		19
Any 300-500 level CPE Course (up to 4 units of CPE 400)		
Any 300-500 level CSC or EE Course		
Up to 8 units of any 200-500 level course offered by the College of Engineering or College of Science and Mathematics		
SUPPORT COURSES		
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ⁶	4
Select from the following: (C2) ⁶		4
PHIL 230	Philosophical Classics: Knowledge and Reality	
PHIL 231	Philosophical Classics: Ethics and Political Philosophy	
Select from the following: (Upper-Division C) ⁶		4
PHIL 323	Ethics, Science and Technology	
PHIL 327	Robot Ethics	
PHIL 328	Technologies and Ethics of Warfare	
PHIL 339	Biomedical Ethics	
PHIL 340	Environmental Ethics	
ES 350 or ES 351	Gender, Race, Culture, Science & Technology Gender, Race, Class, Nation in Global Engineering, Technology & International Development	4
MATH 141	Calculus I (B4) ⁶	4
MATH 142	Calculus II (B4) ⁶	4
MATH 143	Calculus III (Area B Electives) ⁶	4
MATH 241	Calculus IV	4

MATH 244	Linear Analysis I	4
PHYS 141	General Physics I (Area B Electives) ⁶	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
STAT 350	Probability and Random Processes for Engineers (Upper-Division B) ⁶	4
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		40
FREE ELECTIVES		
Free Electives		0
Total units		191-192

- ¹ An additional 4 units of Technical Electives may be substituted, although new students are strongly encouraged to take CSC 123/CPE 123.
- ² ENGR 459, ENGR 460, ENGR 461, and CPE 400 (7) or ENGR 463, ENGR 464, ENGR 465, and CPE 400 (7) may substitute for CPE 350 and CPE 450 (7).
- ³ Consultation with an advisor is recommended prior to selecting Approved or Technical Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ⁴ Courses taken to meet the Technical Electives requirement cannot be double-counted to satisfy another Major or Support requirement.
- ⁵ The following courses may not be used to satisfy this requirement: COOP units; BUS 499; CSC 304, CSC 320, CSC 364, CSC 400, CSC 500; EE 321, EE 322, EE 361, EE 400, EE 460, EE 500, EE 563. A student with credit in CPE 327/CPE 367 cannot take EE 328/EE 368 for credit.
- ⁶ Required in Major or Support; also satisfies General Education (GE) requirement.

General Education (GE) Requirements

- 72 units required, 32 of which are specified in Major and/or Support.
- If any of the remaining 40 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0

Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English (4 units in Support) ¹	0
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C (4 units in Support) ¹		0
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		40

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Computer Science and Software Engineering

Computer Science Bldg. (14), Room 254
Phone: 805.756.2824
<https://csc.calpoly.edu>

Department Chair: Chris Lupo

Engineering Student Services
Engineering South (40), Room 115
Phone: 805.756.1461

Academic Programs

Program name	Program type
Computer Science	BS, MS, Minor
Cross Disciplinary Studies Minor in Bioinformatics	Minor
Cross Disciplinary Studies Minor in Computing for Interactive Arts	Minor
Cross Disciplinary Studies Minor in Data Science	Minor
Software Engineering	BS

The Computer Science and Software Engineering Department educates students in the discipline of computer science and teaches them to apply their education to solve practical problems in a socially responsible way. To support the department's educational mission, faculty engage in research and professional development.

Department programs are designed to be flexible. Although freshmen choose their major when they apply for admission, students can easily switch among software engineering, computer engineering and computer science since the lower division curricula are similar.

In all of the department's programs, laboratory experiences ensure that students have both a theoretical and practical understanding of computer science. Individual and team projects, culminating in a capstone experience or a senior project, reinforce concepts and provide students the opportunity to apply and communicate their knowledge.

The department has active student chapters of the Association for Computing Machinery, IEEE Computer Society and Upsilon Pi Epsilon (the national computer honor society). Student teams compete in national competitions and student organizations sponsor industry/student events.

The department, with industry support, provides a modern computing environment that includes the most current software tools running on a variety of workstations and servers. Projects in advanced courses are supported by specialized laboratories for databases, computer architecture, operating systems, software engineering, computer networks, computer graphics, and human/computer interaction.

Undergraduate Programs

BS Computer Science

The BS Computer Science program provides in-depth study of computer science fundamentals and practice, including programming concepts and languages, software engineering, operating systems and computer architecture.

In addition, the major offers a wide choice of technical electives that allows students to focus on particular areas of computer science and their application. Typical areas of emphasis include databases, distributed computing, software engineering, programming languages, graphical user interfaces, operating systems, computer networks, computer graphics, computer security, game development, and artificial intelligence.

The curriculum is project-oriented and develops students' ability to solve problems using modern computing concepts. Students can expect to complete many projects in a variety of programming languages and on a variety of computer systems. During their last year of study, students complete a senior project, either individually or as members of a team, spanning two academic quarters.

Graduates of the computer science program are well prepared to become successful professionals and to pursue graduate study. They are sought by the computer industry for positions as software developers, quality assurance and test engineers, and other technical positions in computer-related industries.

The Computer Science program has four broad program educational objectives (PEOs) that graduates are expected to attain within five years of graduation:

- **Technical Competence.** Graduates have applied current technical knowledge and skills to develop effective computer solutions, using state-of-the art technologies.
- **Interpersonal Skills.** Graduates have communicated effectively and worked collaboratively in a team environment.
- **Professional Awareness.** Graduates have maintained a positive and ethical attitude concerning the computing profession and its impact on individuals, organizations and society.
- **Intellectual Growth.** Graduates have continued to grow intellectually and professionally in their chosen field, including successful pursuit of graduate study if such study was a desired goal.

The BS Computer Science program is accredited by the Computing Accreditation Commission of ABET, <http://www.ABET.org>.

General Curriculum in Computer Science or Concentrations

- General Curriculum in Computer Science
- Artificial Intelligence and Machine Learning
- Data Engineering
- Game Development
- Graphics
- Privacy and Security

BS Software Engineering

The BS in Software Engineering prepares students to become software professionals who develop software products on time, within budget, and that meet customer requirements. Building on the fundamentals of computer science, the program focuses on practical aspects of building and deploying software systems in a socially responsible way. The program's educational mission supports the faculty in research and professional development that keeps them current in their field and in touch with current industry practices and trends.

The hallmark of the program is “hands on” experience where students follow a curriculum that builds on traditional computer science but differs from the BS in Computer Science in the following ways:

1. Classes emphasize the team approach to building software and provide leadership opportunities for every student.
2. Classes place an emphasis on software processes and lifecycles.
3. Classes include significant learning in engineering and management areas such as quality assurance, testing, metrics, maintenance, configuration management and interpersonal management skills.
4. The curriculum has a stronger emphasis on mathematics and the use of engineering methods in software design.

The software engineering curriculum culminates in a year-long capstone sequence where the students work in teams to build a large software system.

The software industry increasingly requires both a software and an engineering background for their cutting edge projects. Graduates with a BS in Software Engineering can expect to find significant opportunities in software development and management, software engineering and marketing.

The Software Engineering program has four broad program educational objectives (PEOs) that graduates are expected to attain within five years of graduation:

- **Technical Competence.** Graduates have applied the software engineering body of knowledge and other technical skills to specify, design, and implement complex software systems, doing so with state-of-the art technologies.
- **Interpersonal Skills.** Graduates have communicated effectively and worked collaboratively in a multi-disciplinary team environment.
- **Professional Awareness.** Graduates have maintained a positive and ethical attitude concerning the computing profession and its impact on individuals, organizations and society.
- **Intellectual Growth.** Graduates have continued to grow intellectually and professionally in their chosen field, including successful pursuit of graduate study if such study was a desired goal.

The BS Software Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.ABET.org>.

Computer Science Minor

Nearly all disciplines use the capabilities of computers. The Computer Science minor consists of a core and upper-division courses selected in consultation with an advisor. The core provides common knowledge and skills needed by anyone who wishes to advance further in computer science. The remaining courses enable students to specialize in areas relevant to their goals.

Admission to the minor is limited and selection is based upon the applicant’s performance in:

CSC/CPE 101	Fundamentals of Computer Science	4
CSC/CPE 202	Data Structures	4
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	4

Students who intend to minor in computer science should consult the College of Engineering Advising Center website for GPA and course grade requirements for admission to the minor. In addition, they should contact

the Advising Center for further information *before* planning to enter the minor.

Before formally applying, students must make an appointment at the College of Engineering Advising Center. The Computer Science minor is not open to CSC, CPE or SE major students, or to students in the Computing for Interactive Arts Minor or the Cross Disciplinary Studies Minor in Data Science. Questions concerning the minor should be directed to the Advising Center.

Cross Disciplinary Studies Minor in Bioinformatics

For information regarding the Cross Disciplinary Studies Minor in Bioinformatics, please see the Biological Sciences (p. 364) section of the catalog.

Cross Disciplinary Studies Minor in Computing for Interactive Arts

The minor in Computing for Interactive Arts (CIA) is a Cross Disciplinary Studies Minor jointly offered by the Department of Art and Design and the Computer Science Department. The CIA minor fosters a collaborative, cross-disciplinary environment in which Art and Design students integrate coding and algorithmic thinking in creative works and Computer Science students apply the principles and methodology of design thinking to visual applications. The minor enables students from different disciplines to collaborate on projects requiring both a technical and a creative perspective. The Computing for Interactive Arts minor is not open to students in the Computer Science minor or the Cross Disciplinary Studies Minor in Data Science.

Cross Disciplinary Studies Minor in Data Science

An interdisciplinary minor sponsored by the departments of Statistics and Computer Science. For more information, see the Statistics (p. 422) section. The Cross Disciplinary Studies Minor in Data Science is not open to students in the Computer Science minor or the Computing for Interactive Arts minor.

Graduate Program MS Computer Science

The MS program in Computer Science offers students the opportunity to prepare for careers in several areas of emphasis including software engineering, computer architecture, programming languages, theory of computing, operating systems, database systems, distributed computing, computer networks, artificial intelligence, computer graphics, and human computer interaction. The program is designed for maximum flexibility to allow students to concentrate in one or more areas of study.

Eligibility for admission to the program requires a baccalaureate degree from an accredited institution and good standing at the last college attended. Admission can be granted in either classified or conditionally classified status. Classified admission can be granted to domestic and overseas applicants who satisfy the following conditions: applicants with a bachelor’s degree in computer science, software engineering, or computer engineering are required to have a minimum 3.0 grade point average, including a minimum 3.0 grade point average in major

courses; applicants with a bachelor's degree in a different field must have completed the required preliminary coursework listed in the table below and have a minimum grade point average of 3.25 for all undergraduate coursework. Conditionally classified admission can be granted to domestic applicants who satisfy the following conditions: The applicant must hold a Computer Science minor obtained as part of their undergraduate study, or they must have successfully completed introductory and upper-division Computer Science coursework in the amount equivalent to the Computer Science minor (an equivalent of about 28-32 quarter units). Specifically, applicants are expected to have completed the equivalent of 24 units of coursework (6 courses) from the below list, prior to starting their MS in Computer Science study.

All applicants must satisfy the following. A satisfactory score on the General Graduate Record Exam (GRE) is required; applicants are expected to achieve the following minimum scores: 425 verbal, 650 quantitative, 4.0 analytical writing on the old GRE test, or their matching equivalents on the revised GRE test (currently standing at 148 verbal, 158 quantitative and 4.0 analytical writing). A satisfactory score on the TOEFL is required for applicants with degrees from institutions from countries where English is not a native language; expected minimum scores are: 80 for internet-based test with a minimum 20 on each portion; 213 for computer-based test; 550 for paper-based test, plus 4.5 on TWE. All applicants must provide three letters of recommendation. Women and underrepresented minorities are strongly encouraged to apply for admission.

Students admitted as conditionally classified must complete the necessary undergraduate coursework to advance to candidacy. While fulfilling the undergraduate requirements, conditionally classified students retain official status as graduate students in the university. Conditionally classified students may advance to candidacy by completing coursework selected by the graduate coordinator from the following list of courses:

CSC 300	Professional Responsibilities	4
CSC 307 or CSC 308	Introduction to Software Engineering Software Engineering I	4
CPE 315	Computer Architecture	4
CSC 349	Design and Analysis of Algorithms	4
CSC/CPE 357	Systems Programming	4
CSC 430	Programming Languages	4
CSC 445	Theory of Computation I	4
CSC/CPE 453	Introduction to Operating Systems	4

Each course must be completed with a grade of "B" or better. These courses do not count toward the graduate degree.

The department may offer several graduate teaching assistantships. Preference is given to continuing graduate students and experienced teachers. Other grant, fellowship, scholarship and loan information can be obtained from the Financial Aid office.

Degree Requirements

Students must file a Formal Study Plan with the Computer Science Department office no later than the end of the quarter in which they complete the twelfth unit of coursework to be counted toward the degree. The formal study plan identifies specific courses to be taken to fulfill requirements of the MS degree. The formal study plan may be amended with approval of the graduate coordinator.

Blended BS + MS Computer Science Program

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

A blended program is available for MS Computer Science.

Eligibility

Majors that are eligible for the blended program are:

- BS Computer Science
- BS Computer Engineering
- BS Software Engineering

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Computer Science and Software Engineering department for any additional eligibility criteria.

Program of Study

Senior project requirements for the eligible undergraduate majors are satisfied as follows:

- BS Computer Engineering students may complete either CPE 461 and CPE 462 or CSC 497 and CSC 498. Those that complete CPE 461 and CPE 462 to satisfy the senior project requirement must take CSC 596 and CSC 597 as prerequisites to CSC 599 to complete the MS degree requirements. Those that complete CSC 497 and CSC 498 to satisfy both the senior project requirement and the CSC 599 prerequisites must take an additional 500-level course to satisfy the MS degree requirements.
- BS Computer Science students may complete either CSC 491 and CSC 492 or CSC 497 and CSC 498 to satisfy the undergraduate senior project requirement. Those that complete CSC 491 and CSC 492 to satisfy the senior project requirement must take CSC 596 and CSC 597 as prerequisites to CSC 599 to complete the MS degree requirements. Those that complete CSC 497 and CSC 498 to satisfy both the senior project requirement and the CSC 599 prerequisites must take an additional 500-level course to satisfy the MS degree requirements.
- BS Software Engineering students must complete the senior project requirement as satisfied by the software engineering capstone sequence culminating in CSC 406. BS Software Engineering students must complete CSC 596 and CSC 597 to satisfy the MS degree requirements.

In all cases, the master's culminating experience (CSC 599) must be completed to satisfy the MS degree requirements.

BS Computer Science Program Learning Outcomes

Graduates of the program will have an ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

CSC 445	Theory of Computation I	4
CSC/CPE 453	Introduction to Operating Systems	4
Select from the following: 4		
CSC 491 & CSC 492	Senior Project I and Senior Project II (2, 2)	
or		
CSC 497 & CSC 498	Research Senior Project I and Research Senior Project II (2, 2)	

SUPPORT COURSES

ES/WGQS 350	Gender, Race, Culture, Science & Technology	4
or ES 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development	
MATH 141	Calculus I (B4) ⁵	4
MATH 142	Calculus II (B4) ⁵	4
MATH 143	Calculus III (Area B Electives) ⁵	4
MATH 206 or MATH 244	Linear Algebra I Linear Analysis I	4
PHIL 230	Philosophical Classics: Knowledge and Reality (C2) ⁵	4
or PHIL 231	Philosophical Classics: Ethics and Political Philosophy	
STAT 312	Statistical Methods for Engineers (Upper-Division B) ⁵	4

Life Science Support Elective

Select from the following (B2): ⁵ 4		
BIO 111	General Biology	
BIO 161	Introduction to Cell and Molecular Biology	
BIO 213 & BMED 213	Life Science for Engineers and Bioengineering Fundamentals	
BOT 121	General Botany	
MCRO 221	Microbiology	

Physical Science Support Elective

Select one sequence from the following (B1 & B3): ⁵ 12		
CHEM 124 & CHEM 125 & CHEM 126	General Chemistry for Physical Science and Engineering I and General Chemistry for Physical Science and Engineering II and General Chemistry for Physical Science and Engineering III	
PHYS 141 & PHYS 142 & PHYS 143	General Physics I and General Physics II and General Physics III	

Additional Science Support Elective

Select from the following (Area B Electives): ^{5,6} 4		
BIO 111	General Biology	
BIO 161	Introduction to Cell and Molecular Biology	
BOT 121	General Botany	
CHEM 124	General Chemistry for Physical Science and Engineering I	
MCRO 221	Microbiology	
PHYS 141	General Physics I	

Concentration or General Curriculum in Computer Science

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

CSC/CPE 101	Fundamentals of Computer Science	4
CSC/CPE 123	Introduction to Computing ¹	4
CSC/CPE 202	Data Structures	4
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	4
CSC 225	Introduction to Computer Organization	4
CSC 248	Discrete Structures	4
CSC 300 or PHIL 323	Professional Responsibilities Ethics, Science and Technology	4
Select from the following: 4		
CSC 307	Introduction to Software Engineering	
or		
CSC 308 & CSC 309	Software Engineering I and Software Engineering II ²	
Select from the following: 4		
CSC 321 or CSC 323 or CSC 325	Introduction to Computer Security ³ Cryptography Engineering Introduction to Privacy: Policy and Technology	
CSC 349	Design and Analysis of Algorithms	4
CSC/CPE 357	Systems Programming	4
Select from the following: 4		
CSC 364	Introduction to Networked, Distributed, and Parallel Computing	
or		
CPE 464 & CPE 469	Introduction to Computer Networks and Distributed Systems ⁴	
CSC 365	Introduction to Database Systems	4
CSC 430	Programming Languages	4

(See list of Concentrations and General Curriculum in Computer Science below)	24
GENERAL EDUCATION (GE)	
(See list of GE program requirements below.)	40
FREE ELECTIVES	
Free Electives ⁷	0
Total units	180

- ¹ Although new students are strongly encouraged to take CSC/CPE 123, an additional 4 units of CPE/CSC Technical Electives within your selected concentration or, if not selected, the General Curriculum may substitute for CSC/CPE 123.
- ² CSC 309 counts as a Technical Elective. Students in the Artificial Intelligence and Machine Learning concentration or the Privacy and Security concentration are advised to take CSC 307 instead of CSC 308 and CSC 309.
- ³ Students in the Privacy and Security Concentration must take CSC 321.
- ⁴ CPE 469 counts as a Technical Elective for the General Curriculum, and the following concentrations: Graphics, Privacy and Security, and Data Engineering.
- ⁵ Required in Major or Support; also satisfies General Education (GE) requirement.
- ⁶ No double-counting is allowed between Additional Science Support Elective and Life Science Support Elective or Physical Science Support Elective.
- ⁷ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Curriculum in Computer Science or Concentrations (select one)

- General Curriculum in Computer Science
- Artificial Intelligence and Machine Learning
- Data Engineering
- Game Development
- Graphics
- Privacy and Security

General Education (GE) Requirements

- 72 units required, 32 of which are specified in Major and/or Support.
- If any of the remaining 40 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4

Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English (4 units in Support) ¹	0
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		40

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

General Curriculum in Computer Science

Technical Electives		
Select from the lists in Technical Electives Guidelines below ^{1,2}		20
Mathematics/Statistics Elective		
Select from the following:		4
MATH 241	Calculus IV	
MATH 248	Methods of Proof in Mathematics	
MATH 306	Linear Algebra II	
MATH 334	Combinatorial Math	
MATH 335	Graph Theory	
MATH 437	Game Theory	
MATH 470	Selected Advanced Topics	
STAT 305	Introduction to Probability and Simulation	
STAT 323	Design and Analysis of Experiments I	

STAT 324	Applied Regression Analysis
STAT 330	Statistical Computing with SAS
STAT 331	Statistical Computing with R
STAT 334	Applied Linear Models
STAT 416	Statistical Analysis of Time Series
STAT 418	Categorical Data Analysis
STAT 419	Applied Multivariate Statistics
STAT 434	Statistical Learning: Methods and Applications

Total units **24**

¹ Consultation with advisor is recommended prior to selecting technical electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² An additional 4 units of CPE/CSC Technical Electives is needed if CPE/CSC 123 (<http://catalog.calpoly.edu/search/?P=CSC%20123>) is not taken in the major.

Technical Electives Guidelines

Courses used to satisfy any other Major, Support, or General Education requirement are not allowed to count toward the Technical Electives Elective requirement. Credit/No Credit grading is not allowed.

Select Technical Electives from the following: ^{1,2}

CSC 305	Individual Software Design and Development
CSC 309	Software Engineering II
CSC 313	Teaching Computing
CSC 321	Introduction to Computer Security
CSC 323	Cryptography Engineering
CSC 325	Introduction to Privacy: Policy and Technology
CSC 344	Music Programming
CSC 366	Database Modeling, Design and Implementation
CSC 369	Introduction to Distributed Computing
CSC 371	Game Design
CSC 377	Introduction to Mixed Reality
CSC 378	Interactive Entertainment Engineering
CSC 400	Special Problems ²
CSC 402	Software Requirements Engineering
CSC 405	Software Construction
CSC 406	Senior Project - Software Deployment
CSC 409	Current Topics in Software Engineering
CSC 410	Software Evaluation
CSC 421	Binary Exploitation: Tools and Techniques
CSC 422	Network Security
CSC 424	Software Security
CSC/CPE 425	Wireless Security
CSC 429	Current Topics in Computer Security
CSC 431	Compiler Construction

CSC 436	Mobile Application Development
CSC 437	Dynamic Web Development
CSC 448	Bioinformatics Algorithms
CSC/CPE 454	Implementation of Operating Systems
CSC/CPE 458	Current Topics in Computer Systems
CSC 466	Knowledge Discovery from Data
CSC 468	Database Management Systems Implementation
CSC/CPE 469	Distributed Systems
CSC/CPE 471	Introduction to Computer Graphics
CSC 473	Advanced Rendering Techniques
CSC 474	Computer Animation
CSC/CPE 476	Real-Time 3D Computer Graphics Software
CSC 477	Scientific and Information Visualization
CSC 478	Current Topics in Computer Graphics
CSC 480	Artificial Intelligence
CSC 481	Knowledge Based Systems
CSC 482	Speech and Language Processing
CSC 484	User-Centered Interface Design and Development
CSC 486	Human-Computer Interaction Theory and Design
CSC 487	Deep Learning
CSC 490	Selected Advanced Topics ²
CSC 493	Cooperative Education Experience ²
CSC 496	Selected Advanced Laboratory ²
CSC 508	Software Engineering I
CSC 509	Software Engineering II
CSC 513	Computing Education Research and Practice
CSC/CPE 515	Computer Architecture
CSC 521	Computer Security
CSC 522	Advanced Network Security
CSC 524	System Security
CSC 530	Languages and Translators
CSC 540	Theory of Computation II
CSC 549	Advanced Algorithm Design and Analysis
CSC 550	Operating Systems
CSC 560	Database Systems
CSC/CPE 564	Computer Networks: Research Topics
CSC 566	Topics in Advanced Data Mining
CSC/CPE 569	Distributed Computing
CSC 570	Current Topics in Computer Science
CSC 572	Computer Graphics
CSC 580	Artificial Intelligence
CSC 581	Computer Support for Knowledge Management
CSC 582	Computational Linguistics
CSC 587	Advanced Deep Learning
CPE 315	Computer Architecture

CPE 316	Microcontrollers and Embedded Applications
CPE/PHYS 345	Quantum Computing
CPE 400	Special Problems for Undergraduates ²
CPE 416	Autonomous Mobile Robotics
CPE 419	Applied Parallel Computing
CPE/EE 428	Computer Vision
CPE/EE 442	Real Time Embedded Systems
CPE 464	Introduction to Computer Networks
CPE 465	Advanced Computer Networks
CPE 488	Microelectronics and Electronics Packaging
DATA 301	Introduction to Data Science

The following restrictions must be satisfied.

4 units must be satisfied by a course that has as a prerequisite either

1) An upper-division course required by the major (excluding CSC 357) or

2) Another Technical Elective.

Select from the following:

CSC 366	Database Modeling, Design and Implementation
CSC 402	Software Requirements Engineering
CSC 405	Software Construction
CSC 406	Senior Project - Software Deployment
CSC 409	Current Topics in Software Engineering
CSC 410	Software Evaluation
CSC 421	Binary Exploitation: Tools and Techniques
CSC 422	Network Security
CSC 424	Software Security
CSC/CPE 425	Wireless Security
CSC 429	Current Topics in Computer Security
CSC 437	Dynamic Web Development
CSC 448	Bioinformatics Algorithms
CSC/CPE 454	Implementation of Operating Systems
CSC 466	Knowledge Discovery from Data
CSC 468	Database Management Systems Implementation
CSC 473	Advanced Rendering Techniques
CSC 474	Computer Animation
CSC/CPE 476	Real-Time 3D Computer Graphics Software
CSC 477	Scientific and Information Visualization
CSC 478	Current Topics in Computer Graphics
CSC 481	Knowledge Based Systems
CSC 482	Speech and Language Processing
CSC 484	User-Centered Interface Design and Development

CSC 486	Human-Computer Interaction Theory and Design
CSC 487	Deep Learning
CSC 508	Software Engineering I
CSC 509	Software Engineering II
CSC/CPE 515	Computer Architecture
CSC 521	Computer Security
CSC 522	Advanced Network Security
CSC 530	Languages and Translators
CSC 540	Theory of Computation II
CSC 549	Advanced Algorithm Design and Analysis
CSC 550	Operating Systems
CSC 560	Database Systems
CSC/CPE 564	Computer Networks: Research Topics
CSC 566	Topics in Advanced Data Mining
CSC 572	Computer Graphics
CSC 580	Artificial Intelligence
CSC 581	Computer Support for Knowledge Management
CSC 582	Computational Linguistics
CSC 587	Advanced Deep Learning
CPE 416	Autonomous Mobile Robotics
CPE 465	Advanced Computer Networks

Up to 4 units may be taken from the Approved External Electives listed below:

AERO 450	Introduction to Aerospace Systems Engineering
ART 376	The Art of Mixed Reality
ART 384	Digital 3D Modeling and Design
BUS 310	Introduction to Entrepreneurship
CHEM 216	Organic Chemistry I
CHEM 217	Organic Chemistry II
CHEM 218	Organic Chemistry III
CHEM 312	Organic Chemistry: Fundamentals and Applications
ECON 339	Econometrics
EE 201 & EE 251	Electric Circuit Theory and Electric Circuits Laboratory
EE 314	Introduction to Communication Systems
EE/CPE 336	Microprocessor System Design
EE 424	Introduction to Remote Sensing
ENVE 542	Sustainable Environmental Engineering
IME 301	Operations Research I
IME 314	Engineering Economics
IME 315	Financial Decision Making for Engineers
IME 356	Manufacturing Automation
MATH 241	Calculus IV
MATH 242	Differential Equations I
MATH 248	Methods of Proof in Mathematics
MATH 341	Theory of Numbers

MATH 350	Mathematical Software
MATH 412	Introduction to Analysis I
ME 211	Engineering Statics
ME 212	Engineering Dynamics
ME 405	Mechatronics
PHIL 412	Epistemology
PHIL 422	Philosophy of Mind
PHYS 211	Modern Physics I
PSY 329	Research Methods in Psychology
PSY 333	Quantitative Research Methods for the Behavioral Sciences
PSY 357	Cognition
STAT 305	Introduction to Probability and Simulation
STAT 323	Design and Analysis of Experiments I
STAT 324	Applied Regression Analysis
STAT 330	Statistical Computing with SAS
STAT 331	Statistical Computing with R
STAT 334	Applied Linear Models
STAT 416	Statistical Analysis of Time Series
STAT 418	Categorical Data Analysis
STAT 419	Applied Multivariate Statistics
STAT 434	Statistical Learning: Methods and Applications

¹ A total of 20 Technical Elective units selected from upper-division and graduate CSC and CPE courses open to those in the major and not otherwise required by the major. An additional 4 units of CPE/CSC Technical Electives is needed if CPE/CSC 123 is not taken in the major.

² Up to a combined 4 units may be taken from CSC 400, CPE 400, CSC 490, CSC 493, or CSC 496.

Artificial Intelligence and Machine Learning Concentration

CSC 466	Knowledge Discovery from Data	4
CSC 480	Artificial Intelligence	4
CSC 487	Deep Learning	4
STAT 334	Applied Linear Models	4
Select from the following: ¹		8
CPE/EE 428	Computer Vision	
CSC 481	Knowledge Based Systems	
CSC 482	Speech and Language Processing	
CSC 566	Topics in Advanced Data Mining	
CSC 580	Artificial Intelligence	
CSC 581	Computer Support for Knowledge Management	
CSC 582	Computational Linguistics	
CSC 587	Advanced Deep Learning	
DATA 301	Introduction to Data Science	
EE 509	Computational Intelligence	

STAT 434	Statistical Learning: Methods and Applications	
Total units		24

¹ An additional 4 units of CPE/CSC Technical Electives is needed if CPE/CSC 123 is not taken in the major.

Data Engineering Concentration

CSC 366	Database Modeling, Design and Implementation	4
CSC 436 or CSC 437 or CSC 309	Mobile Application Development Dynamic Web Development Software Engineering II	4
CSC 466	Knowledge Discovery from Data	4
CSC 468 or CSC 469	Database Management Systems Implementation Distributed Systems	4
Select from the following: ¹		4
CPE/EE 428	Computer Vision	
CSC 369	Introduction to Distributed Computing	
CSC 400	Special Problems ²	
CSC 468	Database Management Systems Implementation	
CSC/CPE 469	Distributed Systems	
CSC 480	Artificial Intelligence	
CSC 482	Speech and Language Processing	
CSC 487	Deep Learning	
CSC 560	Database Systems	
CSC 566	Topics in Advanced Data Mining	
CSC 569	Distributed Computing	

Mathematics/Statistics Elective

Select from the following:		4
MATH 241	Calculus IV	
MATH 248	Methods of Proof in Mathematics	
MATH 306	Linear Algebra II	
MATH 334	Combinatorial Math	
MATH 335	Graph Theory	
MATH 437	Game Theory	
MATH 470	Selected Advanced Topics	
STAT 305	Introduction to Probability and Simulation	
STAT 323	Design and Analysis of Experiments I	
STAT 324	Applied Regression Analysis	
STAT 330	Statistical Computing with SAS	
STAT 331	Statistical Computing with R	
STAT 334	Applied Linear Models	
STAT 416	Statistical Analysis of Time Series	
STAT 418	Categorical Data Analysis	
STAT 419	Applied Multivariate Statistics	

STAT 434	Statistical Learning: Methods and Applications	
Total units		24

¹ An additional 4 units of CPE/CSC Technical Electives is needed if CPE/CSC 123 is not taken in the major.

² Up to 4 units may be taken from CSC 400.

Game Development Concentration

COMS 404	Video Games & Society	4
CSC 371	Game Design	4
CSC 377	Introduction to Mixed Reality	4
CSC 378	Interactive Entertainment Engineering	4
Select from the following: ¹		4
ART 182	Foundation in Digital Art I	
ART 183	Foundation in Digital Art II	
ART 376	The Art of Mixed Reality	
ART 384	Digital 3D Modeling and Design	
CSC 309	Software Engineering II	
CSC 471	Introduction to Computer Graphics	
CSC 473	Advanced Rendering Techniques	
CSC 474	Computer Animation	
CSC 476	Real-Time 3D Computer Graphics Software	
CSC 478	Current Topics in Computer Graphics	
CSC 480	Artificial Intelligence	
ISLA 240	Introduction to Media Arts and Technologies	
ISLA 340	Media Arts and Technologies: Storytelling	
ISLA 341	Media Arts and Technologies: Cinematic Process	
ENGL 387	Fiction Writing	
ENGL 411	New Media Arts I	
ENGL 412	New Media Arts II	
Mathematics/Statistics Elective		
Select from the following:		4
MATH 241	Calculus IV	
MATH 248	Methods of Proof in Mathematics	
MATH 306	Linear Algebra II	
MATH 334	Combinatorial Math	
MATH 335	Graph Theory	
MATH 437	Game Theory	
MATH 470	Selected Advanced Topics	
STAT 305	Introduction to Probability and Simulation	
STAT 323	Design and Analysis of Experiments I	
STAT 324	Applied Regression Analysis	
STAT 330	Statistical Computing with SAS	
STAT 331	Statistical Computing with R	
STAT 334	Applied Linear Models	
STAT 416	Statistical Analysis of Time Series	

STAT 418	Categorical Data Analysis	
STAT 419	Applied Multivariate Statistics	
STAT 434	Statistical Learning: Methods and Applications	
Total units		24

¹ An additional 4 units of CPE/CSC Technical Electives is needed if CPE/CSC 123 is not taken in the major.

Graphics Concentration

CSC/CPE 471	Introduction to Computer Graphics	4
Select from the following:		8
CSC 473	Advanced Rendering Techniques	
CSC 474	Computer Animation	
CSC/CPE 476	Real-Time 3D Computer Graphics Software	
CSC 572	Computer Graphics	
Tracks^{1,2}		
Select courses from one of the following tracks:		8
GPU/Systems Track		
CSC 473	Advanced Rendering Techniques	
or CSC 474	Computer Animation	
or CSC 476	Real-Time 3D Computer Graphics Software	
or CSC 572	Computer Graphics	
Technical Electives (select from the lists in Technical Electives Guidelines below) ¹		
Art Track		
CSC 350 & CSC 450	Computing for Interactive Arts Capstone I and Computing for Interactive Arts Capstone II	
or ART 376	The Art of Mixed Reality	
or ART 384	Digital 3D Modeling and Design	
CSC 371	Game Design	
or CSC 377	Introduction to Mixed Reality	
or CSC 378	Interactive Entertainment Engineering	
Mathematics/Statistics Elective		
Select from the following:		4
MATH 241	Calculus IV	
MATH 248	Methods of Proof in Mathematics	
MATH 306	Linear Algebra II	
MATH 334	Combinatorial Math	
MATH 335	Graph Theory	
MATH 437	Game Theory	
MATH 470	Selected Advanced Topics	
STAT 305	Introduction to Probability and Simulation	
STAT 323	Design and Analysis of Experiments I	
STAT 324	Applied Regression Analysis	
STAT 330	Statistical Computing with SAS	
STAT 331	Statistical Computing with R	
STAT 334	Applied Linear Models	
STAT 416	Statistical Analysis of Time Series	

STAT 418	Categorical Data Analysis
STAT 419	Applied Multivariate Statistics
STAT 434	Statistical Learning: Methods and Applications
Total units	24

¹ Consultation with advisor is recommended prior to selecting technical electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² An additional 4 units of CPE/CSC Technical Electives is needed if CPE/CSC 123 (<http://catalog.calpoly.edu/search/?P=CSC%20123>) is not taken in the major.

Technical Electives Guidelines

Courses used to satisfy any other Major, Support, or General Education requirement are not allowed to count toward the Technical Electives requirement. Credit/No Credit grading is not allowed.

Select Technical Electives from the following: ^{1,2}

CSC 305	Individual Software Design and Development
CSC 309	Software Engineering II
CSC 313	Teaching Computing
CSC 321	Introduction to Computer Security
CSC 323	Cryptography Engineering
CSC 325	Introduction to Privacy: Policy and Technology
CSC 344	Music Programming
CSC 366	Database Modeling, Design and Implementation
CSC 369	Introduction to Distributed Computing
CSC 371	Game Design
CSC 377	Introduction to Mixed Reality
CSC 378	Interactive Entertainment Engineering
CSC 400	Special Problems ²
CSC 402	Software Requirements Engineering
CSC 405	Software Construction
CSC 409	Current Topics in Software Engineering
CSC 410	Software Evaluation
CSC 421	Binary Exploitation: Tools and Techniques
CSC 422	Network Security
CSC 424	Software Security
CSC/CPE 425	Wireless Security
CSC 429	Current Topics in Computer Security
CSC 431	Compiler Construction
CSC 436	Mobile Application Development
CSC 437	Dynamic Web Development
CSC 448	Bioinformatics Algorithms
CSC/CPE 454	Implementation of Operating Systems
CSC/CPE 458	Current Topics in Computer Systems

CSC 466	Knowledge Discovery from Data
CSC 468	Database Management Systems Implementation
CSC/CPE 469	Distributed Systems
CSC 473	Advanced Rendering Techniques
CSC 474	Computer Animation
CSC/CPE 476	Real-Time 3D Computer Graphics Software
CSC 477	Scientific and Information Visualization
CSC 478	Current Topics in Computer Graphics
CSC 480	Artificial Intelligence
CSC 481	Knowledge Based Systems
CSC 482	Speech and Language Processing
CSC 484	User-Centered Interface Design and Development
CSC 486	Human-Computer Interaction Theory and Design
CSC 487	Deep Learning
CSC 490	Selected Advanced Topics ²
CSC 493	Cooperative Education Experience ²
CSC 496	Selected Advanced Laboratory ²
CSC 508	Software Engineering I
CSC 509	Software Engineering II
CSC 513	Computing Education Research and Practice
CSC/CPE 515	Computer Architecture
CSC 521	Computer Security
CSC 522	Advanced Network Security
CSC 524	System Security
CSC 530	Languages and Translators
CSC 540	Theory of Computation II
CSC 549	Advanced Algorithm Design and Analysis
CSC 550	Operating Systems
CSC 560	Database Systems
CSC/CPE 564	Computer Networks: Research Topics
CSC 566	Topics in Advanced Data Mining
CSC/CPE 569	Distributed Computing
CSC 570	Current Topics in Computer Science
CSC 572	Computer Graphics
CSC 580	Artificial Intelligence
CSC 581	Computer Support for Knowledge Management
CSC 582	Computational Linguistics
CSC 587	Advanced Deep Learning
CPE 315	Computer Architecture
CPE 400	Special Problems for Undergraduates
CPE 416	Autonomous Mobile Robotics
CPE 419	Applied Parallel Computing
CPE 428	Computer Vision
CPE 442	Real Time Embedded Systems
CPE 464	Introduction to Computer Networks

CPE 465	Advanced Computer Networks
Up to 4 units may be taken from the Approved External Electives listed below:	
AERO 450	Introduction to Aerospace Systems Engineering
ART 376	The Art of Mixed Reality
ART 384	Digital 3D Modeling and Design
BUS 310	Introduction to Entrepreneurship
CHEM 216	Organic Chemistry I
CHEM 217	Organic Chemistry II
CHEM 218	Organic Chemistry III
CHEM 312	Organic Chemistry: Fundamentals and Applications
ECON 339	Econometrics
EE 201 & EE 251	Electric Circuit Theory and Electric Circuits Laboratory
EE 314	Introduction to Communication Systems
EE/CPE 336	Microprocessor System Design
EE 424	Introduction to Remote Sensing
ENVE 542	Sustainable Environmental Engineering
IME 301	Operations Research I
IME 314	Engineering Economics
IME 315	Financial Decision Making for Engineers
IME 356	Manufacturing Automation
MATH 241	Calculus IV
MATH 242	Differential Equations I
MATH 248	Methods of Proof in Mathematics
MATH 341	Theory of Numbers
MATH 350	Mathematical Software
MATH 412	Introduction to Analysis I
ME 211	Engineering Statics
ME 212	Engineering Dynamics
ME 405	Mechatronics
PHIL 412	Epistemology
PHIL 422	Philosophy of Mind
PSY 329	Research Methods in Psychology
PSY 333	Quantitative Research Methods for the Behavioral Sciences
PSY 357	Cognition
STAT 305	Introduction to Probability and Simulation
STAT 323	Design and Analysis of Experiments I
STAT 324	Applied Regression Analysis
STAT 330	Statistical Computing with SAS
STAT 331	Statistical Computing with R
STAT 334	Applied Linear Models
STAT 416	Statistical Analysis of Time Series
STAT 418	Categorical Data Analysis
STAT 419	Applied Multivariate Statistics

STAT 434	Statistical Learning: Methods and Applications
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- ¹ A total of 0-4 technical elective units (depending on Track) selected from upper-division and graduate CSC and CPE courses open to those in the major and not otherwise required by the major. An additional 4 units of CPE/CSC Technical Electives is needed if CPE/CSC 123 (<http://catalog.calpoly.edu/search/?P=CSC%20123>) is not taken in the major.
- ² Up to a combined 4 units may be taken from CPE 400, CSC 400 (<http://catalog.calpoly.edu/search/?P=CSC%20400>), CSC 490 (<http://catalog.calpoly.edu/search/?P=CSC%20490>), CSC 493, or CSC 496 (<http://catalog.calpoly.edu/search/?P=CSC%20496>).

Privacy and Security Concentration

Select from the following: ¹ 12

CPE/CSC 422	Network Security
CPE 426	Introduction to Hardware Security
CSC 323	Cryptography Engineering
CSC 325	Introduction to Privacy: Policy and Technology
CSC 421	Binary Exploitation: Tools and Techniques
CSC 424	Software Security
CSC 425	Wireless Security
CSC 429	Current Topics in Computer Security
CSC 521	Computer Security
CSC 522	Advanced Network Security
CSC 524	System Security

Select from the following: ^{1,2} 8

CPE 315	Computer Architecture
CPE/CSC 422	Network Security
CPE 426	Introduction to Hardware Security
CPE/CSC 431	Compiler Construction
CPE/CSC 454	Implementation of Operating Systems
CPE 465	Advanced Computer Networks
CPE 469	Distributed Systems
CSC 323	Cryptography Engineering
CSC 325	Introduction to Privacy: Policy and Technology
CSC 400	Special Problems ²
CSC 421	Binary Exploitation: Tools and Techniques
CSC 424	Software Security
CSC 425	Wireless Security
CSC 429	Current Topics in Computer Security
CSC 521	Computer Security
CSC 522	Advanced Network Security
CSC 524	System Security
MATH 341	Theory of Numbers
MATH 437	Game Theory
MATH 451	Numerical Analysis I
MATH 453	Numerical Optimization

MATH 481	Abstract Algebra I	
Mathematics/Statistics Elective		
Select from the following:		4
MATH 241	Calculus IV	
MATH 248	Methods of Proof in Mathematics	
MATH 306	Linear Algebra II	
Total units		24

Students in this concentration must take CSC 321 as part of their major.

- ¹ Courses taken in this list cannot be double-counted in the concentration.
- ² An additional 4 units of CPE/CSC Technical Electives is needed if CPE/CSC 123 is not taken in the major.
- ³ Up to 4 units may be taken from CSC 400.

BS Software Engineering Program Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

CSC/CPE 101	Fundamentals of Computer Science	4
CSC/CPE 202	Data Structures	4
CSC/CPE 123	Introduction to Computing ¹	4

CSC/CPE 203	Project-Based Object-Oriented Programming and Design	4
CSC 225	Introduction to Computer Organization	4
CSC 248	Discrete Structures	4
CSC 300	Professional Responsibilities	4
or PHIL 323	Ethics, Science and Technology	
CSC 305	Individual Software Design and Development	4
CSC 308	Software Engineering I	4
CSC 309	Software Engineering II	4
CSC 349	Design and Analysis of Algorithms	4
CSC/CPE 357	Systems Programming	4
CSC 365	Introduction to Database Systems	4
CSC 402	Software Requirements Engineering	4
CSC 405	Software Construction	4
CSC 406	Senior Project - Software Deployment	4
CSC 430	Programming Languages	4
CSC 484	User-Centered Interface Design and Development	4

Technical Electives

Select from the lists in Technical Electives Guidelines below ^{2,3} 16

SUPPORT COURSES

IME 314	Engineering Economics	3
or IME 315	Financial Decision Making for Engineers	
MATH 141	Calculus I (B4) ⁴	4
MATH 142	Calculus II (B4) ⁴	4
MATH 143	Calculus III (Area B Electives) ⁴	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
PHIL 230	Philosophical Classics: Knowledge and Reality (C2) ⁴	4
or PHIL 231	Philosophical Classics: Ethics and Political Philosophy	
PSY 201/202	General Psychology (E) ⁴	4
PSY 350	Teamwork	4
or COMS 217	Small Group Communication	
STAT 312	Statistical Methods for Engineers (Upper-Division B) ⁴	4

Life Science Support Elective

Select from the following (B2): ⁴		4-5
BIO 111	General Biology	
BIO 161	Introduction to Cell and Molecular Biology	
BIO 213 & BMED 213	Life Science for Engineers and Bioengineering Fundamentals	
BOT 121	General Botany	
MCRO 221	Microbiology	
MCRO 224	General Microbiology I	

Mathematics Support Elective

Select from the following:		4
MATH 248	Methods of Proof in Mathematics	
MATH 334	Combinatorial Math	

MATH 335	Graph Theory	
MATH 451	Numerical Analysis I	
Physical Science Support Electives		
Select one of the following series (B1 & B3; Area B Electives): ⁴		12
CHEM 124 & CHEM 125 & CHEM 126	General Chemistry for Physical Science and Engineering I and General Chemistry for Physical Science and Engineering II and General Chemistry for Physical Science and Engineering III	
PHYS 141 & PHYS 142 & PHYS 143	General Physics I and General Physics II and General Physics III	
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		36
FREE ELECTIVES		
Free Electives ⁵		0
Total units		183-184

¹ An additional 4 units of CPE/CSC technical electives may substitute for CSC/CPE 123, although new students are strongly encouraged to take CSC/CPE 123.

² Consultation with advisor is recommended prior to selecting Technical Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

³ An additional 4 units of CPE/CSC Technical Electives is needed if CSC/CPE 123 is not taken.

⁴ Required in Major or Support; also satisfies General Education (GE) requirement.

⁵ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Technical Electives Guidelines

Courses used to satisfy any other Major, Support, or General Education requirement are not allowed to count toward the Technical Electives requirement. Credit/No Credit grading is not allowed.

Contact the Computer Science and Software Engineering department for further information.

Select Technical Electives from the following:^{1,2}

CSC 313	Teaching Computing
CSC/CPE 321	Introduction to Computer Security
CSC 323	Cryptography Engineering
CSC 325	Introduction to Privacy: Policy and Technology
CSC 344	Music Programming
CSC 364	Introduction to Networked, Distributed, and Parallel Computing
CSC 366	Database Modeling, Design and Implementation
CSC 369	Introduction to Distributed Computing
CSC 371	Game Design
CSC 377	Introduction to Mixed Reality

CSC 378	Interactive Entertainment Engineering
CSC 400	Special Problems ²
CSC 409	Current Topics in Software Engineering
CSC 410	Software Evaluation
CSC 421	Binary Exploitation: Tools and Techniques
CSC 422	Network Security
CSC 424	Software Security
CSC/CPE 425	Wireless Security
CSC 429	Current Topics in Computer Security
CSC/CPE 431	Compiler Construction
CSC 436	Mobile Application Development
CSC 437	Dynamic Web Development
CSC 445	Theory of Computation I
CSC 448	Bioinformatics Algorithms
CSC/CPE 453	Introduction to Operating Systems
CSC/CPE 454	Implementation of Operating Systems
CSC/CPE 458	Current Topics in Computer Systems
CSC 466	Knowledge Discovery from Data
CSC 468	Database Management Systems Implementation
CSC/CPE 469	Distributed Systems
CSC/CPE 471	Introduction to Computer Graphics
CSC 473	Advanced Rendering Techniques
CSC 474	Computer Animation
CSC/CPE 476	Real-Time 3D Computer Graphics Software
CSC 477	Scientific and Information Visualization
CSC 478	Current Topics in Computer Graphics
CSC 480	Artificial Intelligence
CSC 481	Knowledge Based Systems
CSC 482	Speech and Language Processing
CSC 486	Human-Computer Interaction Theory and Design
CSC 487	Deep Learning
CSC 490	Selected Advanced Topics ²
CSC 493	Cooperative Education Experience ²
CSC 496	Selected Advanced Laboratory ²
CSC 497 & CSC 498	Research Senior Project I and Research Senior Project II
CSC 508	Software Engineering I
CSC 509	Software Engineering II
CSC 513	Computing Education Research and Practice
CSC/CPE 515	Computer Architecture
CSC 521	Computer Security
CSC 522	Advanced Network Security
CSC 524	System Security
CSC 530	Languages and Translators
CSC 540	Theory of Computation II

CSC 549	Advanced Algorithm Design and Analysis
CSC 550	Operating Systems
CSC 560	Database Systems
CSC/CPE 564	Computer Networks: Research Topics
CSC 566	Topics in Advanced Data Mining
CSC/CPE 569	Distributed Computing
CSC 570	Current Topics in Computer Science
CSC 572	Computer Graphics
CSC 580	Artificial Intelligence
CSC 581	Computer Support for Knowledge Management
CSC 582	Computational Linguistics
CSC 587	Advanced Deep Learning
CPE 315	Computer Architecture
CPE 316	Microcontrollers and Embedded Applications
CPE 400	Special Problems for Undergraduates ²
CPE 416	Autonomous Mobile Robotics
CPE 419	Applied Parallel Computing
CPE/EE 428	Computer Vision
CPE 464	Introduction to Computer Networks
CPE 465	Advanced Computer Networks
CPE 488/ IME 458/MATE 458	Microelectronics and Electronics Packaging
DATA 301	Introduction to Data Science
PHYS/CPE 345	Quantum Computing

The following restrictions must be satisfied

4 of these units must be satisfied by a course that has as a prerequisite either

- 1) An upper-division course required by the major (excluding CSC 357) or
- 2) Another Technical Elective

Select from the following:

CSC 366	Database Modeling, Design and Implementation
CSC 409	Current Topics in Software Engineering
CSC 410	Software Evaluation
CSC 421	Binary Exploitation: Tools and Techniques
CSC 422	Network Security
CSC 424	Software Security
CSC/CPE 425	Wireless Security
CSC 429	Current Topics in Computer Security
CSC/CPE 431	Compiler Construction
CSC 437	Dynamic Web Development
CSC 448	Bioinformatics Algorithms
CSC/CPE 454	Implementation of Operating Systems
CSC 466	Knowledge Discovery from Data

CSC 468	Database Management Systems Implementation
CSC 473	Advanced Rendering Techniques
CSC 474	Computer Animation
CSC/CPE 476	Real-Time 3D Computer Graphics Software
CSC 477	Scientific and Information Visualization
CSC 478	Current Topics in Computer Graphics
CSC 481	Knowledge Based Systems
CSC 482	Speech and Language Processing
CSC 486	Human-Computer Interaction Theory and Design
CSC 487	Deep Learning
CSC 497 & CSC 498	Research Senior Project I and Research Senior Project II
CSC 508	Software Engineering I
CSC 509	Software Engineering II
CSC/CPE 515	Computer Architecture
CSC 521	Computer Security
CSC 522	Advanced Network Security
CSC 530	Languages and Translators
CSC 540	Theory of Computation II
CSC 549	Advanced Algorithm Design and Analysis
CSC 550	Operating Systems
CSC 560	Database Systems
CSC/CPE 564	Computer Networks: Research Topics
CSC 566	Topics in Advanced Data Mining
CSC 572	Computer Graphics
CSC 580	Artificial Intelligence
CSC 581	Computer Support for Knowledge Management
CSC 582	Computational Linguistics
CSC 587	Advanced Deep Learning
CPE 416	Autonomous Mobile Robotics
CPE 465	Advanced Computer Networks

Up to 4 units may be taken from the Approved External Electives listed below:

AERO 450	Introduction to Aerospace Systems Engineering
ART 376	The Art of Mixed Reality
ART 384	Digital 3D Modeling and Design
BUS 310	Introduction to Entrepreneurship
CHEM 216	Organic Chemistry I
CHEM 217	Organic Chemistry II
CHEM 218	Organic Chemistry III
CHEM 312	Organic Chemistry: Fundamentals and Applications
ECON 339	Econometrics
EE 201 & EE 251	Electric Circuit Theory and Electric Circuits Laboratory
EE 314	Introduction to Communication Systems

EE/CPE 336	Microprocessor System Design
EE 424	Introduction to Remote Sensing
ENVE 542	Sustainable Environmental Engineering
IME 301	Operations Research I
IME 356	Manufacturing Automation
IME 403	Software Product Management
IME 456	The Industrial Internet of Things
MATH 206	Linear Algebra I
MATH 242	Differential Equations I
MATH 248	Methods of Proof in Mathematics
MATH 341	Theory of Numbers
MATH 350	Mathematical Software
MATH 412	Introduction to Analysis I
ME 211	Engineering Statics
ME 212	Engineering Dynamics
ME 405	Mechatronics
PHIL 412	Epistemology
PHIL 422	Philosophy of Mind
PHYS 211	Modern Physics I
PSY 329	Research Methods in Psychology
PSY 333	Quantitative Research Methods for the Behavioral Sciences
PSY 357	Cognition
STAT 305	Introduction to Probability and Simulation
STAT 323	Design and Analysis of Experiments I
STAT 324	Applied Regression Analysis
STAT 330	Statistical Computing with SAS
STAT 331	Statistical Computing with R
STAT 334	Applied Linear Models
STAT 416	Statistical Analysis of Time Series
STAT 418	Categorical Data Analysis
STAT 419	Applied Multivariate Statistics
STAT 434	Statistical Learning: Methods and Applications
Total units	16

¹ A total of 16 Technical Elective units selected from upper-division and graduate CSC and CPE courses open to those in the major and not otherwise required by the major. An additional 4 units of CPE/CSC Technical Electives is needed if CSC/CPE 123 is not taken.

² Up to a combined 4 units may be taken from CSC 400, CPE 400, CSC 490, CSC 493, or CSC 496.

General Education (GE) Requirements

- 72 units required, 36 of which are specified in Major and/or Support.
- If any of the remaining 36 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written

Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A		English Language Communication and Critical Thinking	
A1	Oral Communication		4
A2	Written Communication		4
A3	Critical Thinking		4
Area B		Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹		0
B2	Life Science (4 units in Support) ¹		0
B3	One lab taken with either a B1 or B2 course		
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹		0
Upper-Division B (4 units in Support) ¹			0
Area B Electives (8 units in Support) ¹			0
Area C		Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.			
C1	Arts: Arts, Cinema, Dance, Music, Theater		4
C2	Humanities: Literature, Philosophy, Languages other than English (4 units in Support) ¹		0
Lower-Division C Elective - Select a course from either C1 or C2.			4
Upper-Division C			4
Area D		Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)		4
Area D Elective - Select either a lower-division D2 or upper-division D course.			4
Area E		Lifelong Learning and Self-Development	
Lower-Division E (4 units in Support) ¹			0
Area F		Ethnic Studies	
F	Ethnic Studies		4
Total units			36

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Computer Science Minor

Required Courses

CSC/CPE 101	Fundamentals of Computer Science	4
CSC/CPE 202	Data Structures	4
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	4

Approved Electives¹

Select from the following:		12
CPE 315	Computer Architecture	

CPE 316	Microcontrollers and Embedded Applications	CSC/CPE 431	Compiler Construction
CPE 329	Microcontroller-Based Systems Design	CSC 436	Mobile Application Development
CPE 333	Computer Hardware Architecture and Design	CSC 437	Dynamic Web Development
CPE 416	Autonomous Mobile Robotics	CSC 445	Theory of Computation I
CPE 426	Introduction to Hardware Security	CSC 448	Bioinformatics Algorithms
CPE/EE 428	Computer Vision	CSC/CPE 453	Introduction to Operating Systems
CPE 439	Introduction to Real-Time Operating Systems	CSC/CPE 454	Implementation of Operating Systems
CPE/EE 442	Real Time Embedded Systems	CSC/CPE 458	Current Topics in Computer Systems
CPE 446	Design of Fault-Tolerant Digital Systems	CSC 466	Knowledge Discovery from Data
CPE 464	Introduction to Computer Networks	CSC 468	Database Management Systems Implementation
CPE 465	Advanced Computer Networks	CSC/CPE 469	Distributed Systems
CSC 300	Professional Responsibilities	CSC/CPE 471	Introduction to Computer Graphics
CSC 305	Individual Software Design and Development	CSC 473	Advanced Rendering Techniques
CSC 307	Introduction to Software Engineering	CSC 474	Computer Animation
CSC 308	Software Engineering I	CSC/CPE 476	Real-Time 3D Computer Graphics Software
CSC 309	Software Engineering II	CSC 477	Scientific and Information Visualization
CSC 313	Teaching Computing	CSC 478	Current Topics in Computer Graphics
CSC 320	Practical Computer Security for Everyone ²	CSC 480	Artificial Intelligence
CSC/CPE 321	Introduction to Computer Security ²	CSC 481	Knowledge Based Systems
CSC 323	Cryptography Engineering	CSC 482	Speech and Language Processing
CSC 325	Introduction to Privacy: Policy and Technology	CSC 484	User-Centered Interface Design and Development
CSC 344	Music Programming	CSC 486	Human-Computer Interaction Theory and Design
CSC 349	Design and Analysis of Algorithms	CSC 487	Deep Learning
CSC/CPE 357	Systems Programming	CSC 490	Selected Advanced Topics ³
CSC 364	Introduction to Networked, Distributed, and Parallel Computing	CSC 508	Software Engineering I
CSC 365	Introduction to Database Systems	CSC 509	Software Engineering II
CSC 366	Database Modeling, Design and Implementation	CSC 513	Computing Education Research and Practice
CSC 369	Introduction to Distributed Computing	CSC/CPE 515	Computer Architecture
CSC 371	Game Design	CSC 521	Computer Security
CSC 377	Introduction to Mixed Reality	CSC 524	System Security
CSC 378	Interactive Entertainment Engineering	CSC 530	Languages and Translators
CSC 400	Special Problems ³	CSC 540	Theory of Computation II
CSC 409	Current Topics in Software Engineering	CSC 549	Advanced Algorithm Design and Analysis
CSC 410	Software Evaluation	CSC 550	Operating Systems
CSC 421	Binary Exploitation: Tools and Techniques	CSC 560	Database Systems
CSC/CPE 422	Network Security	CSC/CPE 564	Computer Networks: Research Topics
CSC 424	Software Security	CSC 566	Topics in Advanced Data Mining
CSC/CPE 425	Wireless Security	CSC 569	Distributed Computing
CSC 429	Current Topics in Computer Security	CSC 570	Current Topics in Computer Science ³
CSC 430	Programming Languages	CSC 572	Computer Graphics
		CSC 580	Artificial Intelligence
		CSC 581	Computer Support for Knowledge Management
		CSC 582	Computational Linguistics
		CSC 587	Advanced Deep Learning

DATA 301	Introduction to Data Science	
Total units		24

¹ Choose from CSC/CPE upper-division courses open to CSC majors. Must be approved via the CSC minor form upon acceptance to the minor.

² Cannot take both CSC 320 and CSC 321 as Approved Electives.

³ Must be approved via the CSC minor form, signed by the minor advisor.

Cross Disciplinary Studies Minor in Computing for Interactive Arts

Required Courses

ART 182	Foundation in Digital Art I	4
ART 183	Foundation in Digital Art II	4
ART 384	Digital 3D Modeling and Design	4
Select from the following:		12
CSC/CPE 101	Fundamentals of Computer Science	
CSC 121	Computing for All I	
CSC 122	Computing for All II	
CSC/CPE 123	Introduction to Computing	
CSC/CPE 202	Data Structures	
CSC/ART 350	Computing for Interactive Arts Capstone I	2
CSC/ART 450	Computing for Interactive Arts Capstone II	2

Approved Electives

Select from the following (no more than 8 units with a CSC or CPE prefix): ¹		12
ART 302	Figure Drawing	
ART 334	Illustration I: Techniques and Tools	
ART 376	The Art of Mixed Reality	
ART 383	Digital Video I	
ART 388	Interaction Design II	
ART 434	Illustration II	
ART 439	Type in Motion	
ART 474	Collaborative Studio: Storyboarding, Modeling, Animation and Rendering	
CSC 313	Teaching Computing	
CSC 371	Game Design	
CSC 377	Introduction to Mixed Reality	
CSC 378	Interactive Entertainment Engineering	
CSC/CPE 471	Introduction to Computer Graphics	
CSC 473	Advanced Rendering Techniques	
CSC 474	Computer Animation	
CSC/CPE 476	Real-Time 3D Computer Graphics Software	
CSC 480	Artificial Intelligence	
CSC 484	User-Centered Interface Design and Development	

Total units **40**

¹ Art and Design students in the Studio Art concentration that take CSC 121 and CSC 122 to also satisfy General Education requirements must take an additional Approved Elective to maintain the required 12-unit minimum within the minor because ART 302 is required by the concentration.

MS Computer Science

Program Learning Objectives

1. Prepared for successful careers in a computing-related field, including careers that involve positions of technical leadership and advanced responsibility
2. Exposed to a broad range of computer-science subjects in coursework that emphasizes technical subject matter.
3. Able to perform, analyze, evaluate and synthesize computer science research, in particular, know how to present research findings in oral and written form.
4. Prepared for life-long learning in the discipline of computer science, including continued formal graduate education.
5. Aware of the impacts of computing technology on society and understand ethics and responsible professional conduct.

The MS degree requires at least 45 units beyond the undergraduate degree. Courses must be chosen according to the following requirements:

Select from the following:		20
CSC 508	Software Engineering I	
CSC 509	Software Engineering II	
CSC 513	Computing Education Research and Practice	
CSC 515	Computer Architecture	
CSC 521	Computer Security	
CSC 522	Advanced Network Security	
CSC 524	System Security	
CSC 530	Languages and Translators	
CSC 540	Theory of Computation II	
CSC 549	Advanced Algorithm Design and Analysis	
CSC 550	Operating Systems	
CSC 560	Database Systems	
CSC 564	Computer Networks: Research Topics	
CSC 566	Topics in Advanced Data Mining	
CSC 569	Distributed Computing	
CSC 570	Current Topics in Computer Science	
CSC 572	Computer Graphics	
CSC 580	Artificial Intelligence	
CSC 581	Computer Support for Knowledge Management	
CSC 582	Computational Linguistics	
CSC 587	Advanced Deep Learning	

Thesis/Project and Seminar

CSC 590	Thesis Seminar	1
Select from the following: ¹		4
CSC 596 & CSC 597	Research in Computer Science I and Research in Computer Science II (2, 2)	

or

an additional 500-level course (4) ²

CSC 599	Thesis	4
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Electives

Selected with Graduate Coordinator approval ²	16
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Total units	45
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¹ CSC 596 and CSC 597 must be taken before CSC 599.

² No more than 4-units total of CSC 500 allowed.

For further information or advisement students should communicate with the Graduate Coordinator of the Computer Science and Software Engineering Department.

Electrical Engineering

Engineering East Bldg. (20A), Room 200
Phone: 805.756.2781
<https://ee.calpoly.edu/>

Department Chair: Dale Dolan

Engineering Student Services
Engineering South (40), Room 115
Phone: 805.756.1461

Academic Programs

Program name	Program type
Electrical Engineering	BS, MS

The Electrical Engineering Department offers a Bachelor of Science degree and a Master of Science degree in Electrical Engineering. The undergraduate degree is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

The mission of the Electrical Engineering Department is to educate students to achieve excellence in the discipline of electrical engineering and to teach them to apply their education to solve practical problems in a socially responsible way. Students are prepared for careers of service, leadership, and distinction in a wide range of engineering and other related fields using a participatory, learn-by-doing, and "hands-on" laboratory, project, and design centered approach. Students are encouraged to participate in lifelong learning as essential in the presence of the ever-increasing pace of technological change.

Diversity in the students, faculty and staff is embraced and enhances the quality and creativity of the campus experience and environment.

The primary educational objectives of the Electrical Engineering program are to prepare graduates to:

1. Excel in the electrical engineering profession;
2. Embrace life-long learning as a necessary component to remain current in their profession; and
3. Pursue graduate degrees for enhanced skills and opportunities.

The Electrical Engineering degree programs prepare graduates for distinguished practice in professional engineering; equipping students for pursuing engineering solutions to urgent problems while being responsibly aware of all implications. To that end, the curriculum provides a sound theoretical background along with current, practical engineering knowledge. Cal Poly's "learn by doing" philosophy is emphasized by integrating design throughout the curriculum in numerous design-centered laboratories that provide students with hands-on experiences in design synthesis, analysis, characterization, and verification.

The student begins the major in the first quarter with an orientation class and laboratory; and generally has one or more major courses each quarter until graduation. The many laboratory courses provide practical experience and lead logically from demonstration of theory into design applications.

During their junior and senior years, students choose technical electives to gain additional expertise in one or more areas of specialization within electrical engineering. These courses deal with the development, design and application of circuits, electronic devices, computers, and systems for communication, controls, information processing and display, and

system instrumentation. Senior courses in this area provide specialized preparation in a selected area such as active and passive network synthesis, advanced communications systems, software and hardware aspects of computer system design, microelectronic circuit engineering, microprocessor systems applications, rf and microwave engineering, photonics, biomedical engineering, integrated circuits, and solid state devices.

Other courses deal with industrial process control systems, power electronics, and with generation, distribution, control and utilization of electric power. Senior elective courses in this area provide specialized preparation in a selected area such as advanced control systems, energy conversion, power system analysis, protection and stability, and solid state motor control.

Employers recognize that students who have completed such specialized technical courses are early contributors in the workforce. Students wishing to pursue graduate work may select appropriate senior courses in keeping with this goal.

In the required senior design project, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to solve practical problems.

Involvement in faculty research is possible for graduate students and outstanding undergraduate students. Research areas include computer-aided education, autonomous systems, signal and image processing, electric vehicles, computer architecture and software systems, photonics, polymer electronics, power systems, power electronics, radio frequency electronics, communication systems, biomedical electronics, renewable energy systems, and electric power microgrid systems.

Students are encouraged to participate in professional organizations and clubs such as: Institute of Electrical and Electronics Engineers (IEEE), IEEE Computer Society (IEEE-CS), IEEE Consumer Electronics Society (IEEE-CES), IEEE Power and Energy Society (IEEE-PES), Audio Engineering Society (AES), Cal Poly Robotics, Electric Vehicle Club, Renewable Energy Club, Society of Automotive Engineers (SAE) and the Formula Electric challenge, Society of Women Engineers (SWE), Women Involved in Software & Hardware (WISH), Eta Kappa Nu (HKN), Society of Photo-Optical Instrumentation Engineers (SPIE), Student Electrical Engineering Council (SEEC), and the Amateur Radio Club. The Electric Power Institute, sponsored by the university and underwritten by major utility companies and electrical equipment manufacturers, offers advanced seminars and lectures in the electrical power field and facilitates student and faculty interaction with industry.

Undergraduate Programs

BS Electrical Engineering

Students are prepared for careers of service, leadership, and distinction in engineering and other related fields using a participatory, learn-by-doing, and "hands-on" laboratory, project, and design centered approach. Students are encouraged to participate in lifelong learning in the presence of rapid technological change.

General Curriculum in Electrical Engineering or Concentrations

- General Curriculum in Electrical Engineering
- Power
- Radio Frequency - Microwaves - Photonics
- Systems

Graduate Program MS Electrical Engineering

General Characteristics

The Master of Science program in Electrical Engineering serves students and practicing engineers seeking:

- Job-entry education for the more complex areas of engineering, such as research and development, innovative design, systems analysis and design, and managerial engineering;
- Updating and upgrading opportunities for practicing engineers;
- Graduate preparation for further study in engineering, leading to the Doctor of Engineering or Ph.D. degree;
- A base which allows graduates to maintain currency in their fields.

Prerequisites

For admission as a classified graduate student, an applicant must hold a bachelor's degree in engineering or a closely related physical science with a minimum grade point average of 3.0 in the last 90 quarter units (60 semester units) attempted. Applicants for graduate engineering programs are required to submit satisfactory scores for the General (Aptitude) Test of the Graduate Record Examination. Foreign applicants must have satisfactory scores on the TOEFL and TWE exams. An applicant who meets these standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies before advancement to classified graduate standing.

Information pertaining to specific requirements for admission to graduate standing (classified or conditionally classified) may be obtained from the Graduate Coordinator, Electrical Engineering Department.

Program of Study

Graduate students in this program must file a formal study plan with their advisor, department, college and university graduate studies office by no later than the end of the second quarter in the program. The formal program of study must include a minimum of 45 units (at least 28 of which must be at the 500 level and the remainder at the 400 level).

The broad curriculum requirements for the MS in Electrical Engineering are:

1. core of 16 units;
2. a minimum of 12 units of additional electrical engineering courses;
3. at least 17 units of approved electives;
4. at least 28 units of the 45 unit program at the 500 level.

Two program options are available for MS in Electrical Engineering students: a thesis program which requires coursework, a thesis and oral defense of thesis; or a nonthesis option which involves additional coursework and a comprehensive examination. The thesis option is strongly encouraged for all students.

Blended BS + MS Electrical Engineering Program

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to

graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

A blended program is available for MS Electrical Engineering.

Eligibility

Majors that are eligible for the blended program are:

- BS Computer Engineering
- BS Electrical Engineering

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Electrical Engineering department for any additional eligibility criteria.

BS Electrical Engineering Program Learning Outcomes

Electrical engineering students are expected to graduate with:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

CPE/EE 133	Digital Design	4
CPE/EE 233	Computer Design and Assembly Language Programming	4

EE 111 & EE 151	Introduction to Electrical Engineering and Introduction to Electrical Engineering Laboratory	2
Select from the following:		
EE 113 & EE 143	Electric Circuit Analysis I and Electronics Manufacturing and Circuit Analysis Laboratory	4
or		
EE 112 & IME 156	Electric Circuit Analysis I and Basic Electronics Manufacturing	4
EE 211 & EE 241	Electric Circuit Analysis II and Electric Circuit Analysis Laboratory II	4
EE 212 & EE 242	Electric Circuit Analysis III and Electric Circuit Analysis Laboratory III	4
EE 228	Continuous-Time Signals and Systems	4
EE 255 & EE 295	Energy Conversion Electromagnetics and Energy Conversion Electromagnetics Laboratory	4
EE 302 & EE 342	Classical Control Systems and Classical Control Systems Laboratory	4
EE 306 & EE 346	Semiconductor Device Electronics and Semiconductor Device Electronics Laboratory	4
EE 307 & EE 347	Digital Electronics and Integrated Circuits and Digital Electronics and Integrated Circuits Laboratory	4
EE 308 & EE 348	Analog Electronics and Integrated Circuits and Analog Electronics and Integrated Circuits Laboratory	4
EE 314	Introduction to Communication Systems	3
EE 328 & EE 368	Discrete Time Signals and Systems and Signals and Systems Laboratory	4
EE/CPE 329	Microcontroller-Based Systems Design	4
or EE 336	Microprocessor System Design	
EE 335	Electromagnetic Fields and Transmission	4
EE 375	Electromagnetic Fields and Transmission Laboratory	1
EE 402	Electromagnetic Waves	4
EE 409 & EE 449	Electronic Design and Electronic Design Laboratory	4
EE 460	Senior Project Preparation ¹	2
Select from the following: ¹		
EE 461 & EE 462	Senior Project I and Senior Project II	4
or		
EE 463 & EE 464	Senior Project Design Laboratory I and Senior Project Design Laboratory II	

SUPPORT COURSES

BIO 213 & BMED 213	Life Science for Engineers and Bioengineering Fundamentals (B2) ²	4
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ²	4
CSC/CPE 101	Fundamentals of Computer Science	4
MATH 141	Calculus I (B4) ²	4
MATH 142	Calculus II (B4) ²	4
MATH 143	Calculus III (Area B Electives) ²	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
PHYS 141	General Physics I (Area B Electives) ²	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
PHYS 211	Modern Physics I	4
STAT 350	Probability and Random Processes for Engineers (Upper-Division B) ²	4

Concentration or General Curriculum in Electrical Engineering³

(See list of Concentrations and General Curriculum in Electrical Engineering below)	20
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GENERAL EDUCATION (GE)

(See GE program requirements below.)	44
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FREE ELECTIVES

Free Electives	0
Total units	192

¹ Either the ENGR 459, ENGR 460 and ENGR 461 (6) series or the ENGR 463, ENGR 464 and ENGR 465 (6) series may substitute for the EE 460, EE 461 and EE 462 (6) series or the EE 460, EE 463 and EE 464 (6) series.

² Required in Major or Support; also satisfies General Education (GE) requirement.

³ Unless a concentration is declared, the default will be General Curriculum in Electrical Engineering.

General Curriculum in Electrical Engineering or Concentrations (Select one)

- General Curriculum in Electrical Engineering (p. 241)
- Power (p. 243)
- Radio Frequency - Microwaves - Photonics (p. 244)
- Systems (p. 244)

General Education (GE) Requirements

- 72 units required, 28 of which are specified in Major and/or Support.
- If any of the remaining 44 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written

Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		44

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

General Curriculum in Electrical Engineering

Technical Electives

Select from the following:^{1,2,3} 11

EE Senior Design Lecture/Laboratory Electives

EE 410	Power Electronics I
EE 411	Power Electronics II
EE 413	Advanced Electronic Design
EE/CPE 414	Robotic Systems Integration
EE 417	Alternating Current Machines

EE 420	Sustainable Electric Energy Conversion
EE 424	Introduction to Remote Sensing
EE/CPE 428	Computer Vision
EE 431/CPE 441	Computer-Aided Design of VLSI Devices
EE 433	Introduction to Magnetic Design
EE 434	Automotive Engineering for a Sustainable Future
EE/CPE 439	Introduction to Real-Time Operating Systems
EE/CPE 442	Real Time Embedded Systems
EE/CPE 446	Design of Fault-Tolerant Digital Systems
EE/CPE 447	Stringed Musical Instrument Acoustics, Mechanics, and Transducer Design
EE 495	Cooperative Education Experience ⁴
EE 502	Microwave Component and System Engineering
EE 504	Software Defined Radio
EE 516	Pattern Recognition
EE/CPE 521	Computer Systems
EE/CPE 522	Advanced Real-Time Operating Systems Design
EE/CPE 523	Digital Systems Design
EE 529	Microwave Device Electronics
EE 531/CPE 541	Advanced VLSI Design
EE 534	Advanced Photonic Systems
EE/CPE 542	Advanced Real Time Embedded Systems
EE Senior Design Lecture Electives	
EE 400	Special Problems ⁵
EE 403	Introduction to Photonics and Fiber Optics
EE 405	High Frequency Amplifier Design
EE 406	Power Systems Analysis I
EE 407	Power Systems Analysis II
EE 412	Advanced Analog Circuits
EE 415	Communication Systems Design
EE 416	Digital Communication Systems
EE 418	Photonic Engineering
EE 419	Digital Signal Processing
EE 423/ BMED 434/ MATE 430	Micro/Nano Fabrication
EE 425	Analog Filter Design
EE/CPE 432	Digital Control Systems
EE 440	Wireless Communications
EE 470	Selected Advanced Topics
EE 502	Microwave Component and System Engineering
EE 509	Computational Intelligence
EE 511	Electric Machines Theory

EE 513	Control Systems Theory	CPE 315	Computer Architecture
EE 514	Advanced Topics in Automatic Control	CPE 333	Computer Hardware Architecture and Design
EE 515	Discrete Time Filters	CPE 416	Autonomous Mobile Robotics
EE 518	Power System Protection	CPE 464	Introduction to Computer Networks
EE 519	Advanced Analysis of Power Systems	CSC/CPE 357	Systems Programming
EE 520	Advanced Solar-Photovoltaic Systems Design	CSC/CPE 453	Introduction to Operating Systems
EE 524	Solid State Electronics	CSC/CPE 458	Current Topics in Computer Systems
EE 526	Advanced Digital Communications	CSC/CPE 471	Introduction to Computer Graphics
EE 527	Advanced Topics in Power Electronics	ECON 330	International Trade Theory
EE 528	Digital Image Processing	ECON 337	Money, Banking and Credit
EE 530	Fourier Optics	ENVE 331	Fundamentals of Environmental Engineering
EE 533	Antennas	IME 301	Operations Research I
EE 570	Selected Advanced Topics	IME 303	Project Organization and Management
EE Senior Design Laboratory Electives		IME 305	Operations Research II
EE 400	Special Problems ⁵	IME 319	Human Factors Engineering
EE/PHYS 422	Polymer Electronics Laboratory	IME 401	Sales Engineering
EE 435	Industrial Power Control and Automation	IME 435	Reliability for Design and Testing
EE 443	Introduction to Photonics and Fiber Optics Laboratory	IME 457	Advanced Electronic Manufacturing
EE 444	Power Systems Laboratory	IME/MATE 458/ CPE 488	Microelectronics and Electronics Packaging
EE 445	High Frequency Amplifier Design Laboratory	MATE 340	Electronic Materials Systems
EE 452	Advanced Analog Circuits Laboratory	MATH 304	Vector Analysis
EE 455	Analog Filter Design Laboratory	MATH 306	Linear Algebra II
EE 456	Digital Communication Systems Laboratory	MATH 406	Linear Algebra III
EE 458	Photonic Engineering Laboratory	MATH 410	Complex Analysis I
EE 459	Digital Signal Processing Laboratory	MATH 411	Complex Analysis II
EE 471	Selected Advanced Laboratory	MATH 412	Introduction to Analysis I
EE/CPE 472	Digital Control Systems Laboratory	MATH 413	Introduction to Analysis II
EE 473/ BMED 435/MATE 435	Microfabrication Laboratory	MATH 451	Numerical Analysis I
EE 475	Communication Networks and Systems Laboratory	MATH 452	Numerical Analysis II
EE 480	Wireless Communications Laboratory	MATH 453	Numerical Optimization
EE/CPE 532	VLSI Circuit Testing	ME 302	Thermodynamics I
EE 541	Advanced Microwave Laboratory	ME 405	Mechatronics
EE 544	Solid-state Electronics and VLSI Laboratory	ME 415	Energy Conversion
Non-EE Electives		MU 311	Introduction to Recording, Synthesis, and Production
BMED 420	Principles of Biomaterials Design	MU 312	Advanced Recording, Synthesis, and Production
BMED 425	Biomedical Engineering Transport	MU 411	Sonic Interactions with Technology
BMED 430	Biomedical Modeling and Simulation	PHYS 305	Classical Mechanics I
BMED 440	Bioelectronics and Instrumentation	PHYS 306	Classical Mechanics II
BMED 445	Biopotential Instrumentation	PHYS 310	Physics of Energy
BUS 311	Managing Technology in the International Legal Environment	PHYS 313	Introduction to Atmospheric Physics
CHEM 314	Biochemistry: Fundamentals and Applications	PHYS 318	Special Theory of Relativity
		PHYS 403	Particle and Nuclear Physics
		PHYS 405	Quantum Mechanics I
		PHYS 406	Quantum Mechanics II
		PHYS 408	Electromagnetic Fields and Waves I
		PHYS 409	Electromagnetic Fields and Waves II
		PHYS 423	Advanced Optics

PHYS 425	Solid State Physics	
PHYS 426	Solid State Physics Laboratory	
PHYS 428	Nonlinear Dynamical Systems	
Approved Engineering Electives		
Select from the following: ^{1,2,6}		9
BIO 111	General Biology	
BMED 212	Introduction to Biomedical Engineering Design	
BMED 310	Biomedical Engineering Measurement and Analysis	
BMED 450	Contemporary Issues in Biomedical Engineering	
CHEM 125	General Chemistry for Physical Science and Engineering II	
CHEM 212	Introduction to Organic Chemistry	
CHEM 314	Biochemistry: Fundamentals and Applications	
CPE 290	Selected Topics (Introduction to C++ Programming)	
CPE 315	Computer Architecture	
CPE 333	Computer Hardware Architecture and Design	
CSC/CPE 202	Data Structures	
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	
CSC 248	Discrete Structures	
CSC/CPE 357	Systems Programming	
EE 261	Intro C Programming with a Hardware Emphasis	
EE 262	Intro C++ Programming with a Hardware Emphasis	
EE/PHYS 422	Polymer Electronics Laboratory	
IME 142	Manufacturing Processes: Materials Joining	
IME 143	Manufacturing Processes: Material Removal	
IME 301	Operations Research I	
IME 305	Operations Research II	
IME 314	Engineering Economics	
IME 315	Financial Decision Making for Engineers	
MATE 210	Materials Engineering	
MATE 215	Materials Laboratory I	
MATE 232	Materials, Ethics, and Society	
MATE 340	Electronic Materials Systems	
MATE 430/ BMED 434/ EE 423	Micro/Nano Fabrication	
MATE/BMED 435/EE 473	Microfabrication Laboratory	
MATH 206	Linear Algebra I	
MATH 248	Methods of Proof in Mathematics	
MATH 304	Vector Analysis	
MATH 306	Linear Algebra II	
MATH 406	Linear Algebra III	

MATH 412	Introduction to Analysis I	
MATH 410	Complex Analysis I	
MATH 411	Complex Analysis II	
MATH 451	Numerical Analysis I	
MATH 452	Numerical Analysis II	
MATH 453	Numerical Optimization	
ME 211	Engineering Statics	
ME 212	Engineering Dynamics	
ME 228	Engineering Design Communication	
ME 251	Introduction to Detailed Design with Solid Modeling	
ME 302	Thermodynamics I	
ME 341	Fluid Mechanics I	
PHYS 212	Modern Physics II	
PHYS 310	Physics of Energy	
PHYS 313	Introduction to Atmospheric Physics	
PHYS 315	Lasers	
PHYS 318	Special Theory of Relativity	
PHYS 323	Optics	
PHYS 403	Particle and Nuclear Physics	
PHYS 405	Quantum Mechanics I	
PHYS 406	Quantum Mechanics II	
PHYS 408	Electromagnetic Fields and Waves I	
PHYS 409	Electromagnetic Fields and Waves II	
PHYS 423	Advanced Optics	
PHYS 425	Solid State Physics	
PHYS 426	Solid State Physics Laboratory	
PHYS 428	Nonlinear Dynamical Systems	

Total units **20**

- ¹ Consultation with an advisor is recommended prior to selecting Technical Electives or Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ² A course cannot be double-counted as a Technical Elective and an Approved Engineering Elective.
- ³ A minimum of two EE Senior Design Lecture Electives and two EE Senior Design Laboratory Electives.
- ⁴ Four units maximum.
- ⁵ Four units maximum may count toward Technical Electives; one unit maximum, with approval of department chair, may count towards Senior Design Laboratory Elective.
- ⁶ The number of units given for transfer credit will not exceed the number of units of the Cal Poly course.

Power Concentration

EE 406	Power Systems Analysis I	4
or EE 410	Power Electronics I	

Approved Electives

Select from the following:		9
IME 314	Engineering Economics	
IME 315	Financial Decision Making for Engineers	

MATE 210	Materials Engineering
MATE 340	Electronic Materials Systems
MATH 248	Methods of Proof in Mathematics
MATH 304	Vector Analysis
MATH 306	Linear Algebra II
MATH 451	Numerical Analysis I
ME 211	Engineering Statics
ME 212	Engineering Dynamics
ME 302	Thermodynamics I
PHYS 310	Physics of Energy
Technical Electives	
Select from the following: 7	
EE 406	Power Systems Analysis I
EE 407	Power Systems Analysis II
EE 410	Power Electronics I
EE 411	Power Electronics II
EE 417	Alternating Current Machines
EE 420	Sustainable Electric Energy Conversion
EE 432	Digital Control Systems
EE 433	Introduction to Magnetic Design
EE 434	Automotive Engineering for a Sustainable Future
EE 435	Industrial Power Control and Automation
EE 444	Power Systems Laboratory
EE 472	Digital Control Systems Laboratory
EE 509	Computational Intelligence
EE 511	Electric Machines Theory
EE 513	Control Systems Theory
EE 514	Advanced Topics in Automatic Control
EE 518	Power System Protection
EE 519	Advanced Analysis of Power Systems
EE 520	Advanced Solar-Photovoltaic Systems Design
EE 527	Advanced Topics in Power Electronics
MATH 453	Numerical Optimization
Total units	20

Radio Frequency - Microwaves - Photonics Concentration

Approved Electives: ¹

Select from the following: 9	
EE 423/ MATE 430/ BMED 434	Micro/Nano Fabrication
EE 473/ MATE 435/BMED 435	Microfabrication Laboratory
MATE 210	Materials Engineering
MATE 215	Materials Laboratory I

MATE 340	Electronic Materials Systems
MATH 206	Linear Algebra I
MATH 304	Vector Analysis
PHYS 315	Lasers
PHYS 323	Optics
PHYS 408	Electromagnetic Fields and Waves I
PHYS 423	Advanced Optics
Technical Electives: ¹	
Select from the following: 11	
EE 403	Introduction to Photonics and Fiber Optics
EE 405	High Frequency Amplifier Design
EE 412	Advanced Analog Circuits
EE 413	Advanced Electronic Design
EE 416	Digital Communication Systems
EE 418	Photonic Engineering
EE 423/ MATE 430/ BMED 434	Micro/Nano Fabrication
EE 425	Analog Filter Design
EE 440	Wireless Communications
EE 443	Introduction to Photonics and Fiber Optics Laboratory
EE 445	High Frequency Amplifier Design Laboratory
EE 452	Advanced Analog Circuits Laboratory
EE 455	Analog Filter Design Laboratory
EE 456	Digital Communication Systems Laboratory
EE 458	Photonic Engineering Laboratory
EE 480	Wireless Communications Laboratory
EE 502	Microwave Component and System Engineering
EE 504	Software Defined Radio
EE 524	Solid State Electronics
EE 526	Advanced Digital Communications
EE 529	Microwave Device Electronics
EE 530	Fourier Optics
EE 533	Antennas
EE 534	Advanced Photonic Systems
EE 541	Advanced Microwave Laboratory
PHYS 423	Advanced Optics
Total units	20

¹ A course cannot be double-counted as an Approved Elective and a Technical Elective.

Systems Concentration

Approved Electives ¹

Select from the following: 9	
BMED 310	Biomedical Engineering Measurement and Analysis
CPE/CSC 202	Data Structures

CPE/CSC 203	Project-Based Object-Oriented Programming and Design
CPE 333	Computer Hardware Architecture and Design
IME 301	Operations Research I
IME 305	Operations Research II
MATH 206	Linear Algebra I
MATH 306	Linear Algebra II
MATH 410	Complex Analysis I
MATH 411	Complex Analysis II
MATH 451	Numerical Analysis I
ME 211	Engineering Statics
ME 212	Engineering Dynamics
PHYS 323	Optics
PHYS 428	Nonlinear Dynamical Systems

Technical Electives¹

Select from the following: 11

BMED 440	Bioelectronics and Instrumentation
CPE 315	Computer Architecture
CPE 333	Computer Hardware Architecture and Design
CPE/CSC 357	Systems Programming
CPE/EE 414	Robotic Systems Integration
CPE 416	Autonomous Mobile Robotics
CPE/EE 428	Computer Vision
CPE/EE 432	Digital Control Systems
CPE/EE 442	Real Time Embedded Systems
CPE/EE 447	Stringed Musical Instrument Acoustics, Mechanics, and Transducer Design
CPE 464	Introduction to Computer Networks
CPE/EE 472	Digital Control Systems Laboratory
EE 403	Introduction to Photonics and Fiber Optics
EE 415	Communication Systems Design
EE 416	Digital Communication Systems
EE 419	Digital Signal Processing
EE 424	Introduction to Remote Sensing
EE 425	Analog Filter Design
EE 440	Wireless Communications
EE 443	Introduction to Photonics and Fiber Optics Laboratory
EE 455	Analog Filter Design Laboratory
EE 456	Digital Communication Systems Laboratory
EE 459	Digital Signal Processing Laboratory
EE 475	Communication Networks and Systems Laboratory
EE 480	Wireless Communications Laboratory
EE 504	Software Defined Radio
EE 509	Computational Intelligence
EE 513	Control Systems Theory
EE 514	Advanced Topics in Automatic Control

EE 515	Discrete Time Filters
EE 516	Pattern Recognition
EE 525	Stochastic Processes
EE 526	Advanced Digital Communications
EE 528	Digital Image Processing
IME 301	Operations Research I
IME 305	Operations Research II
MATH 306	Linear Algebra II
MATH 406	Linear Algebra III
MATH 410	Complex Analysis I
MATH 411	Complex Analysis II
MATH 453	Numerical Optimization
ME 405	Mechatronics
MU 311	Introduction to Recording, Synthesis, and Production
MU 312	Advanced Recording, Synthesis, and Production
MU 411	Sonic Interactions with Technology

Total units 20¹ A course cannot be double-counted as a Approved Elective and a Technical Elective.

MS Electrical Engineering Program Learning Objectives

Our goal is to create a graduate degree program and a learning environment that result in graduates who possess the following:

1. Technical competency in their chosen disciplines;
2. Effective communication skills;
3. Awareness of the impacts of technology on society and the environment;
4. Understanding of ethics and responsible professional conduct;
5. Strong interpersonal and teamwork skills;
6. Appreciation of the need for life-long learning;
7. Leadership/planning/decision-making skills;
8. Critical thinking/complex problem-solving skills.

Required Courses

EE 525	Stochastic Processes	4
or EE 513	Control Systems Theory	
EE 563	Graduate Seminar (1, 1, 1)	3
EE 599	Design Project (Thesis) (or 9 units of approved Technical Electives and a comprehensive written examination) ¹	9

Additional Electrical Engineering Graduate CoursesSelect from the following:² 12

EE 500	Individual Study
EE 502	Microwave Component and System Engineering
EE 504	Software Defined Radio
EE 509	Computational Intelligence
EE 511	Electric Machines Theory

EE 513	Control Systems Theory	
EE 514	Advanced Topics in Automatic Control	
EE 515	Discrete Time Filters	
EE 518	Power System Protection	
EE 519	Advanced Analysis of Power Systems	
EE 520	Advanced Solar-Photovoltaic Systems Design	
EE 521	Computer Systems	
EE 522	Advanced Real-Time Operating Systems Design	
EE 523	Digital Systems Design	
EE 524	Solid State Electronics	
EE 526	Advanced Digital Communications	
EE 527	Advanced Topics in Power Electronics	
EE 528	Digital Image Processing	
EE 529	Microwave Device Electronics	
EE 530	Fourier Optics	
EE 531	Advanced VLSI Design	
EE 532	VLSI Circuit Testing	
EE 533	Antennas	
EE 534	Advanced Photonic Systems	
EE 541	Advanced Microwave Laboratory	
EE 542	Advanced Real Time Embedded Systems	
EE 544	Solid-state Electronics and VLSI Laboratory	
EE 570	Selected Advanced Topics	
EE 571	Selected Advanced Laboratory	
Approved Technical Electives (400-500 level) ¹		
May be selected from the course list above and other advisor approved technical electives.		17
Total units		45

¹ At least 8 units of approved Technical Electives must be at 500 level.

² Not all courses listed are offered each academic year. Consult the EE Department for current information on course offerings.

General Engineering

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 gene@calpoly.edu
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Program Director: Lizabeth Lea Thompson

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 Engineering South (40), Room 115
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Academic Programs

Program	Classification
General Engineering	BS

General Engineering

The mission of the General Engineering Program is to provide students with the highest quality technical and professional engineering education, with a particular emphasis in new or evolving interdisciplinary areas, while allowing the student to participate in designing their own programs of study.

Undergraduate Program BS General Engineering

General Engineering is a comprehensive and unique interdisciplinary engineering program that cultivates problem solving with an emphasis on a hands-on approach (“Learn by Doing”). The General Engineering program provides students with the highest quality technical and professional engineering education, with a particular emphasis in new or evolving interdisciplinary areas while allowing students to participate in designing their own curricula. It brings together mathematics, the fundamental sciences, engineering sciences, engineering design, and the liberal arts in a rich, flexible, student-driven academic environment that allows each student to develop core competencies and a unique, individualized area of expertise. All practitioners of engineering must have a solid understanding of the physical sciences and mathematics as well as a firm grasp of engineering sciences. The General Engineering curriculum provides the framework for this matrix of understanding, upon which the practitioner may begin to develop a unique area of expertise.

The theoretically rigorous and laboratory-centered, practice-oriented, hands-on education that is the foundation of the General Engineering program allows graduates to immediately participate and to excel in professional environments. The BS degree in General Engineering is, therefore, a direct path to employment in a traditional engineering field or in an emerging technology area. It is also a natural step toward a professional or a graduate degree.

There are two concentrations in the General Engineering program: the General Curriculum in General Engineering, which provides a broad, but rigorous, undergraduate course of study, and the Individualized Course of Study in which students, in consultation with their faculty advisor, select advanced technical elective classes that allow the students to put their own mark on their degrees, ensuring a unique competency with a solid technical underpinning. In addition to the abilities expected of all engineering graduates (as articulated in the section of this catalog describing the College of Engineering), General Engineering graduates are

expected to leave the University with special capabilities pertinent to their own concentrations.

The *General Curriculum in General Engineering* is designed to provide the broad foundation of engineering competency in preparation for further graduate or professional studies, for engineering careers requiring a breadth of knowledge, or for non-engineering careers benefiting from a broad technical background (e.g., education, engineering entrepreneurship, or work in non-profit organizations with a technical focus). The *Individualized Course of Study* is for self-directed, highly motivated students who have clearly-defined career goals and want to pursue a customized engineering-based course of study that is not addressed by the curriculum of any other single engineering department.

The Individualized Course of Study concentration is designed to allow students the latitude in course selection required to educate themselves either in the classical study of engineering or in new and evolving interdisciplinary technologies. A sound foundation in the fundamental principles of engineering and engineering systems is built during the early years of study, and students customize the later years of their study plan with the help of a faculty advisor, allowing students the opportunity to focus their education while still at the undergraduate level. This is accomplished primarily by selecting advanced technical elective courses that are consistent with the student’s sharply defined career goal.

Examples of study plans created in the past have emphasized audio engineering, sustainable energy, bioengineering, chemical engineering, engineering physics, technology management, and engineering in unique environments.

General Engineering students demonstrate an ability to satisfy their personal needs for further education, as expressed in their matriculation to graduate or professional schools in many cases, and an interest in life-long learning. Both the General Curriculum and the Individualized Course of Study concentrations in General Engineering are excellent preparation for pursuing a master’s degree in interdisciplinary fields, including via the Blended BS+MS program described in the MS Engineering section of this catalog. This program recognizes that the entry-level expertise of engineers in many fields, particularly in new and evolving technological fields, often requires a master’s degree as a prerequisite for success. The Blended BS+MS program allows motivated students to reduce the time necessary to earn both degrees.

General Engineering graduates are also ready for immediate entry into the professional engineering field. They possess a solid engineering foundation that underpins a successful career. They can become leaders, based on solid fundamental engineering knowledge, strong communication skills, a capacity to form teams and perform at a high level in teams, and an understanding of the economic and social impact of their decisions. General Engineering graduates have used this program as a foundation for advanced studies and careers in engineering, project management, technical sales, law, entrepreneurship, medicine, education, and many other paths defined by their keen intellects and adventuresome spirits.

General Curriculum in General Engineering or Individualized Course of Study

General Curriculum

The General Engineering Curriculum in General Engineering is designed to meet the needs of students interested in a broad, but rigorous, undergraduate course of study. Students will primarily use this degree as preparation for further graduate/professional studies (e.g. engineering, law, business), engineering careers requiring breadth, and

non-engineering careers benefiting from a broad technical background (e.g. education, entrepreneurship, non-profit organizations).

BS General Engineering

Program Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

CE 204	Mechanics of Materials I	3
CSC/CPE 101	Fundamentals of Computer Science ¹	4
EE 201 & EE 251	Electric Circuit Theory and Electric Circuits Laboratory	4
ENGR 110	Introduction to Engineering	2
IME 144	Introduction to Design and Manufacturing	4
IME 314 or IME 315	Engineering Economics Financial Decision Making for Engineers	3
MATE 210 & MATE 215	Materials Engineering and Materials Laboratory I	4
ME 211	Engineering Statics	3
ME 212	Engineering Dynamics	3
ME 302	Thermodynamics I	3
ME 341	Fluid Mechanics I	3
ME 343	Heat Transfer	4
Select from the following:		6

ENGR 459 & ENGR 460 & ENGR 461	Interdisciplinary Senior Design Project I and Interdisciplinary Senior Design Project II and Interdisciplinary Senior Design Project III
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or	
Senior Project in appropriate engineering discipline	
General Curriculum in General Engineering or Individualized Course of Study ²	40

SUPPORT COURSES		
Select from the following (B1 & B3): ³		8
CHEM 124 & CHEM 125	General Chemistry for Physical Science and Engineering I and General Chemistry for Physical Science and Engineering II	
CHEM 127 & CHEM 128	General Chemistry for Agriculture and Life Science I and General Chemistry for Agriculture and Life Science II	
ES 350 or ES 351	Gender, Race, Culture, Science & Technology ⁴ Gender, Race, Class, Nation in Global Engineering, Technology & International Development	4
MATH 141	Calculus I (B4) ³	4
MATH 142	Calculus II (B4) ³	4
MATH 143	Calculus III (Area B Electives) ³	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
Select from the following (Upper-Division B): ³		4
MATH 344	Linear Analysis II	
STAT 312	Statistical Methods for Engineers	
STAT 350	Probability and Random Processes for Engineers	
PHYS 141	General Physics I (Area B Electives) ³	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
Physical Science Electives		
Select from the following: ⁵		4
CHEM 126 or CHEM 129	General Chemistry for Physical Science and Engineering III General Chemistry for Agriculture and Life Science III	
GEOL 102	Introduction to Geology	
GEOL 201	Physical Geology	
GEOL 241	Physical Geology Laboratory	
GEOL 305	Seismology and Earth Structure	
PHYS 211	Modern Physics I	
PHYS 323	Optics	
GENERAL EDUCATION		
(See GE program requirements below.)		48
FREE ELECTIVES		
Free Electives ⁴		0
Total units		186

- ¹ Students with an approved Individualized Course of Study may substitute CSC 231 (2 units) plus an additional 2 units of other advisor approved coursework for CSC/CPE 101 (4 units).
- ² The Individualized Course of Study consists of 40 units of technical electives with a minimum of 29 units at the 300-400 level.
- ³ Required in Major or Support; also satisfies General Education (GE) requirement.
- ⁴ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree
- ⁵ Students in the General Curriculum in General Engineering should choose a minimum of 3 units of 300-400 level Physical Science Electives in order to meet 60 units of upper-division required for the degree.

General Curriculum in BS General Engineering or Individualized Course of Study (Select one)

General Curriculum in General Engineering (p. 249)
Individualized Course of Study

This program is for self-directed, highly motivated students, allowing them to pursue a customized course of study that meets their individual needs and interests. The Individualized Course of Study consists of 40 units of technical electives with a minimum of 33 of these units at the 300-400 level. Courses are selected by the student with the advice and approval of the student's academic advisor.

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	

Lower-division courses in Area C must come from three different subject prefixes.

C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		48

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

General Curriculum in General Engineering

CE 207	Mechanics of Materials II	2
CPE/EE 133	Digital Design	4
CPE/CSC 202	Data Structures	4
CPE/EE 329	Microcontroller-Based Systems Design	4
or IME 356	Manufacturing Automation	
or ME 305	Introduction to Mechatronics	
EE 321 & EE 361	Electronics and Electronics Laboratory	4
IME 418	Product-Process Design	4
Approved Electives (300-level or higher)		18
Total units		40

Industrial & Manufacturing Engineering

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Department Chair: Dan Waldorf

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Academic Programs

Program name	Program type
Engineering Management	MS
Industrial Engineering	BS, MS
Manufacturing Engineering	BS

The mission of the Industrial Engineering and Manufacturing Engineering programs at Cal Poly is to inspire and educate students for successful careers as engineering professionals using a learn-by-doing approach that develops students' abilities to design and implement innovative, effective solutions for improving processes and systems in society, business, and industry.

The Department focuses on programs that integrate engineering with a real concern for people. Our students study topics that lead to satisfying and productive careers, and also provide strong preparation for graduate work in many fields. Programs reflect the traditional strengths of Cal Poly through close interaction between students and faculty in classroom, laboratory, and other activities. The programs use a project based learning approach where students work on multiple real life projects. Students often present results to industry representatives.

Department and university laboratories and computers are integrated into coursework to investigate, test, and apply theoretical principles learned in the classroom. The descriptions below provide details of the various programs.

Undergraduate Programs

BS Industrial Engineering

Industrial Engineering is the profession concerned with solving integrated engineering and management problems. According to the Institute of Industrial and Systems Engineers, "Industrial engineers figure out how to do things better. They engineer processes and systems that improve quality and productivity. They work to eliminate waste of time, money, materials, energy and other commodities. This is why many industrial engineers end up being promoted into management positions." Key objectives of industrial engineering are to improve the quality and productivity of creating and delivering goods and services and to act as the interface between technology and humans. Engineering methods and practical knowledge are used in formulating decision models for the optimum application of engineering and management principles.

The Bachelor of Science program in Industrial Engineering is accredited by the Engineering Accreditation Commission of ABET, <http://www.ABET.org>. Within three to five years of graduation, the alumni of the Industrial Engineering undergraduate program will:

1. Make immediate contributions towards the design and implementation of innovative, effective solutions for improving processes and systems in society, business, and industry.
2. Have successful careers as engineering professionals with increasing responsibility and impact in their careers.
3. Will communicate and function effectively in a collaborative and inclusive team, and will recognize the economic, societal, and ethical impacts of their decisions.
4. Effectively adapt to changes in technology and our global society over the course of their professional lives by continuously learning.

Our main focus is to prepare graduates for practice in professional engineering. Thus, our "learn by doing" philosophy is emphasized in the curriculum by the large number of design-centered laboratories, integrating design throughout the curriculum, and the senior design project experience. In the required senior design project, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems. Graduates can choose from a challenging range of career activities: operations research and analysis, production planning and scheduling, plant design, management, human factors engineering design, data processing and analytics, measurement, quality control and reliability assurance, technical economic planning, resource conservation, productivity measurement, increasing productivity using computer integrated manufacturing techniques, robotics, and, in general, systems analysis and design. The physical, engineering, and social sciences form the broad base for these endeavors.

The program is oriented to provide graduates with the capability of producing results with a minimum of additional training. Computer and hi-tech firms, health care and biomedical industries, aerospace/defense, entertainment, retail chains, agriculture, airlines, automotive, as well as government, service firms, traditional manufacturing industries, and consulting firms all employ graduates of this discipline. Graduates also are well prepared for successful graduate study.

BS Manufacturing Engineering

Manufacturing Engineering is the profession that applies engineering analysis and methods to the production of all manufactured goods and services. The manufacturing engineer plans, develops, and optimizes the processes of production including methods of manufacture, and designs of tools and equipment for manufacturing. The emphasis is on both development and sustained operation of manufacturing systems, including computer-aided methods, automation, design for manufacture, production tooling, and material handling, as well as the processes and ancillary support systems of modern manufacturing.

The Bachelor of Science program in Manufacturing Engineering is accredited by the Engineering Accreditation Commission of ABET, <http://www.ABET.org>. Within three to five years of graduation, the alumni of the Manufacturing Engineering undergraduate program will:

1. Make immediate contributions towards the design and implementation of innovative, effective solutions for improving processes and systems in society, business, and industry.
2. Have successful careers as engineering professionals with increasing responsibility and impact in their careers.
3. Will communicate and function effectively in a collaborative and inclusive team, and will recognize the economic, societal, and ethical impacts of their decisions.

- Effectively adapt to changes in technology and our global society over the course of their professional lives by continuously learning.

In the required senior design project, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

Graduates typically work more directly with the manufacturing processes than do industrial engineers.

Emphasis is placed upon application of the basic sciences and engineering fundamentals. Knowledge of basic processes, tool design, automation, and computer-aided manufacturing are applied directly to the problems of development and sustained operation of manufacturing systems.

Graduates are prepared for job-entry at the professional level in the areas of CAD/CAM, process engineering, automation, quality assurance, and production engineering. They also are well prepared for successful graduate study.

Graduate Programs

MS Engineering Management

The mission of the MS in Engineering Management program is to inspire and educate a new generation of technical leaders with analytical knowledge, business insight, advanced communication and project management skills to design and implement data-driven, innovative, and effective solutions for improving processes and systems in industry and society.

This program emphasizes learn-by-doing and a project-based engineering education approach. Students typically work closely with industry to solve real-world problems. The MS Engineering Management program helps students sharpen both technical skills and non-technical skills required for success in their careers.

The MS Engineering Management program requires 45 quarter credits of coursework in 400 or 500 level courses, including five quarter units of graduate project. At least 60% of the courses need to be at the 500-level.

MS Industrial Engineering

General Characteristics

The Master of Science in Industrial Engineering (MS IE) program is designed to prepare students for a successful career in industry as well as a further study in a Ph.D. program, building on its strength in learn-by-doing and project-based engineering education and focusing on applied research. Through the MS IE program, students will sharpen both technical skills and non-technical skills required for success in their careers.

<https://ime.calpoly.edu/academics/programs> (<http://www.ime.calpoly.edu/academics/programs/>)

Blended BS + MS Programs

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to

graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

Blended programs are available for the following Master's degrees offered by the Industrial and Manufacturing Engineering department:

MS Engineering Management
MS Industrial Engineering

Eligibility

Majors that are eligible for the blended program in MS Engineering Management are:

- BS Aerospace Engineering
- BS Biomedical Engineering
- BS Environmental Engineering
- BS Industrial Engineering
- BS Manufacturing Engineering
- BS Materials Engineering
- BS Mechanical Engineering
- BS Software Engineering

Majors that are eligible for the blended program in MS Industrial Engineering are:

- BS Industrial Engineering
- BS Materials Engineering
- BS Mechanical Engineering

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Industrial and Manufacturing Engineering department for any additional eligibility criteria.

BS Industrial Engineering

Program Learning Outcomes

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

IME 101	Introduction to Industrial and Manufacturing Engineering	1
IME 141	Manufacturing Processes: Net Shape	1
IME 144	Introduction to Design and Manufacturing	4
IME 156	Basic Electronics Manufacturing	2
IME 212	Introduction to Enterprise Analytics	4
IME 223	Process Improvement Fundamentals	4
IME 301	Operations Research I	4
IME 305	Operations Research II	4
IME 312	Data Management and System Design	4
IME 315	Financial Decision Making for Engineers	3
IME 319	Human Factors Engineering	3
IME 326	Engineering Test Design and Analysis	4
IME 372	Applications of Enterprise Analytics	4
IME 410	Production Planning and Control Systems	4
IME 417	Supply Chain and Logistics Management	4
IME 420	Simulation	4
IME 429	Ergonomics Laboratory	1
IME 430	Quality Engineering	4
IME 443	Facilities Planning and Design	4
IME 481 & IME 482 & IME 483	Senior Design Project I and Senior Design Project II and Senior Design Project III ^{1,2}	6
Technical Electives		
Select from Category A (8-13 units) & Category B (0-5 units) below: ^{3,4}		13
Category A		
DATA 301	Introduction to Data Science	
EE 321	Electronics	
EE 361	Electronics Laboratory	
EE 434	Automotive Engineering for a Sustainable Future	
IME 303	Project Organization and Management	
IME 331	Intermediate Metal Casting	
IME 335	Computer-Aided Manufacturing I	
IME 336	Computer-Aided Manufacturing II	

IME 356	Manufacturing Automation
IME 400	Special Problems for Advanced Undergraduates ⁵
IME 403	Software Product Management
IME 408	Systems Engineering
IME 409	Economic Decision Systems
IME 415	Service Enterprises Engineering and Management
IME 416	Automation of Industrial Systems
IME 418	Product-Process Design
IME 424	Industrial Engineering in Healthcare
IME 428	Engineering Metrology
IME 432	Additive Manufacturing
IME 435	Reliability for Design and Testing
IME 451	Radio Frequency Identification and Sensing System Design
IME 456	The Industrial Internet of Things
IME 457	Advanced Electronic Manufacturing
IME 458	Microelectronics and Electronics Packaging
IME 470	Selected Advanced Topics
IME 471	Selected Advanced Laboratory
IME 510	Systems Engineering I
IME 511	Systems Engineering II
IME 520	Advanced Information Systems for Operations
IME 527	Design of Experiments
IME 535	Change Management for Engineering Leaders
IME 541	Advanced Operations Research
IME 542	Applied Reliability Engineering
IME 543	Applied Human Factors
IME 544	Advanced Topics in Engineering Economy
IME 545	Advanced Topics in Simulation
IME 549	Network Analysis and Optimization
IME 565	Predictive Data Analytics for Engineers
MATH 344	Linear Analysis II
MATH 350	Mathematical Software
ME 302	Thermodynamics I
ME 305	Introduction to Mechatronics
ME 341	Fluid Mechanics I
STAT 324	Applied Regression Analysis
STAT 330	Statistical Computing with SAS
STAT 331	Statistical Computing with R
STAT 414	Multilevel and Mixed Modeling
STAT 415	Bayesian Reasoning and Methods
STAT 416	Statistical Analysis of Time Series
STAT 419	Applied Multivariate Statistics
STAT 431	Advanced Statistical Computing with R
Category B	

AG/ISLA/EDES/ ENGR/SCM/UNIV 350	The Global Environment	
BUS/ENGR 310	Introduction to Entrepreneurship	
BUS 311	Managing Technology in the International Legal Environment	
BUS 346	Principles of Marketing	
BUS 382	Leadership and Organizations	
CE 204	Mechanics of Materials I	
CE 207	Mechanics of Materials II	
CPE 202	Data Structures	
IME 239	Industrial Costs and Controls	
IME 244	Intermediate Design and Manufacturing	
IME 401	Sales Engineering	
IME 421	Engineering Management	
IME 441	Engineering Supervision I	
IME 460	Introduction to Value Chain Analysis	
ME 212	Engineering Dynamics	
PSY 350	Teamwork	
SUPPORT COURSES		
Select from the following:		6
CE 204	Mechanics of Materials I	
EE 321	Electronics	
ME 212	Engineering Dynamics	
BIO 213 & BMED 213	Life Science for Engineers and Bioengineering Fundamentals (B2) ⁶	4
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ⁶	4
CSC 232	Computer Programming for Scientists and Engineers ⁷	3
or CPE/CSC 101	Fundamentals of Computer Science	
EE 201	Electric Circuit Theory	3
EE 251	Electric Circuits Laboratory	1
ENGL 147	Writing Arguments about STEM (A3) ⁶	4
MATE 210	Materials Engineering	3
MATE 215	Materials Laboratory I	1
MATH 141	Calculus I (B4) ⁶	4
MATH 142	Calculus II (B4) ⁶	4
MATH 143	Calculus III (Area B Electives) ⁶	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
ME 211	Engineering Statics	3
PHYS 141	General Physics I (Area B Electives) ⁶	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
PSY 201	General Psychology (E) ⁶	4
or PSY 202	General Psychology	
STAT 321	Probability and Statistics for Engineers and Scientists (Upper-Division B) ⁶	4

GENERAL EDUCATION (GE)

(See GE program requirements below.) 36

FREE ELECTIVES	
Free Electives	0
Total units	190

- ¹ ENGR 459, ENGR 460 and ENGR 461 (6) may substitute for IME 481, IME 482 and IME 483 (6).
- ² ENGR 463, ENGR 464 and ENGR 465 (6) may substitute for IME 481, IME 482 and IME 483 (6).
- ³ If a course is taken to meet the Technical Electives requirement, it cannot be double-counted to satisfy another Major or Support requirement.
- ⁴ Consultation with an advisor is recommended prior to selecting Technical Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals. Upper-division courses not on this list may substitute as Technical Electives, if approved by an advisor and the Industrial and Manufacturing Engineering department chair.
- ⁵ IME 400 requires a Special Problems form and no more than 4 total units are allowed.
- ⁶ Required in Major or Support; also satisfies General Education (GE) requirement.
- ⁷ Excess unit from CPE/CSC 101 can count as Category B technical elective.

General Education (GE) Requirements

- 72 units required, 36 of which are specified in Major and/or Support.
- If any of the remaining 36 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking (4 units in Support) ¹	0
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4

C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2.		
Upper-Division C		
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Support) ¹		
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		36

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

BS Manufacturing Engineering Program Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirements (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

IME 101	Introduction to Industrial and Manufacturing Engineering	1
IME 141	Manufacturing Processes: Net Shape	1
IME 142	Manufacturing Processes: Materials Joining	2
IME 144	Introduction to Design and Manufacturing	4
IME 156	Basic Electronics Manufacturing	2
IME 223	Process Improvement Fundamentals	4
IME 244	Intermediate Design and Manufacturing	2
IME 314	Engineering Economics	3
or IME 315	Financial Decision Making for Engineers	
IME 327	Test Design and Analysis in Manufacturing Engineering	4
IME 330	Fundamentals of Manufacturing Engineering	4
IME 335	Computer-Aided Manufacturing I	4
IME 342	Manufacturing Systems Integration	4
IME 356	Manufacturing Automation	4
IME 417	Supply Chain and Logistics Management	4
IME 418	Product-Process Design	4
IME 430	Quality Engineering	4
IME 450	Manufacturing Process and Tool Engineering	4
IME 481 & IME 482 & IME 483	Senior Design Project I and Senior Design Project II and Senior Design Project III ^{1,2}	6
Technical Electives		
Select from Category A (8-13 units) & Category B (0-5 units) below: ^{3,4}		13
Category A		
BMED 410	Biomechanics	
EE 361	Electronics Laboratory	
EE 434	Automotive Engineering for a Sustainable Future	
IME 301	Operations Research I	
IME 303	Project Organization and Management	
IME 305	Operations Research II	
IME 312	Data Management and System Design	
IME 319	Human Factors Engineering	
IME 331	Intermediate Metal Casting	
IME 336	Computer-Aided Manufacturing II	
IME 400	Special Problems for Advanced Undergraduates	
IME 408	Systems Engineering	
IME 409	Economic Decision Systems	
IME 410	Production Planning and Control Systems	
IME 415	Service Enterprises Engineering and Management	

IME 416	Automation of Industrial Systems	BUS 346	Principles of Marketing
IME 420	Simulation	BUS 382	Leadership and Organizations
IME 424	Industrial Engineering in Healthcare	CE 207	Mechanics of Materials II ⁵
IME 428	Engineering Metrology	ENGR 350	The Global Environment
IME 429	Ergonomics Laboratory	IME 212	Introduction to Enterprise Analytics
IME 432	Additive Manufacturing	IME 401	Sales Engineering
IME 435	Reliability for Design and Testing	IME 421	Engineering Management
IME 443	Facilities Planning and Design	IME 441	Engineering Supervision I
IME 451	Radio Frequency Identification and Sensing System Design	IME 460	Introduction to Value Chain Analysis
IME 456	The Industrial Internet of Things	ITP 326	Product Design and Development
IME 457	Advanced Electronic Manufacturing	ITP 330	Packaging Fundamentals
IME/MATE 458/ CPE 488	Microelectronics and Electronics Packaging	ITP 341	Packaging Polymers and Processing
IME 470	Selected Advanced Topics	ITP 371	Supply Chain Management in Manufacturing and Services
IME 471	Selected Advanced Laboratory	ITP 406	Professional Technical Selling
IME 510	Systems Engineering I	ITP 428	Commercialization of New Technologies
IME 511	Systems Engineering II	ME 234	Philosophy of Design
IME 520	Advanced Information Systems for Operations	SUPPORT COURSES	
IME 527	Design of Experiments	BIO 213 & BMED 213	Life Science for Engineers and Bioengineering Fundamentals (B2) ⁶ 4
IME 541	Advanced Operations Research	CE 204	Mechanics of Materials I ⁵ 3
IME 542	Applied Reliability Engineering	CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ⁶ 4
IME 543	Applied Human Factors	CHEM 125	General Chemistry for Physical Science and Engineering II 4
IME 544	Advanced Topics in Engineering Economy	CSC 232	Computer Programming for Scientists and Engineers 3
IME 545	Advanced Topics in Simulation	EE 201	Electric Circuit Theory 3
MATE 401	Materials Characterization Techniques	EE 251	Electric Circuits Laboratory 1
MATE 410	Nanoscale Engineering	EE 321	Electronics 3
MATE 430	Micro/Nano Fabrication	ENGL 147	Writing Arguments about STEM (A3) ⁶ 4
MATE 435	Microfabrication Laboratory	MATE 210	Materials Engineering 3
MATE 440	Welding Metallurgy and Joining of Advanced Materials	MATE 215	Materials Laboratory I 1
MATE 445	Joining of Advanced Materials Laboratory	MATH 141	Calculus I (B4) ⁶ 4
MATH 344	Linear Analysis II	MATH 142	Calculus II (B4) ⁶ 4
MATH 350	Mathematical Software	MATH 143	Calculus III (Area B Electives) ⁶ 4
ME 303	Thermodynamics II	MATH 241	Calculus IV 4
ME 305	Introduction to Mechatronics	MATH 244	Linear Analysis I 4
ME 318	Mechanical Vibrations	ME 211	Engineering Statics 3
ME 326	Intermediate Dynamics	ME 212	Engineering Dynamics 3
ME 328	Design for Strength and Stiffness	ME 302	Thermodynamics I 3
ME 329	Mechanical Systems Design	PHYS 141	General Physics I (Area B Electives) ⁶ 4
ME 341	Fluid Mechanics I	PHYS 142	General Physics II 4
ME 343	Heat Transfer	PHYS 143	General Physics III 4
ME 405	Mechatronics	STAT 321	Probability and Statistics for Engineers and Scientists (Upper-Division B) ⁶ 4
ME 415	Energy Conversion	GENERAL EDUCATION (GE)	
Category B		(See GE program requirements below.) 40	
BMED 212	Introduction to Biomedical Engineering Design	FREE ELECTIVES	
BUS/ENGR 310	Introduction to Entrepreneurship		
BUS 311	Managing Technology in the International Legal Environment		

Free Electives	0
Total units	192

- ¹ ENGR 459, ENGR 460 and ENGR 461 (6) may substitute for IME 481, IME 482 and IME 483 (6).
- ² ENGR 463, ENGR 464 and ENGR 465 (6) may substitute for IME 481, IME 482 and IME 483 (6).
- ³ If a course is taken to meet the Technical Electives requirement, it cannot be double-counted to satisfy another Major or Support requirement.
- ⁴ Consultation with an advisor is recommended prior to selecting Technical Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals. Upper-division courses not on this list may substitute as Technical Electives, if approved by an advisor and the Industrial and Manufacturing Engineering department chair.
- ⁵ CE 208 (5) may substitute for both CE 204 (3) and CE 207 (2).
- ⁶ Required in Major or Support; also satisfies General Education (GE) requirement.

General Education (GE) Requirements

- 72 units required, 32 of which are specified in Major and/or Support.
- If any of the remaining 40 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking (4 units in Support) ¹	0
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
	Upper-Division B (4 units in Support) ¹	0
	Area B Electives (8 units in Support) ¹	0
Area C	Arts and Humanities	
	Lower-division courses in Area C must come from three different subject prefixes.	
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
	Lower-Division C Elective - Select a course from either C1 or C2.	4
	Upper-Division C	4

Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
	Area D Elective - Select either a lower-division D2 or upper-division D course.	4
Area E	Lifelong Learning and Self-Development	
	Lower-Division E	4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		40

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

MS Engineering Management Program Learning Outcomes

1. Summarize, synthesize, and evaluate existing methods/solutions of engineering problems.
2. Solve complex technical and operational problems to meet both business and customer needs.
3. Analyze and interpret quantitative and qualitative data to make sound engineering and business decisions.
4. Lead multidisciplinary teams and projects; assess tools and techniques, resources, and organizational systems for the successful management of projects.
5. Estimate and control engineering cost.
6. Communicate engineering ideas/solutions effectively across the entire enterprise.

Student Learning Objectives

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to design experiments, collect data, analyze and interpret data, and draw conclusions to make sound engineering and business decisions.
3. An ability to function effectively as a leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusion environment.
4. An ability to communicate effectively with a range of audiences.

Required Courses

IME 503	Applied Statistical Methods in Engineering ¹	4
IME 507	Graduate Seminar	2
IME 520	Advanced Information Systems for Operations	4
IME 544	Advanced Topics in Engineering Economy	4
IME 556	Technological Project Management ²	4
IME 577	Engineering Entrepreneurship	4
IME 580	Manufacturing Systems ³	4
IME 596	Graduate Project/Internship	5

Approved Electives

Select from the following: ⁴ 14

IME 500	Individual Study
IME 510	Systems Engineering I
IME 527	Design of Experiments
IME 535	Change Management for Engineering Leaders
IME 541	Advanced Operations Research
IME 542	Applied Reliability Engineering
IME 543	Applied Human Factors
IME 549	Network Analysis and Optimization
IME 565	Predictive Data Analytics for Engineers
Total units	45

- ¹ Students with a B+ or better grade in IME 326 or IME 327 may substitute IME 503 with another statistics related course such as IME 527, STAT 416, STAT 418, STAT 419, STAT 530, or STAT 531 upon approval of the graduate coordinator.
- ² Students with a B+ or better grade in IME 303 may substitute IME 556 with another approved technical elective course.
- ³ Course cannot be taken by students who have already received credit for IME 410.
- ⁴ Students may take other 400 or 500 level courses after consultation with and approval by advisor and the graduate coordinator. At least 4 units must be at 500 level.

MS Industrial Engineering Program Learning Outcomes

After successfully completing the requirements of the Master of Science in Industrial Engineering, students will be able to:

1. Summarize and synthesize state-of-the art knowledge in a selected topic in the field of Industrial and Manufacturing Engineering.
2. Apply scientific methods to investigate industry-driven research projects (problem articulation; hypothesis formulation; data collection, management, and analysis; implementation and dissemination of results).
3. Make data-driven engineering decisions.
4. Communicate appropriate information in both written and oral format, based on the audience setting and audience's background.
5. Work productively, respectfully, and professionally as a member of a team; exhibit leadership, ethical conduct, and community values.

The MS IE program has flexible curriculum allowing the student a wide choice in course selection. The program requires a minimum 45 quarter credits of course work in the 400 or 500 level. Of the 45 units, 22 are technical electives. Student can choose technical elective courses from the Industrial and Manufacturing Engineering (IME) department as well as outside the IME department. Flexibility is emphasized so that the student and his/her advisor can structure a degree plan tailored to the individual needs of the student. Only those letter-graded courses count toward satisfying the total unit requirement for the degree. Courses on a credit/no credit basis are not allowed in the formal study plan. No audit credits are permitted.

The MS IE program requires a thesis; the student's thesis topic must be approved by his/her graduate committee, consisting of three committee members. Both an oral defense and a written thesis are required. The

thesis will be reviewed by the Graduate Education Office and published at the Digital Commons.

Required Courses

IME 503	Applied Statistical Methods in Engineering ¹	4
IME 507	Graduate Seminar	2
IME 556	Technological Project Management ²	4
IME 580	Manufacturing Systems ³	4
IME 599	Thesis	9

Approved Electives

Select from the following ^{4, 5} 22

IME 500	Individual Study
IME 510	Systems Engineering I
IME 511	Systems Engineering II
IME 520	Advanced Information Systems for Operations
IME 527	Design of Experiments
IME 535	Change Management for Engineering Leaders
IME 541	Advanced Operations Research
IME 542	Applied Reliability Engineering
IME 543	Applied Human Factors
IME 544	Advanced Topics in Engineering Economy
IME 545	Advanced Topics in Simulation
IME 546	Large-Scale Optimization
IME 549	Network Analysis and Optimization
IME 565	Predictive Data Analytics for Engineers
IME 570	Selected Advanced Topics
IME 571	Selected Advanced Laboratory
IME 577	Engineering Entrepreneurship
STAT 416	Statistical Analysis of Time Series
STAT 418	Categorical Data Analysis
STAT 419	Applied Multivariate Statistics
STAT 530	Statistical Computing with SAS
STAT 531	Statistical Computing with R

Total units 45

- ¹ Students with a B+ or better grade in IME 326 or IME 327 may substitute IME 503 with another statistics related course such as IME 527, STAT 416, STAT 418, STAT 419, STAT 530, or STAT 531 upon approval of the graduate coordinator.
- ² Students with a B+ or better grade in IME 303 may substitute IME 556 with another approved technical elective course.
- ³ Course cannot be taken by students who have already received credit for IME 410. Another course may substitute, with the approval of the graduate coordinator.
- ⁴ Students may take other 400 or 500 level courses after consultation with and approval by advisor and the graduate coordinator.
- ⁵ 400 level courses may not exceed 18 units in total.

Materials Engineering

Brown Engineering Bldg. (41A), Rm 229
 Phone: 805.756.2568
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 Email: mate@calpoly.edu (matedept@calpoly.edu)

Department Chair: Trevor Harding

Engineering Student Services
 Engineering South (40), Room 115
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Academic Program

Program name	Program type
Materials Engineering	BS

Materials engineering is a field in which engineers use their knowledge of the relationship between a material's atomic or molecular structure and its properties to alter the material to get the performance needed. Materials engineers contribute their expertise in virtually all areas of technology: from the nano-sized materials found in biomedical and microelectronic applications to the large-scale composites found in aerospace applications.

Because engineered products are often limited by materials issues (such as performance and manufacturability), materials engineers play a vital role on engineering design teams, working closely with other engineers. As part of these teams, they apply their knowledge of science, engineering, and state-of-the-art analytical instruments.

The majority of our graduates find employment in the biomedical, electronic, aerospace and petroleum industries. Some work as consultants for large or small organizations. Others become executives. A significant number of materials engineers are involved in research and development. Some of our graduates are entrepreneurs who have started their own companies. Others are attorneys or physicians. Because of our broad-based, student focused curriculum, our graduates are able to excel in professions of their choosing.

Vision

To collaboratively address the grand challenges of our time, especially sustainability and transformative learning, through our materials engineering program.

Mission

To be a vibrant, creative and effectual learning community that cultivates the unique capabilities of each member of our community to thrive in a complex, interconnected, technological and ever-changing world.

Program Education Objectives

1. Holistically address complex challenges, drawing from materials engineering understanding and life experiences;
2. Live meaningful, socially-beneficial lives, enriched by their engineering education;
3. Exemplify proactive adaptive capacity throughout their lives; and
4. Communicate effectively in different contexts

Undergraduate Program BS Materials Engineering

The Materials Engineering curriculum has received national recognition for its innovative structure and will provide both breadth and depth in your understanding of science and engineering principles and practices. The curriculum in materials engineering emphasizes practical applications as well as principles. The laboratories are constantly evolving, and our students benefit from frequent exposure to a wide variety of materials testing and analysis equipment. The program is accredited by the Engineering Accreditation Commission ABET, <http://www.ABET.org>. Our students have a reputation for being immediately productive in industry, and they are also actively sought by graduate programs throughout the country.

BS Materials Engineering Program Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies
8. An integrated understanding of scientific and engineering principles underlying the four major elements of the field: structure, properties, processing, and performance related to materials systems
9. An ability to apply and integrate knowledge from each of the above four elements of the field to solve materials selection and design problems

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

MATE 110	Introduction to Materials Engineering Design I	1
MATE 120	Introduction to Materials Engineering Design II	1
MATE 210	Materials Engineering	3
MATE 215	Materials Laboratory I	1
MATE 225	Materials Laboratory II	1
MATE 232	Materials, Ethics, and Society	4
MATE 235	Materials Laboratory III	1
MATE 245	Materials Engineering Analysis	1
MATE 280	Introduction to Materials Thermodynamics	4
MATE 300	Materials Selection for the Life Cycle (GWR)	4
MATE 310	Noncrystalline Material Systems	4
MATE 325	Transport Phenomena I	1
MATE 340	Electronic Materials Systems	4
MATE 350	Structural Materials Systems	4
MATE 360	Metallurgical Materials Systems	4
MATE 370	Kinetics of Materials and Process Design	4
MATE 480	Composite Materials Systems	4
MATE 482 & MATE 483 & MATE 484	Senior Project I and Senior Project II and Senior Project III ¹	5
Technical Electives		
Select from the following: ^{2,3,4}		12
BMED 420	Principles of Biomaterials Design	
BMED 434/ MATE 430	Micro/Nano Fabrication	
BMED/MATE 435	Microfabrication Laboratory	
BMED/MATE 530	Biomaterials	
CHEM 444	Polymers & Coatings I	
CHEM/MATE 446	Surface Chemistry of Materials	
CHEM 447	Polymers and Coatings Laboratory I	
CPE 488/ IME 458/MATE 458	Microelectronics and Electronics Packaging	
EE/PHYS 422	Polymer Electronics Laboratory	
ENVE 490	Environmental Nanotechnology	
MATE 400	Special Problems for Advanced Undergraduates	
MATE 401	Materials Characterization Techniques	
MATE 402	Materials Characterization Theory	
MATE 403	Computational Materials Analysis	
MATE 410	Nanoscale Engineering	
MATE 420	Biopolymers and Bionanocomposites	
MATE 422	Ceramics and Glasses	
MATE 425	Corrosion Engineering	
MATE 440	Welding Metallurgy and Joining of Advanced Materials	

MATE 445	Joining of Advanced Materials Laboratory	
MATE 450	Fracture and Failure Analysis	
MATE 456	Materials for Electrochemical Energy Storage	
MATE 460	Materials Selection in Mechanical Design	
MATE 465	Ferrous Metallurgy	
MATE 470	Selected Advanced Topics	
MATE 471	Selected Advanced Laboratory	
MATE 485	Materials and the Environment	
MATE 490	Solidification and Densification	
MATE 500	Individual Study	
MATE 550	Micro Systems	
or BMED 432	Micro/Nano System Design	
PHYS 425	Solid State Physics	
PHYS 427	Advanced Topics in Solid State Physics	
Approved Electives/Technical Breadth Electives		
Select from the following: ^{2,3,4}		8
BIO 231	Human Anatomy and Physiology I	
BMED 212	Introduction to Biomedical Engineering Design	
BMED 310	Biomedical Engineering Measurement and Analysis	
BMED 401	Biomedical Entrepreneurship	
BMED 434/ MATE 430	Micro/Nano Fabrication	
BMED/MATE 435	Microfabrication Laboratory	
BMED/MATE 530	Biomaterials	
BMED 550	Current and Evolving Topics in Biomedical Engineering	
BUS 207	Legal Responsibilities of Business	
BUS 212	Financial Accounting for Nonbusiness Majors	
CE 207	Mechanics of Materials II	
CHEM 444	Polymers & Coatings I	
CHEM/MATE 446	Surface Chemistry of Materials	
CHEM 447	Polymers and Coatings Laboratory I	
CHEM 466	Learning Assistant Seminar	
CPE 488/ IME 458/MATE 458	Microelectronics and Electronics Packaging	
CSC 231	Programming for Engineering Students	
EE/PHYS 422	Polymer Electronics Laboratory	
ECON 221	Microeconomics	
ENGR 322/ SCM 302	The Learn By Doing Lab Teaching Practicum	
ENGR 470	Selected Advanced Topics	
ENGR 471	Selected Advanced Laboratory	
ENVE 490	Environmental Nanotechnology	
IME 223	Process Improvement Fundamentals	
IME 421	Engineering Management	

MATE 400	Special Problems for Advanced Undergraduates		
MATE 401	Materials Characterization Techniques		
MATE 402	Materials Characterization Theory		
MATE 403	Computational Materials Analysis		
MATE 410	Nanoscale Engineering		
MATE 420	Biopolymers and Bionanocomposites		
MATE 422	Ceramics and Glasses		
MATE 425	Corrosion Engineering		
MATE 440	Welding Metallurgy and Joining of Advanced Materials		
MATE 445	Joining of Advanced Materials Laboratory		
MATE 450	Fracture and Failure Analysis		
MATE 456	Materials for Electrochemical Energy Storage		
MATE 460	Materials Selection in Mechanical Design		
MATE 465	Ferrous Metallurgy		
MATE 470	Selected Advanced Topics		
MATE 471	Selected Advanced Laboratory		
MATE 485	Materials and the Environment		
MATE 490	Solidification and Densification		
MATE 500	Individual Study		
MATE 550	Micro Systems		
or BMED 432	Micro/Nano System Design		
MATE 570	Selected Advanced Topics		
MATE 571	Selected Advanced Laboratory		
ME 212	Engineering Dynamics		
ME 341	Fluid Mechanics I		
PHYS 211	Modern Physics I		
PHYS 425	Solid State Physics		
PHYS 427	Advanced Topics in Solid State Physics		
PSC/UNIV 392	Appropriate Technology for the World's People: Design		
PSC/UNIV 492	Appropriate Technology for the World's People: Design		
Approved Electives/Junior Year Elective:			
Select from the following:			4-5
CHEM 312	Organic Chemistry: Fundamentals and Applications		
ENGR 334	Needfinding in New Product Design		
IME 303	Project Organization and Management		
ITP 341	Packaging Polymers and Processing		
MATE 390	Textile and Fiber Engineering		
NR 434	Wood Properties, Products and Sustainable Uses		
SUPPORT COURSES			
CE 204	Mechanics of Materials I		3
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ⁵		4
CHEM 125	General Chemistry for Physical Science and Engineering II		4
EE 201	Electric Circuit Theory		3
EE 251	Electric Circuits Laboratory		1
IME 144	Introduction to Design and Manufacturing		4
MATH 141	Calculus I (B4) ⁵		4
MATH 142	Calculus II (B4) ⁵		4
MATH 143	Calculus III (Area B Electives) ⁵		4
MATH 241	Calculus IV		4
MATH 244	Linear Analysis I		4
ME 211	Engineering Statics		3
PHYS 141	General Physics I (Area B Electives) ⁵		4
PHYS 142	General Physics II		4
PHYS 143	General Physics III		4
Select from the following (Upper-Division B): ⁵			7-8
STAT 312 & IME 315	Statistical Methods for Engineers and Financial Decision Making for Engineers		
or			
STAT 321 & IME 315	Probability and Statistics for Engineers and Scientists and Financial Decision Making for Engineers		
or			
STAT 321 & IME 326	Probability and Statistics for Engineers and Scientists and Engineering Test Design and Analysis		
GENERAL EDUCATION			
(See GE program requirements below.)			48
FREE ELECTIVES			
Free Electives			0
Total units			184-186

- ¹ ENGR 459, ENGR 460 and ENGR 461 (6) may substitute for MATE 482, MATE 483 and MATE 484 (5) with the one excess unit counting towards Technical Electives.
- ² If a course is taken to meet this requirement, it cannot be double-counted to satisfy another Major or Support requirement.
- ³ Consultation with an advisor is recommended prior to selecting Technical or Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ⁴ 8 units maximum of MATE 400 and/or MATE 500 may count towards Technical Electives or Approved Electives/Technical Breadth Electives.
- ⁵ Required in Major or Support; also satisfies General Education (GE) requirement.

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).

- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
	Upper-Division B (4 units in Support) ¹	0
	Area B Electives (8 units in Support) ¹	0
Area C	Arts and Humanities	
	Lower-division courses in Area C must come from three different subject prefixes.	
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
	Lower-Division C Elective - Select a course from either C1 or C2.	4
	Upper-Division C	4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
	Area D Elective - Select either a lower-division D2 or upper-division D course.	4
Area E	Lifelong Learning and Self-Development	
	Lower-Division E	4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		48

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Mechanical Engineering

Engineering Bldg. (13), Room 254
Phone: 805.756.1334
<https://me.calpoly.edu> (<https://me.calpoly.edu/>)

Department Chair: James Widmann

Engineering Student Services
Engineering South (40), Room 115
Phone: 805.756.1461

Academic Programs

Program name	Program type
Mechanical Engineering	BS, MS

Mission Statement

To impart knowledge in the art and science of mechanical engineering through a comprehensive curriculum true to the traditional Cal Poly learn-by-doing philosophy that produces mechanical engineers of high ethics and skill, fully prepared for entry into industry, government, graduate school and private enterprise.

Program Educational Objectives

A mechanical engineering alumnus will:

1. Research, design, develop, test, evaluate, or implement engineering solutions to problems that are of a complexity encountered in professional practice.
2. Communicate and perform as an effective engineering professional in both individual and team-based project environments.
3. Recognize and determine the ethical implications and societal impacts of engineering solutions.
4. Continuously improve through lifelong learning.

Program Description

The profession of mechanical engineering is directed toward the design, manufacture, and system integration of a very wide variety of equipment ranging from manufacturing machinery and power generation equipment to consumer goods. Of central concern to mechanical engineers is the sound application of basic principles of solid mechanics, fluid mechanics and thermal sciences in the design, manufacture, and application of this equipment. Mechanical Engineering graduates obtain employment primarily with manufacturers, energy companies, consultants, and government agencies. Types of work performed by graduates include product design, mechanical design, testing, engineering management, engineering sales, design of manufacturing systems, and development of maintenance procedures. Mechanical Engineering graduates also often enhance their careers through graduate study in engineering, and some students also study engineering to build a scientific and technical foundation as a prelude to enrollment in medical, law, and business schools.

The focus of the Cal Poly Mechanical Engineering program is on education based on our "learn by doing" educational philosophy. Thus, the curriculum includes a large number of hands-on laboratories, integration of design throughout, and a senior project requirement for all students. Students are enrolled in engineering laboratories in all years of the curriculum. The program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<http://www.abet.org>).

The Mechanical Engineering Department is the home of the Donald E. Bently Center for Engineering Innovation. The center provides support for faculty, students, and visiting scholars for the advancement of research, education, and practice in mechanical engineering. A \$6 million endowment to fund three professorships supports the center.

Upper division students in the **General Curriculum** (Degree Requirements and Curriculum (p. 265)) can choose professional elective courses from such courses as turbomachinery, robotics, mechatronics, composite materials, rotor dynamics, advanced mechanics, solar systems, internal combustion engines, heat and mass transfer, and courses emphasizing the petroleum, air conditioning, ventilating, and refrigeration industries. Students in the **Mechatronics Concentration** (Degree Requirements and Curriculum (p. 267)) are prepared for professional practice in the design of "intelligent" products for use in factory automation, robotics, hybrid vehicles, alternative energy, and many other fields. The **HVAC&R Concentration** (Degree Requirements and Curriculum (p. 266)) prepares students for careers in the heating, ventilating, air-conditioning and refrigeration (HVAC&R) industry, with a focus on the design of mechanical systems for commercial and industrial buildings. **Manufacturing Concentration** (Degree Requirements and Curriculum (p. 266)) students focus on fabrication processes, preparing them for careers designing or manufacturing a wide variety of consumer and industrial products. The **Energy Resources Concentration** (Degree Requirements and Curriculum (p. 265)) prepares students for careers in renewable and nonrenewable energy companies producing electrical power, with the focus on the design, manufacture, and system integration of power and fuel plants.

There are several organized student clubs associated with the Mechanical Engineering Department, including national honor societies and student chapters of professional societies. Each of these clubs offers students active programs and leadership activities.

Undergraduate Program BS Mechanical Engineering

The profession of mechanical engineering is directed toward the design, manufacture, and system integration of a very wide variety of equipment ranging from manufacturing machinery and power generation equipment to consumer goods.

Concentrations

- General Curriculum
- Energy Resources Concentration
- Heating, Ventilating, Air-Conditioning and Refrigerating Concentration (HVAC&R)
- Mechatronics Concentration
- Manufacturing Concentration

Graduate Program MS Mechanical Engineering

The masters program of the Mechanical Engineering department at Cal Poly is designed to prepare its graduates with skill and knowledge to be able to work as an engineer in research and development, analysis, or design of products and systems, or to continue toward a PhD degree from other institutions. Due to the nature of the masters degree, students can select an area of emphasis based on their interest, or alternately, choose courses in a variety of different areas that gives them significant breadth of knowledge. At Cal Poly, masters degree candidates can select a thesis

option or a non-thesis option. The thesis option gives the candidates a more thorough knowledge in the area in which they do their research. The non-thesis option gives the candidates a more diverse knowledge from additional courses.

Prerequisites

For admission as a classified graduate student, in addition to the University requirements, an applicant should hold a BS degree in Mechanical Engineering with a grade point average of 3.0 or better. Other closely related majors may be accepted as conditionally classified graduate students if they have had an adequate number of prerequisite classes to successfully fulfill the requirements. Up to 12 units of remedial courses may be taken at Cal Poly. For additional information on University requirements, please refer to the Graduate Programs (p. 431) of this catalog.

Two program options are available:

Thesis option. 36 units of advisor-approved coursework, 9 units of thesis research/design, and an oral thesis defense examination.

Non-thesis option. 45 units of advisor-approved coursework and a written comprehensive examination.

Blended BS + MS Mechanical Engineering Program

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Up to 8 units of technical electives (400-level or higher) that were used in meeting the undergraduate degree requirements can also be used for credit toward meeting the graduate degree requirements.

Eligibility

Majors that are eligible for the blended program are:

- BS Aerospace Engineering
- BS Mechanical Engineering

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Mechanical Engineering department for any additional eligibility criteria.

BS Mechanical Engineering Program Learning Outcomes

In order to prepare our alumni for their career accomplishments expressed by the Program Educational Objectives, the students in the program will be proficient in the following skills upon graduation:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science and mathematics.
 - a. The student will be able to apply basic math and science principles and associated analysis techniques.
 - b. The student will be able to evaluate components, systems, and processes and be able to develop appropriate models of engineering systems.
 - c. The student will be able to analyze their models, interpret their results, and formulate appropriate action.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
 - a. The student will be able to recognize a need, identify constraints, and develop appropriate design specifications.
 - b. Using the above specifications, the student will be able to synthesize conceptual solutions for a component, system, or process.
 - c. The student will be able to use analysis techniques to refine and select the design of a component, system, or process.
 - d. The student will be able to build a functional prototype and assess if it meets design specifications.
3. An ability to communicate effectively with a range of audiences.
 - a. The student will be able to write an effective memorandum, letter, abstract, and project report for a wide range of audiences.
 - b. The student will be able to give a coherent and effective oral presentation for a wide range of audiences.
 - c. The student will be able to critique writing samples and oral presentations and identify both strong points and weak points in grammar, clarity, and organization.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
 - a. The student will be able to interpret engineering professional codes of ethics and to identify situations with ethical concerns.
 - b. The student will be able to identify and mitigate health and safety concerns associated with their design.
 - c. The student will be able to assess the environmental, societal, and economic impact of their engineering solutions.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
 - a. The student will be able to manage a team project by establishing goals, planning tasks, and meeting objectives.
 - b. The student will be able to collaborate effectively on a team and contribute to an inclusive teamwork environment.
 - c. The student will be able to identify when problems occur due to poor interactions among team members and identify ways to improve team dynamics.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
 - a. The student will be able to select and operate appropriate instrumentation used in engineering measurement.
 - b. The student will be able to design and conduct an experiment and compare the results to those predicted by an analytical model.
 - c. The student will be able to interpret and draw conclusions from the results.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

- The student will be able to recognize the limitations of their knowledge and to acquire new knowledge using appropriate learning strategies.
- The student will be able to find and use appropriate technical resources.
- The student will be able to identify their need for additional learning.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

ME 128	Introduction to Mechanical Engineering I ¹	1
ME 129	Introduction to Mechanical Engineering II ¹	1
ME 130	Introduction to Mechanical Engineering III ¹	1
ME 163	Freshmen Orientation to Mechanical Engineering ¹	1
ME 211	Engineering Statics	3
ME 212	Engineering Dynamics	3
ME 234	Philosophy of Design	3
ME 236	Measurement and Engineering Data Analysis	3
ME 251	Introduction to Detailed Design with Solid Modeling	2
ME 302	Thermodynamics I	3
ME 303	Thermodynamics II	3
ME 318	Mechanical Vibrations	4
ME 322	Introduction to System Dynamics	4
ME 328	Design for Strength and Stiffness	4
ME 329	Mechanical Systems Design	4
ME 341	Fluid Mechanics I	3
ME 343	Heat Transfer	4
ME 347	Fluid Mechanics II	4
ME 448	Thermal System Design	4

Concentration or General Curriculum in Mechanical Engineering

(See list of Concentrations and General Curriculum in Mechanical Engineering below) 25-27

SUPPORT COURSES

CE 204	Mechanics of Materials I ²	3
CE 207	Mechanics of Materials II ²	2
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ³	4

CHEM 125	General Chemistry for Physical Science and Engineering II	4
CSC 231	Programming for Engineering Students	2-3
or CSC 234	C and Unix	
EE 201	Electric Circuit Theory	3
EE 251	Electric Circuits Laboratory	1
EE 321	Electronics	3
EE 361	Electronics Laboratory	1
IME 142	Manufacturing Processes: Materials Joining	2
Select from the following: ⁴		2
IME 145	Subtractive Manufacturing	
& IME 146	Processes for Mechanical Designs I and Subtractive Manufacturing Processes for Mechanical Designs II	
or IME 143	Manufacturing Processes: Material Removal	
MATE 210 & MATE 215	Materials Engineering and Materials Laboratory I	4
MATH 141	Calculus I (B4) ³	4
MATH 142	Calculus II (B4) ³	4
MATH 143	Calculus III (Area B Electives) ³	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
MATH 344	Linear Analysis II (Upper-Division B) ³	4
PHYS 141	General Physics I (Area B Electives) ³	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
Manufacturing Processes Elective		
Select from the following:		1-4
IME 141	Manufacturing Processes: Net Shape	
ITP 341	Packaging Polymers and Processing	
ME 161	Introduction to Composite Materials Manufacturing	
GENERAL EDUCATION		
(See GE program requirements below.)		48
FREE ELECTIVES		
Free Electives		0
Total units		196-202

¹ ME 228, ME 263 and ME 264 are required in lieu of ME 128, ME 129, ME 130, and ME 163 for change of major and transfer students.

² May take CE 208 in place of CE 204 and CE 207.

³ Required in Major or Support; also satisfies General Education (GE) requirement.

⁴ IME 143 is required in lieu of IME 145 and IME 146 for change of major and transfer students.

General Curriculum in Mechanical Engineering or Concentrations (select one)

- General Curriculum in Mechanical Engineering (p. 265)
- Energy Resources (p. 265)

- Heating, Ventilating, Air-Conditioning and Refrigerating (HVAC&R) (p. 266)
- Mechatronics (p. 267)
- Manufacturing (p. 266)

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area B Electives (8 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
Area D	Social Sciences	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
Total units		48

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

General Curriculum in BS Mechanical Engineering

ME 326	Intermediate Dynamics	4
ME 418	Implementation of Mechanical Controls	4
or ME 419	Advanced Control Systems	
ME 428	Senior Design Project I ¹	2
ME 429	Senior Design Project II ¹	2
ME 430	Senior Design Project III ¹	2
Technical Electives^{2,3,4}		
Select from the following:		11-12
Select 8-12 units from the following ME courses:		
ME 305	Introduction to Mechatronics	
ME 359	Fundamentals of HVAC Systems	
ME 361	Fundamentals of Fire Protection Engineering	
Any ME 400-level or ME 500-level class with the exception of required (major) and senior project courses.		
Select 0 - 4 units from:		
Any upper-division or graduate level course in the College of Engineering with the exception of GE Upper-Division B, ENGR 301, senior project, thesis, special problems and co-op courses.		
Total units		25-26

¹ ENGR 459, ENGR 460 and ENGR 461 (6), or ENGR 463, ENGR 464 and ENGR 465 (6) may substitute for ME 428, ME 429 and ME 430 (6).

² Consultation with advisor is recommended prior to selecting Technical Electives. Note that 300-level Technical Electives cannot be used for graduate credit in the blended BS + MS Mechanical Engineering program.

³ ME 470, ME 471, ME 570 and ME 571 are variable topics courses, and may or may not count as ME Electives. Please contact instructor for additional information. A course substitution form may be required.

⁴ ME 400 and ME 500 are independent study classes and may be acceptable for Technical Elective credit. A course substitution form is required.

Energy Resources Concentration

ME 415	Energy Conversion	4
ME 418	Implementation of Mechanical Controls	4
or ME 419	Advanced Control Systems	
ME 428	Senior Design Project I ¹	2
ME 429	Senior Design Project II ¹	2
ME 430	Senior Design Project III ¹	2
Select from the following: ²		11-12
EE 255 & EE 295	Energy Conversion Electromagnetics and Energy Conversion Electromagnetics Laboratory	

EE 420	Sustainable Electric Energy Conversion
EE 423	Micro/Nano Fabrication
MATE 430	Micro/Nano Fabrication
ME 434	Enhanced Oil Recovery
ME 435	Drilling Engineering
ME 436	Petroleum Production Engineering
ME 437	Nuclear Energy Power Generation
ME 438	Nuclear Power Plant Design
ME 439	Nuclear Power Plant Operations
ME 443	Turbomachinery
ME 444	Combustion Engine Design
ME 450	Solar Thermal Power Systems
ME 454	Benchmarking and Assessment of Building Energy Performance
ME 488	Wind Energy Engineering
ME 541	Advanced Thermodynamics

Total units **25-26**

¹ ENGR 459, ENGR 460, and ENGR 461 (6) or ENGR 463, ENGR 464, and ENGR 465 (6) may substitute for ME 428, ME 429, and ME 430 (6).

² ME 400 and ME 500 are independent study classes and may be acceptable for technical elective credit. A course substitution form is required.

Heating, Ventilating, Air-Conditioning and Refrigerating Concentration (HVAC&R)

ME 418	Implementation of Mechanical Controls	4
or ME 419	Advanced Control Systems	
ME 456	HVAC Air and Water Distribution System Design	4
ME 459	HVAC Senior Design Project I	3
ME 460	HVAC Senior Design Project II	2
Select from the following: ¹		12
ME 359	Fundamentals of HVAC Systems	
ME 453	Trends and Opportunities in HVAC&R	
ME 454	Benchmarking and Assessment of Building Energy Performance	
ME 455	Introduction to Building Energy Modeling	
ME 457	Refrigeration Principles and Design	
ME 458	Building Heating and Cooling Loads	

Total units **25**

¹ ME 400 and ME 500 are independent study classes and may be acceptable for technical elective credit. A course substitution form is required.

Manufacturing Concentration

IME 327	Test Design and Analysis in Manufacturing Engineering	4
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ME 418	Implementation of Mechanical Controls	4
or ME 419	Advanced Control Systems	
ME 428	Senior Design Project I ¹	2
ME 429	Senior Design Project II ¹	2
ME 430	Senior Design Project III ¹	2

Take all of the courses in one of the following emphasis areas:

Mechanical Manufacturing Emphasis Area

IME 330	Fundamentals of Manufacturing Engineering
IME 450	Manufacturing Process and Tool Engineering

Electronics Manufacturing Emphasis Area

IME/MATE 458	Microelectronics and Electronics Packaging
MATE 430 & MATE 435	Micro/Nano Fabrication and Microfabrication Laboratory

Design and Manufacturing Elective

Select from the following: ² 3-5

IME 330	Fundamentals of Manufacturing Engineering ³
IME 335	Computer-Aided Manufacturing I
IME 356	Manufacturing Automation
IME 416	Automation of Industrial Systems
IME 418	Product-Process Design
IME 428	Engineering Metrology
IME 430	Quality Engineering
IME 432	Additive Manufacturing
IME 457	Advanced Electronic Manufacturing
IME/MATE 458	Microelectronics and Electronics Packaging ³
IME 527	Design of Experiments
IME 543	Applied Human Factors
MATE 430 & MATE 435	Micro/Nano Fabrication and Microfabrication Laboratory ³
MATE 440 & MATE 445	Welding Metallurgy and Joining of Advanced Materials and Joining of Advanced Materials Laboratory
ME 305	Introduction to Mechatronics
ME 412	Composite Materials Analysis and Design

Total units **25-27**

¹ ENGR 459, ENGR 460 and ENGR 461 (6) or ENGR 463, ENGR 464, and ENGR 465 (6) may substitute for ME 428, ME 429 and ME 430 (6).

² ME 400 and ME 500 are independent study classes and may be acceptable for technical elective credit. A course substitution form is required.

³ If a course is taken to meet an Emphasis Area requirement, it cannot be double-counted as a Design and Manufacturing Elective.

Mechatronics Concentration

ME 305	Introduction to Mechatronics	4
ME 326	Intermediate Dynamics	4
ME 405	Mechatronics	4
ME 419	Advanced Control Systems	4
ME 428	Senior Design Project I ¹	2
ME 429	Senior Design Project II ¹	2
ME 430	Senior Design Project III ¹	2
Select from the following: ^{2,3}		3-4
IME 356	Manufacturing Automation	
IME 416	Automation of Industrial Systems	
ME 423	Robotics: Fundamentals and Applications	
ME 506	System Dynamics	
ME 507	Mechanical Control System Design	
Total units		25-26

¹ ENGR 459, ENGR 460 and ENGR 461 (6) or ENGR 463, ENGR 464, and ENGR 465 (6) may substitute for ME 428, ME 429 and ME 430 (6).

² Elective based on interests of students.

³ ME 400 and ME 500 are independent study classes and may be acceptable for technical elective credit. A course substitution form is required.

MS Mechanical Engineering

Program Learning Outcomes

Upon completing the requirements of the Master of Science in Mechanical Engineering, students should be able to:

1. Devise a plan to research issues relevant to the problem at hand and to conduct experiments or develop a computer model.
2. Formulate solutions to advanced engineering problems.
3. Analyze the collected or generated data and draw conclusions from the results.
4. Analyze and synthesize advanced engineering solutions.

Required Courses

ME 599	Design Project (Thesis)	9
Or 9 units of approved Technical Electives and a Comprehensive Examination ¹		
Approved MATH/STAT/CSC Courses ²		8
Select from the following:		12
ME 501	Continuum Mechanics and Elasticity	
ME 503	Inelastic Stress Analysis	
ME 504	Finite Element Analysis	
ME 506	System Dynamics	
ME 507	Mechanical Control System Design	
ME 517	Advanced Vibrations	
ME 518	Machinery Vibration and Rotor Dynamics	
ME 540	Viscous Flow	
ME 541	Advanced Thermodynamics	

ME 542	Dynamics and Thermodynamics of Compressible Flow	
ME 552	Advanced Heat Transfer I	
ME 553	Advanced Heat Transfer II	
ME 554	Computational Heat Transfer	
ME 579	Fluid Power Control	
Approved Technical Electives		
400 or 500-level ME or non-ME courses; maximum of 12 units of 400-level courses allowed		16
Total units		45

¹ Must be at 500 level.

² 4 units required at 500 level.

College of Liberal Arts

Faculty Office Bldg. (47), Room 31

Phone: 805.756.2359

<https://cla.calpoly.edu> (<https://cla.calpoly.edu>)

Dean: Philip J. Williams

Associate Dean for Student Success: Kate Murphy

Associate Dean for Diversity and Curriculum: Jennifer Teramoto Pedrotti

Associate Dean for Operations: Josh Machamer

Director of Research Engagement and Internationalization: Dawn Neill

Academic Programs

Program name	Program type
Agricultural Communication	Minor
Anthropology and Geography	BS, Minor
Art and Design	BFA
Art History	Minor
Asian Studies	Minor
Child Development	BS, Minor
Chinese	Minor
Communication Studies	BA, Minor
Comparative Ethnic Studies	BA
Cross Disciplinary Studies Minor in Computing for Interactive Arts	Minor
Dance	Minor
English	MA, BA, Minor
Ethnic Studies	Minor
Ethics, Public Policy, Science and Technology	Minor
French	Minor
Gender, Race, Culture, Science and Technology	Minor
German	Minor
Gerontology	Minor, Certificate
Global Politics	Minor
Graphic Communication	BS, Minor
History	MA, BA, Minor
Indigenous Studies in Natural Resources and the Environment	Minor
Interdisciplinary Studies	BA
Italian Studies	Minor
Japanese	Minor
Journalism	BS
Latin American Studies	Minor
Law and Society	Minor
Liberal Arts & Engineering Studies	BA
Linguistics	Minor
Media Arts, Society and Technology	Minor
Music	BA, Minor
Philosophy	BA, Minor
Photography and Video	Minor
Political Science	BA, Minor
Printed Electronics and Functional Imaging	MS

Psychology	MS, BS, Minor
Public Policy	MPP
Queer Studies	Minor
Religious Studies	Minor
Science Communication	Minor
Sociology	BA, Minor
Spanish	BA, Minor
Studio Art	Minor
Technical and Professional Communication	Certificate
Teaching English to Speakers of Other Languages	Certificate
Theatre Arts	BA, Minor
Western Intellectual Tradition	Minor
Women's and Gender Studies	Minor

The College of Liberal Arts (CLA) provides students the opportunity to study the record of imaginative, reflective, and cultural experience across multiple groups of people and to add to that record via a variety of Learn by Doing activities that emphasize active learning inside and outside of the classroom. The CLA is home to the foundational disciplines that form the scholarly bases for cultural awareness, knowledge and skills, making the college's commitment to diversity, equity, and inclusion central to the college's curriculum and identity. The college also seeks to relate itself to the technological disciplines in ways that help contribute to the solution of problems from global and multidisciplinary perspectives. Accordingly, a wide range of courses is offered to serve every student without regard to specialized professional interests.

Five broad areas of knowledge are represented: the fine and performing arts, communications, humanities, social sciences, and interdisciplinary studies. While the college has great breadth and diversity, unity is found in a study of the most engaging subject of all – human endeavor. Whatever the focus, the programs in the CLA share a settled purpose: to help students know themselves, understand individual and group values and potential within a cultural context, and understand our society and its institutions.

The CLA offers a wide selection of foundational courses that provide students with a strong grounding in critical thinking and written and oral communication. The disciplines of the liberal arts are explored at both introductory and advanced levels; students are encouraged to further pursue areas of interest through the college's many minors. A broad array of classes that fulfill Cal Poly's general education and USCP requirements are also offered.

The college also offers an interdisciplinary major through its Interdisciplinary Studies in the Liberal Arts (ISLA) Department. The department is also home to four minors that explore the intersection of science, technology and society. For more information, see the ISLA Department (<https://isla.calpoly.edu/>).

The Bachelor of Arts in Liberal Arts and Engineering Studies (LAES) is an interdisciplinary major offered jointly by the College of Liberal Arts and the College of Engineering. It allows students to combine coursework from both areas to explore cutting-edge technologies and their applications to areas such as media arts, technology policy, and technical writing and communications. The degree is offered jointly by both colleges. For more information, see Interdisciplinary Degree Programs (<http://catalog.calpoly.edu/collegesandprograms/interdisciplinaryprograms/>).

International issues are well represented in the college curriculum, and study abroad opportunities are also strongly supported. CLA faculty regularly offer classes in programs such as Cal Poly's Summer Study in London, Thailand Study Program, Valladolid (Spain) Program, and Australia Abroad Program. The college is also involved with the Peru Summer Study Program, which provides internships that complement the minor in Latin American Studies. These and other study abroad programs are administered by the Cal Poly International Center. In addition to current and emerging direct exchanges, the college is also building capacity in the areas of virtual exchange; connecting students and faculty with their peers around the globe through virtual collaboration. For further information, see Cal Poly International Center (<http://international.calpoly.edu>).

The College of Liberal Arts offers a wide range of learn-by-doing opportunities. Students from all majors can participate in the musical ensembles, theater productions, and dance performances. The college supports the Central Coast Center for Arts Education and the University Art Gallery. Students, especially those in the social and behavioral sciences, have access to research experiences and participate in a variety of internships at the local, state, and national government level, and with community, social services, and educational organizations, serving a number of populations. The CLA also partners with the Student Diversity and Belonging to offer training to facilitate Intergroup Dialogues sections. Students contribute to publications that showcase their accomplishments in the disciplines, such as *Byzantium* (English), *The Forum* (History), *Paideia* (Political Science), and *Sprinkle* (Women's and Gender Studies). These publications are often printed by the student-run University Graphic Systems. Students also participate in the award-winning student media organizations Mustang News, KCPR Radio, and MNTV, all part of the Mustang Media Group.

The college has a major responsibility for activities that promote equity and inclusion and enhance the cultural and intellectual life of the University and the community. In addition to the annual CLA Annual Social Justice Teach In, departments regularly host speakers and present films and other programming. The college sponsors the Spanos Theatre and Cal Poly Arts, offering a full range of cultural programs, including exhibits, concerts, literary presentations, and dramatic and other productions, while fostering artistic development and accomplishment across the campus.

College of Liberal Arts graduates will be able to:

1. Question assumptions through critical inquiry.
2. Be innovative; think creatively and constructively.
3. Communicate effectively orally and in writing.
4. Develop scholarly depth within their disciplines.
5. Understand the value of cross-disciplinary knowledge.
6. Collaborate productively in diverse settings and with those different from them.
7. Make reasoned, ethical, and socially and ecologically responsible decisions.
8. Understand the self as product of - and participant in - global traditions of art, ideas, and values.
9. Engage in life-long learning.

Interdisciplinary Minors Agricultural Communication Minor

An interdisciplinary minor sponsored by the College of Agriculture, Food and Environmental Sciences and the College of Liberal Arts. For more information, see the College of Agriculture, Food and Environmental Sciences (p. 65) section.

Indigenous Studies in Natural Resources and the Environment Minor

An interdisciplinary minor sponsored by the departments of Natural Resources Management and Environmental Sciences and Ethnic Studies. For more information, see the Natural Resources Management and Environmental Sciences (p. 117) section.

Western Intellectual Tradition Minor

Professor and Director: D. Kenneth Brown

This minor is designed to appeal not only to majors in the College of Liberal Arts and the College of Science and Mathematics, but to a cross-section of students in major programs throughout the university community. It focuses on the accomplishments of the Western intellectual tradition through courses that trace the development of literary expression, philosophical and scientific thought, and historical understanding from their beginnings to the modern world. Courses in the minor provide direct experience with significant works of the Western tradition, and also expose students to crucial ideas and themes that shaped Western thought and culture. Such exposure cultivates the intellectual skills of analysis and creative expression, and promotes an understanding of the inherent intellectual debate and diversity within the Western intellectual tradition.

Learning objectives for the minor:

1. Explain the development of literary expression, philosophical and scientific thought, or historical understanding from their beginnings to the modern world.
2. Explain crucial ideas and themes that shaped Western thought and culture.
3. Analyze crucial ideas and themes that shaped Western thought and culture.
4. Articulate the the inherent intellectual debate and diversity within the Western intellectual tradition.

Western Intellectual Tradition Minor

Group A

Select 12 units from at least two (2) of the following groupings: 12

Great Books — Literature:

ENGL 230 British Literature: Beginnings to 1789

ENGL 241 American Literature: Beginnings to 1865

ENGL 251 Introduction to Classical Literature

ENGL 252 Introduction to Medieval through Enlightenment Literature

ENGL 253	Introduction to Romantic through Modernist Literature
Great Books – Philosophy:	
PHIL 230	Philosophical Classics: Knowledge and Reality
PHIL 231	Philosophical Classics: Ethics and Political Philosophy
Science and Mathematics	
MATH 112	Nature of Modern Math
PHYS 104	Introductory Physics
PHYS 111	Contemporary Physics for Nonscientists
PHYS 121	College Physics I
PHYS 141	General Physics I
Political Science:	
POLS 230	Basic Concepts of Political Thought
Western Civilization:	
HIST 110	Western Civilization: Ancient to Renaissance
HIST 111	Western Civilization: Reformation to the Present
Group B	
Select 16 units from at least three (3) of the following groupings:	16
British and American Literature:	
ENGL 330	British Literature: Beginnings to 1485
ENGL 331	British Literature: 1485-1660
ENGL 332	British Literature: 1660-1798
ENGL 333	British Literature: 1798-1832
ENGL 334	British Literature: 1832-1914
ENGL 339	Introduction to Shakespeare
ENGL 340	American Literature: Beginnings-1865
ENGL 341	American Literature: 1865-1914
ENGL 354	The Bible as Literature and in Literature and the Arts
History:	
HIST 306	The Witch-Hunts in Europe, 1400-1800
HIST 307	European Thought 1800-2000
HIST 334	Modern Europe, 1789-1914
HIST 350	The Scientific Revolution, c. 1500-1800
HIST 452	Renaissance and Reformation Europe
HIST 453	Religious Wars and Absolutism
ISLA 316	London: From Roman Colony to World Capital
Language and Literature:	
FR 305	Significant Works in French
GER 305	Significant Works in German
SPAN 305	Significant Works in Spanish
SPAN 416	Don Quixote
Philosophy:	
PHIL 309	Early Greek Philosophy through Plato
PHIL 310	Aristotle and Hellenistic Philosophy

PHIL 312	Medieval Philosophy
PHIL 313	Early Modern Rationalism
PHIL 314	Early Modern Empiricism
PHIL 315	Kant and 19th Century European Philosophy
PHIL 332	History of Ethics
PHIL 429	Special Topics in the History of Philosophy
Political Thought:	
POLS 329	Ancient and Medieval Political Thought
POLS 330	Modern Political Thought
POLS 348	Early American Political Thought
POLS 349	Contemporary American Political Thought
Rhetoric:	
COMS 330	Classical Rhetorical Theory
COMS 331	Contemporary Rhetorical Theory
COMS 435	American Political Rhetoric
Science and Mathematics:	
BIO 414	Evolution
MATH 419	Introduction to the History of Mathematics
PHIL 421	Philosophy of Space, Time and Matter
PHYS 305	Classical Mechanics I
Total units	28

Art & Design

Dexter Bldg. (34), Room 169
Phone: 805.756.1148
<https://artdesign.calpoly.edu>

Department Chair: James Werner

Academic Programs

Program name	Program type
Art and Design	BFA
Art History	Minor
Cross Disciplinary Studies Minor in Computing for Interactive Arts	Minor
Media Arts, Society and Technology	Minor
Photography and Video	Minor
Studio Art	Minor

The Department of Art and Design provides students with a diverse program of study, including courses in: art history, digital media, graphic and interaction design, photography, video, and visual art. Art and Design courses integrate hands-on creative work with critical thinking; visual and conceptual experimentation; interdisciplinary collaboration; and a commitment to diversity, equity, and inclusion.

Students are admitted into the Bachelor of Fine Arts (BFA) degree program through submission of a portfolio in their chosen concentration: Graphic Design, Photography and Video, or Studio Art. The Department offers minors in Art History, Photography, and Studio Art. We also offer two affiliate minors: Computing for Interactive Arts and the Media Arts, Society and Technology minor. There are a number of Art and Design Courses that fulfill general education requirements in the C1 and Upper-Division C areas.

The department is also home to the University Art Gallery that showcases nationally and internationally known artists, designers, and photographers, as well as creative work from students, alumni, and faculty.

Undergraduate Programs

BFA Art and Design

The Bachelor of Fine Arts degree (BFA) program in Art and Design offers a progressive and innovative major with concentrations in Graphic Design, Photography and Video, and Studio Art. The BFA in Art and Design is accredited by the National Association of Schools of Art and Design (<https://nasad.arts-accredit.org/>). We cultivate unbiased and diverse designers, photographers, filmmakers, artists, and creative professionals who become leaders in their professional, social, and cultural contexts.

Concentrations

All three concentrations support creative growth and require the development of technical skills, conceptual skills, and cultural competency as a foundation for advanced study and practice in the student's chosen area. The BFA is a pre-professional degree and students in each concentration prepare for either positions in the creative industry or competitive graduate school programs.

Graphic Design

As a discipline and a profession, graphic design is diverse and expanding. It encompasses: branding, package design, interaction

design, environmental graphic design, publication design, and motion design. Students in the graphic design concentration study a variety of subjects relevant to the field, including: typography, identity design, user experience design, user interface design, animation, illustration, book arts, and design history. Our curriculum emphasizes a human-centered approach; students research, analyze, prototype, and design creative concepts and solutions for businesses, social, and cultural contexts. Our program encourages students to think innovatively, ethically, and inclusively, and to engage in hands-on creative exploration and problem solving. Graduates in the graphic design area obtain competitive positions in design studios, creative agencies, in-house creative departments, and in the entertainment and tech industries.

The Graphic Design concentration in the Department of Art and Design is distinct from the Design Reproduction Technology (<http://www.grc.calpoly.edu/students/design-reproduction-technology-drt/>) concentration in the Graphic Communication Department (<http://www.grc.calpoly.edu/>), which focuses on the technical and electronic aspects of preparing design pieces for reproduction in print media. In contrast, the emphasis of the Graphic Design concentration is on the preparation of a professional portfolio that showcases one's creative and conceptual design abilities.

Photography and Video

The study and practice of the lens-based arts of photography and video. Emphasis is placed on concept development, photographic expression, and creative problem solving. Production skills with studio and location lighting are emphasized using digital image making, large format photography and video/cinematic production. This is a diversified, commercially oriented program stressing preparation for careers in advertising, illustration, video and cinema production, corporate and editorial photography, portraiture and digital image making for both online and print. The study of photographic history, cinema styles and contemporary practices is integral to the program. The program culminates in the creation of a professional portfolio in both still and motion that can allow the graduate to enter the professional workforce or apply for graduate study.

Studio Art

The studio art concentration is a program designed for students who are seeking a comprehensive study of visual art for their undergraduate education. This program is distinctive in its depth of required coursework across a range of contemporary art practices, from two-dimensional media in painting and drawing, to three- and four-dimensional media in sculpture and time-based art. The upper division curriculum allows students to specialize in a discipline pertinent to their career choice in the visual arts. Courses in portfolio preparation, professional practices, and a senior project prepare the student to enter the workplace or pursue advanced degrees.

Our concentration is small and rigorous. Students are able to work closely with their art professors and peers, while having access to the resources of a larger, nationally-ranked university. Students within the concentration are presented with an environment where imagination, intellectual rigor, self-expression, cultural competency, and skill development are expected and explored within a community dedicated to their success. The studio art concentration is committed to cultivating creative professionals with a worldview that is informed by issues of diversity, inequality, and power.

Art and Design Minors and Affiliate Minors

The Department offers minors in Art History, Photography, and Studio Art. We also offer two affiliate minors: Computing for Interactive Arts (CIA) and the Media Arts, Society and Technology (MAST) minor.

Art History Minor

Courses consist of a required core and approved electives. The courses include art and architectural history. Students, working with an advisor, select their area(s) of interest.

Advisor: Giancarlo Fiorenza or Allison Myers

Photography and Video Minor

Courses consist of a required core and approved electives. Students, working with an advisor, select their area(s) of interest. Admission to the minor is contingent upon a departmental review as specified on the minor curriculum sheet.

Advisor: Sky Bergman or Lana Caplan

Studio Art Minor

Coursework across a range of contemporary art practices, from two-dimensional media in painting and drawing, to three- and four-dimensional media in sculpture and time-based art. Students select their area(s) of interest after consultation with an advisor.

Advisor: Sara Frantz, Laura Krifka, or Elizabeth Folk

Cross Disciplinary Studies Minor in Computing for Interactive Arts

An interdisciplinary minor sponsored by the Art and Design department and the Computer Science department. For more information, see the Computer Science and Software Engineering (p. 220) section of the catalog.

Advisor: Enrica Lovaglio Costello

Media Arts, Society and Technology (MAST) Minor

An interdisciplinary minor sponsored by the Art and Design department and the Interdisciplinary Studies in the Liberal Arts department. For more information, the Interdisciplinary Studies in the Liberal Arts (p. 301) section of the catalog.

Advisor: James Werner

BFA Art and Design

Program Learning Objectives

1. Produce a strong body of work and/or professional portfolio.
2. Apply comparative reasoning in evaluating works of art and design.
3. Use verbal, visual, and technical vocabulary related to art and design that demonstrates cultural competency and a world view informed by issues of diversity, inequality, and power.

4. Effectively and professionally work in teams and participate in interdisciplinary, collaborative endeavors with people who have beliefs, attitudes, and behaviors that are different from their own.
5. Critically examine the role that visual language plays in global culture through research, innovative thinking, writing, and creative expression.
6. Demonstrate integrity and make ethical decisions in professional practice and/or creative expression.
7. Establish and maintain a rigorous creative practice that is productive and professional.
8. Demonstrate a commitment to learning, inquiry, and discovery.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: Up to 4 units of credit/no credit grading may be selected for courses in Major or Concentration.

MAJOR COURSES

ART 101	Fundamentals of Drawing (C1) ¹	4
ART 102	Art and Design Foundation Studies I	4
ART 104	Art and Design Foundation Studies II	4
ART 182	Foundation in Digital Art I	4
ART 183	Foundation in Digital Art II	4
ART 203	Art Theory and Practice	4
ART 209	Beginning Painting	4
ART 212	Art History - Renaissance through Baroque Eras	4
ART 213	Art History- Modern Art, 1900-1945	4
ART 224	Introduction to Artificial Lighting for Photography	4
ART 260	Critique, Discourse and Practice	4
ART 315	Art History - Art Since 1945	4
Art History Electives		8
Select from the following upper-division art history courses not already required in Major core or Concentration:		
ART 310	Art History - American Art	
ART 311	Art History - Nineteenth Century Art	
ART 313	Design History	
ART 314	History of Photography	
ART 317	Asian Art Survey	
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements	
ART 370	Michelangelo	
ART 371	Topics in Renaissance Art	
ART 373	New Media Art History	
ART/WGQS 375	Intersectional Feminist Art Histories (USCP)	
Diversity Elective (Upper-Division D) ¹		4

COMS 316	Intercultural Communication (USCP)	
ES 310	Hip-Hop, Poetics and Politics (USCP)	
ES 320	African Americans in Popular Culture (USCP)	
ES 321	Native Americans in Popular Culture (USCP)	
ES 322	Asian Americans in Popular Culture (USCP)	
ES 323	Latina/os in Popular Culture (USCP)	
ES 330	The Chinese American Experience (USCP)	
ES 335	The Filipina/o American Experience (USCP)	
ES/WGQS 345	Queer Ethnic Studies (USCP)	
ES 380	Critical Race Theory (USCP)	
ES 381	The Social Construction of Whiteness (USCP)	
HIST 309	Cultures of West Africa and the African Diaspora	
PSY 304	Intergroup Dialogues	
SOC 315	Global Race and Ethnic Relations	
WGQS 301	Contemporary Issues in Women's and Gender Studies (USCP)	
WGQS 302	Contemporary Issues in Queer Studies (USCP)	
WGQS 320	Women, Gender and Sexuality in Global Perspective	
WGQS 340	Sexuality Studies	
Upper-Division Art Elective		
Select any upper-division ART course not already used to meet Major or Concentration requirements. See course descriptions for repeatable units.		4
ART 463	Senior Portfolio Project	4
Concentration courses (see below)		52
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		64
FREE ELECTIVES		
Free Electives ²		0
Total units		184

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentrations (select one)

- Graphic Design (p. 274)
- Photography (p. 274) and Video (p. 274)
- Studio Art (p. 274)

General Education (GE) Requirements

- 72 units required, 8 of which are specified in Major and/or Support.
- If any of the remaining 64 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning	4
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater (4 units in Major) ¹	0
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D (4 units in Major) ¹		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives		8
Total units		64

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Graphic Design Concentration

ART 201	Intermediate Drawing	4
ART 237	Graphic Design I	4
ART 238	Typography I	4
ART 288	Interaction Design I	4
ART 313	Design History	4
ART 337	Graphic Design II	4
ART 338	Typography II	4
ART 388	Interaction Design II	4
ART 437	Graphic Design III	4
ART 438	Typography III	4

Concentration Electives

Select from the following:		12
ART 330	Book Arts	
ART 334	Illustration I: Techniques and Tools	
ART 350	Computing for Interactive Arts Capstone I	
ART 353	Intermedia / Art	
ART 383	Digital Video I	
ART 400	Special Problems for Advanced Undergraduates	
ART 432	Advertising Design	
ART 434	Illustration II	
ART 439	Type in Motion	
ART 450	Computing for Interactive Arts Capstone II	
ART 484	Animation, Video, and Interactive Design	
ART 488	Interaction Design III	
ART 489	Advanced Interactive Media Art	
ART 494	Cooperative Education Experience	
ART 495	Cooperative Education Experience	
ITP 330	Packaging Fundamentals	

Total units 52

Photography and Video Concentration

ART 122	Introduction to Digital Photography	4
ART 222	Black and White Photography	4
ART 314	History of Photography ¹	4
ART 324	Photographic Expression	4
ART 325	Advanced Camera and Lighting Techniques	4
ART 329	Editorial Photography	4
ART 383	Digital Video I	4
ART 427	Advertising Photography	4
ART 483	Digital Video II	4
Select one from the following:		4

ENGL 371	Film Styles and Genres
ENGL 372	Film Directors
ENGL 387	Fiction Writing

GRC 331	Color Management	4
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Concentration Electives

Select from the following:		8
Any 300-400 level ART courses not already used to meet Major or Concentration requirements, OR		
ISLA 340	Media Arts and Technologies: Storytelling	
ISLA 341	Media Arts and Technologies: Cinematic Process ²	
MU 311	Introduction to Recording, Synthesis, and Production ²	
MU 312	Advanced Recording, Synthesis, and Production ²	
TH 434	Lighting Design ²	

Total units 52

¹ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

² Please check prerequisites. Your ability to select elective courses may vary depending upon the curriculum requirements for your major.

Studio Art Concentration

ART 148	Beginning Sculpture	4
ART 201	Intermediate Drawing	4
ART 302	Figure Drawing	4
ART 309	Intermediate Painting	4
ART 348	Intermediate Sculpture	4
ART 366	Junior Studio Art Practice	4
ART 409	Advanced 2-D	4
ART 448	Advanced Topics in Sculpture or ART 353 Intermedia / Art	4
ART 466	Senior Studio Art Practice	4

Art History Elective

Select from the following:		4
ART 310	Art History - American Art	
ART 311	Art History - Nineteenth Century Art	
ART 313	Design History	
ART 314	History of Photography	
ART 317	Asian Art Survey	
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements	
ART 370	Michelangelo	
ART 371	Topics in Renaissance Art	
ART 373	New Media Art History	
ART/WGQS 375	Intersectional Feminist Art Histories (USCP)	

Concentration Electives

Select from the following: 12

At least 8 units must be upper-division.

Any ART courses not already used to meet Major or Concentration requirements (see course descriptions for repeatable units), OR

TH 225	Costume Construction I
TH 230	Stagecraft I
TH 330	Stagecraft II
MU 311	Introduction to Recording, Synthesis, and Production ¹
MU 312	Advanced Recording, Synthesis, and Production ¹
Total units	52

¹ Please check prerequisites. Your ability to select specific elective courses may vary depending upon the curriculum requirements for your major.

Art History Minor

Select one survey course in Art History: 4

ART 112	Western Art: A Thematic History
ART 211	Art Hist - Ancient to Renaissance
ART 212	Art History - Renaissance through Baroque Eras
ART 213	Art History- Modern Art, 1900-1945

Select one survey course in Architecture: 4

ARCH 217	History of World Architecture: Prehistory - Middle Ages
ARCH 218	History of World Architecture: Middle Ages - 18th Century
ARCH 219	History of World Architecture: 18th Century - Present

Select one 300-level Non-Western Course: 4

ARCH 320	Topics in Architectural History ¹
ART 317	Asian Art Survey
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements ¹

Select one 300-level Western Course 4

ARCH 320	Topics in Architectural History ¹
ART 310	Art History - American Art
ART 311	Art History - Nineteenth Century Art
ART 315	Art History - Art Since 1945
ART 370	Michelangelo
ART 371	Topics in Renaissance Art ¹
ART/WGQS 375	Intersectional Feminist Art Histories

Approved Electives ²

Select from the following Western, non-Western, architecture or art history classes at the 300-400 level: 12

ARCH 320	Topics in Architectural History ¹
ARCH 420	Seminar in Architectural History, Theory and Criticism
ART 310	Art History - American Art
ART 311	Art History - Nineteenth Century Art
ART 315	Art History - Art Since 1945
ART 317	Asian Art Survey
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements ¹
ART 370	Michelangelo
ART 371	Topics in Renaissance Art ¹

ART 373	New Media Art History
ART/WGQS 375	Intersectional Feminist Art Histories
Total units	28

¹ Repeatable course, taken twice with different topics, can be used to meet different Minor electives. Consult with adviser.

² If not used to meet Minor requirements, these courses meet Approved Electives.

Photography and Video Minor

ART 224	Introduction to Artificial Lighting for Photography	4
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Select from the following: 8

ART 122	Introduction to Digital Photography
ART 222	Black and White Photography
ART 227	Portrait Photography
ART 314	History of Photography ¹

Select from the following: 12

ART 314	History of Photography
ART 324	Photographic Expression
ART 325	Advanced Camera and Lighting Techniques
ART 329	Editorial Photography
ART 373	New Media Art History
ART 383	Digital Video I
ART 427	Advertising Photography
ART 483	Digital Video II
ART 484	Animation, Video, and Interactive Design

Total units 24

¹ If selected, course may not be selected again below.

Studio Art Minor

Required Courses

Select from the following: 12

ART 101	Fundamentals of Drawing
ART 145	Ceramics I
ART 148	Beginning Sculpture
ART 201	Intermediate Drawing
ART 209	Beginning Painting

ART Approved Electives

Select from the following: 12

ART 302	Figure Drawing
ART 309	Intermediate Painting
ART 334	Illustration I: Techniques and Tools
ART 345	Ceramics II
ART 348	Intermediate Sculpture
ART 400	Special Problems for Advanced Undergraduates
ART 402	Advanced Figure 2D
ART 409	Advanced 2-D
ART 448	Advanced Topics in Sculpture

or ART 353	Intermedia / Art	
Select from the following Art History courses:		4
ART 310	Art History - American Art	
ART 311	Art History - Nineteenth Century Art	
ART 315	Art History - Art Since 1945	
ART 317	Asian Art Survey	
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements	
ART 370	Michelangelo	
ART 371	Topics in Renaissance Art	
ART 373	New Media Art History	
ART/WGQS 375	Intersectional Feminist Art Histories	
Total units		28

Communication Studies

Faculty Office Bldg. (47), Room 33
Phone: 805.756.2553
<https://coms.calpoly.edu>

Department Chair: Lauren Kolodziejcki

Academic Programs

Program name	Program type
Communication Studies	BA, Minor

Understanding the process of communication is no less important in today's Information Age than it was during the Golden Age of Athens, when skill in oral communication determined one's success in life.

The study of the human capacity for speech as a means of influence, entertainment, and information was at the foundation of Western Civilization. A course of study in communication, always one that required knowledge of many cognate fields such as psychology and logic, remains interdisciplinary in nature. Faculty in Communication Studies teach aesthetic, historical, critical, and empirical methods for understanding communication.

The aims of the discipline are both conceptual and practical. In broad terms, students who enroll in a liberal arts curriculum do so to develop the ability to analyze and reason critically, write and speak effectively, and appreciate the influences of culture upon their lives. The first goal of the department is to advance these objectives.

The department offers fully articulated major and minor programs. Courses focus on the history, theory and practice of human communication across personal, professional, and civic contexts. Required courses introduce students to the importance of communication in several key areas: debate, interpersonal communication, media studies, organizational communication, performance of literature, rhetoric, and small group communication. Through the use of electives, the major can be shaped to assist students in preparing for their educational and career objectives.

Students use a Communication Studies major to prepare for careers in business, advertising, public relations, human relations, law, education, the mass media, non-profit work, theatre, and the clergy. In addition to providing students with an option to select from a broad range of internships and to participate in various Learn by Doing activities, the department houses an extensive program in competitive debate. It also offers individual and sequenced courses to develop practical skills in oral composition, critical thinking, and effective human communication.

Mission Statement

The Communication Studies program at Cal Poly offers a comprehensive curriculum, focusing broadly on the composition and influence of messages across the contexts of personal, professional, and civic life. Graduates of the program gain knowledge and skills to effectively engage in and change the world around them. Students learn foundational theories and study human communication from historical, critical, humanistic, and social scientific approaches to uncover how, why, and with what effects people communicate. Upon completing this program, students possess a robust facility for creating ethical, culturally aware, and inclusive communication as citizens of a dynamically mediated world.

Undergraduate Programs BA Communication Studies

The Bachelor of Arts in Communication Studies degree prepares students for careers in the various communication professions as well as a wide variety of occupations that place a premium on excellent communication skills. In addition, many Communication Studies graduates go on to earn advanced degrees in disciplines such as communication, psychology, sociology, and law. The Communication Studies curriculum draws from the traditions of both the humanities and the social sciences and includes a wide array of courses investigating the nature, processes and effects of human communication.

Communication Studies Minor

A 28-unit minor is available for students who desire documented competency in Communication Studies. Further information and application forms are available in the Communication Studies Department office.

BA Communication Studies Program Learning Objectives

1. Describe the foundational concepts, theories, and methods of critical, humanistic, and social scientific approaches to studying communication.
2. Analyze mediated and non-mediated communication practices, messages, and effects considering the culture and context in which they occur.
3. Practice self-reflexivity about one's own communication practices.
4. Develop a critical framework for making ethical and inclusive communication choices.
5. Select appropriate modalities and technologies to accomplish communication goals.
6. Apply communication concepts, theories, and methods to real-world events, issues, and problems.
7. Produce effective and ethical communication based on awareness of diverse perspectives, contexts, and social identities.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

COMS 100	Introduction to the Communication Studies Major	2
COMS 205	Rhetorical Studies	4
COMS 206	Communication Theory	4
COMS 208	Performance, Literature, and Culture (C1) ¹	4

COMS 211	Interpersonal Communication (E) ¹	4
COMS 213	Organizational Communication	4
COMS 215	Media Studies	4
COMS 217	Small Group Communication	4
COMS 250	Forensic Activity	2
Select from the following:		4
COMS 312	Quantitative Research Methods in Communication Studies	
COMS 313	Qualitative Research Methods in Communication Studies	
Select from the following:		4
COMS 332	Rhetorical Criticism	
COMS 385	Media Criticism	
COMS 316	Intercultural Communication (Upper-Division D) (USCP) ¹	4
COMS 460	Undergraduate Seminar	1
COMS 461	Senior Project	3
Focus Area ²		
Select from the following focus areas or any courses in the list below:		24
Culture, Identity, and Power		
COMS 308	Group Performance of Literature	
COMS 319	Critical Cultural Studies and Communication	
COMS 320	Intergroup Communication	
COMS 331	Contemporary Rhetorical Theory	
COMS 350	Advanced Forensic Activity	
COMS 351	Speech and Debate Team	
COMS 387	Sports Communication	
COMS 418	Health Communication	
COMS 420	Nonverbal Communication	
COMS 421	Gender and Communication	
COMS 428	Family Communication	
COMS 435	American Political Rhetoric	
Media and Technology		
COMS 317	Technology and Human Communication	
COMS 384	Media Effects	
COMS 386	Communication, Media, and Politics	
COMS 387	Sports Communication	
COMS 395	Science Communication	
COMS 404	Video Games & Society	
COMS 418	Health Communication	
COMS 421	Gender and Communication	
COMS 422	Rhetorics of Science, Technology, and Medicine	
COMS 458	Solving Big World Challenges	
ISLA 303	Values and Technology	
Persuasion and Social Influence		
COMS 201	Advanced Public Speaking	
COMS 226	Applied Argumentation	
COMS 301	Business and Professional Communication	

COMS 317	Technology and Human Communication	
COMS 322	Persuasion	
COMS 330	Classical Rhetorical Theory	
COMS 350	Advanced Forensic Activity	
COMS 351	Speech and Debate Team	
COMS 384	Media Effects	
COMS 386	Communication, Media, and Politics	
COMS 418	Health Communication	
COMS 420	Nonverbal Communication	
COMS 435	American Political Rhetoric	
Politics, Advocacy, and Civic Engagement		
COMS 201	Advanced Public Speaking	
COMS 226	Applied Argumentation	
COMS 308	Group Performance of Literature	
COMS 319	Critical Cultural Studies and Communication	
COMS 322	Persuasion	
COMS 330	Classical Rhetorical Theory	
COMS 331	Contemporary Rhetorical Theory	
COMS 350	Advanced Forensic Activity	
COMS 351	Speech and Debate Team	
COMS 384	Media Effects	
COMS 386	Communication, Media, and Politics	
COMS 390	Environmental Communication	
COMS 422	Rhetorics of Science, Technology, and Medicine	
COMS 435	American Political Rhetoric	
Relationships, Organizations, and Socialization		
COMS 301	Business and Professional Communication	
COMS 320	Intergroup Communication	
COMS 387	Sports Communication	
COMS 413	Advanced Organizational Communication	
COMS 420	Nonverbal Communication	
COMS 421	Gender and Communication	
COMS 428	Family Communication	
COMS 458	Solving Big World Challenges	
COMS Electives (300-400 level) ^{3,4}		12
SUPPORT COURSES		
Modern language 103 (CHIN, FR, GER, ITAL, JPNS, SPAN, WLC) or demonstration of comparable level of proficiency		4
Select from the following:		4
STAT 217	Introduction to Statistical Concepts and Methods (B4) ¹	
STAT 218	Applied Statistics for the Life Sciences (B4) ¹	
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		56
FREE ELECTIVES		
Free Electives ⁵		32

8-12 units of free electives may need to be at the 300-400 level to ensure completion of the required minimum of 60 units of upper-division.

Total units 180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Students should consult with a faculty advisor to make a course plan for the focus area of their choice.
- ³ Only 4 units of supervised instruction, including COMS 400, COMS 450, and COMS 485, may be counted here.
- ⁴ Courses taken to meet the focus area cannot double count as a COMS Elective.
- ⁵ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater (4 units in Major) ¹	0
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4

D2	Lower-Division D	4
Upper-Division D (4 units in Major) ¹		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Major) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives		8
Total units		56

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Communication Studies Minor

Required Courses

COMS 206	Communication Theory	4
COMS 211	Interpersonal Communication	4
COMS 322	Persuasion	4
COMS 330	Classical Rhetorical Theory	4
or COMS 331	Contemporary Rhetorical Theory	

Approved Electives

12 units of Communication Studies courses, of which at least 8 units must be 300–400 level. ¹

COMS 201	Advanced Public Speaking	
COMS 208	Performance, Literature, and Culture	
COMS 213	Organizational Communication	
COMS 217	Small Group Communication	
COMS 226	Applied Argumentation	
COMS 301	Business and Professional Communication	
COMS 308	Group Performance of Literature	
COMS 312	Quantitative Research Methods in Communication Studies	
COMS 320	Intergroup Communication	
COMS 316	Intercultural Communication	
COMS 317	Technology and Human Communication	
COMS 319	Critical Cultural Studies and Communication	
COMS 330	Classical Rhetorical Theory	
COMS 331	Contemporary Rhetorical Theory	
COMS 332	Rhetorical Criticism	
COMS 384	Media Effects	
COMS 385	Media Criticism	
COMS 386	Communication, Media, and Politics	
COMS 390	Environmental Communication	
COMS 395	Science Communication	
COMS 400	Special Problems for Advanced Undergraduates	

COMS 413	Advanced Organizational Communication
COMS 418	Health Communication
COMS 420	Nonverbal Communication
COMS 421	Gender and Communication
COMS 422	Rhetorics of Science, Technology, and Medicine
COMS 428	Family Communication
COMS 435	American Political Rhetoric
COMS 450	Internship: Communication Studies
COMS 485	Cooperative Education Experience
<hr/>	
Total units	28

¹ No more than 4 units may come from supervised instruction courses: COMS 400, COMS 450, or COMS 485.

English

Faculty Office Bldg. (47), Room 32-E
Phone: 805.756.2596
<https://english.calpoly.edu>

Department Chair: Douglas Keeseey

Academic Programs

Program name	Program type
English	BA, Minor, MA
Linguistics	Minor
Technical and Professional Communication	Certificate
Teaching English to Speakers of Other Languages	Certificate

The English Department offers Bachelor of Arts and Master of Arts programs, minors in English and Linguistics, and certificates in Teaching English to Speakers of Other Languages and in Technical and Professional Communication. Additionally, in cooperation with the School of Education, the department prepares undergraduates and graduates for careers in secondary school teaching. Finally, the English Department provides a wide array of general education courses in composition, literature, film, and creative writing.

An English major or minor is valuable preparation for any career in which critical thinking, nuanced analysis, and clear communication are essential. Many of our majors pursue graduate study in English, education, creative writing, or law; the major provides an excellent foundation for all of these fields. First and foremost, however, students of English are humanists, deeply concerned about the welfare of others. Through imaginatively inhabiting the worlds writers create, English students gain empathy, respect, and perspective, habits of mind that will benefit them throughout their lives.

Certificate Programs

Teaching English to Speakers of Other Languages (TESOL)

The TESOL certificate program provides individuals with specialized training to teach successfully in a wide variety of ESL programs. Both undergraduate and graduate students currently enrolled in any degree program at Cal Poly may pursue this certificate.

The 30-unit TESOL program provides a solid background in theoretical and applied linguistics, cross-cultural communication, second language acquisition, and methods of TESOL. The program is designed for two career options:

1. The Post-Secondary/Adult option prepares individuals to teach in college level and adult education programs. Those wishing to teach at the college level are advised that an MA in English or a related field is the usual minimum requirement for full-time positions.
2. The K-12 option prepares individuals having a single or multiple subject credential to teach ESL in elementary and secondary schools.

Certificate Requirements (p. 282)

Technical and Professional Communication

Commercial, academic and governmental organizations employ technical and professional communicators as writers, editors, public relations experts, information designers, documentation and project

managers, and as mixed media creators. The technical and professional communicator is, first and foremost, an accomplished writer who produces clear, precise, timely, and effective prose. However, technical communicators also are adept at designing information layouts, integrating images with text, working in teams, translating technical concepts for diverse audiences, and engaging with users to ensure the usability of documents. Individuals interested in technical and professional communication enjoy the process of continually learning and sharing information with others.

Certificate Requirements (p. 283)

Undergraduate Programs

BA English

The curriculum for the Bachelor of Arts in English offers students both structure and freedom of choice. Students take introductory courses in several disciplines within English, including literary studies, linguistics, and composition/rhetoric/technical communication, as well as a seven-course sequence of American, British, and global Anglophone literature. Upper-division requirements include courses in literary and non-literary fields, which may include creative writing, film, linguistics, composition/rhetoric, and technical and professional communications. A Senior Project in the student's field of interest provides the capstone to the English major.

English majors must also demonstrate intermediate-level proficiency in a language other than English. Cal Poly offers intermediate-level instruction in several languages. We encourage majors to study abroad, and many students choose to complete their language requirement in another country.

English Minor

An English minor complements any major, adding richness and depth to students' educations. The curriculum boasts literature courses to help students cultivate empathy and insight; writing courses to help students practice essential communication skills; and linguistics courses to provide an understanding of the nature and power of language. Students interested in pursuing an English minor should meet with the minor advisor to review the requirements. The English minor is not open to Liberal Studies majors with a concentration in English.

Linguistics Minor

Cal Poly's English Department offers a range of linguistics and applied linguistics courses designed for the beginning linguist or the non-linguist. Linguistics, the science of language, studies our mental capacity to produce and comprehend language, the varied patterns that the world's languages use to express meaning, and the natural facts of diversity and change within and across languages. Applied linguistics in our Department includes teaching English to speakers of other languages, applications of linguistics in the K-12 language arts classroom, history of English, language and gender, and other varied topics.

Linguistics enriches the English major's understanding of and appreciation for English and other languages, not just by acquainting them with the structure of English, but also by exploding popular myths which often lead to ill-informed personal or policy judgments.

Study of linguistics can be useful as preparation for a variety of occupations: teaching language arts, English, or other languages;

working in journalism or editing and publishing; and a variety of applications in computer-mediated uses of language.

Master of Arts Degree in English

General Characteristics

Students in the Master of Arts in English explore and research texts and their contexts, in intimate cohorts and with award-winning, nationally- and internationally-recognized faculty. Designed to provide a comprehensive experience of the field of English Studies, the M.A. offers courses in American, British, and World Anglophone literatures; literatures in translation; composition and rhetoric; technical and professional writing; linguistics; and literary theory and criticism. Moreover, it is designed to foreground our discipline's exemplary commitment to diversity, equity, and inclusivity, in part by making historically underrepresented and/or disenfranchised texts, movements, and cultural contexts an integral part of our curriculum.

In their second year, students have the opportunity to apply to teach first-year writing courses, and all students complete a highly individualized research "portfolio" project as their capstone achievement. Students are encouraged to submit the work they complete for the portfolio to academic conferences, scholarly journals, and relevant job applications.

The M.A. in English equips its students with a broad appreciation for and deep mastery of the field of English Studies, which prepares them for:

- teaching English at the secondary and/or community college level;
- further graduate work at the doctoral level;
- careers in marketing/public relations, publishing, editing, the arts and culture sector, and other fields in which effective writing and communication skills are valued;
- careers in the emergent fields of technical and professional communication; and
- a life-long appreciation for literature, rhetoric, communication, and the humanistic values at the core of English Studies.

Prerequisites

Students admitted to the Master of Arts in English must have a Bachelor's degree from an accredited institution (or the equivalent, as determined by the English Graduate Committee) and have maintained a grade point average of 3.0 for the last 90 quarter units (60 semester units). Non-native speakers should also submit TOEFL scores (Test of English as a Foreign Language). At the discretion of the graduate coordinator, students without an degree in English or a closely related field may be admitted conditionally.

Program of Study

- 46 units of graduate work approved by the English Graduate Coordinator and the Graduate Committee, completed according to program requirements.
- These units break down to eleven four-unit graduate seminars (in certain circumstances, a select few 400-level seminars can be counted toward the degree) and the completion of the 2-unit research portfolio, ENGL 598.

Application

Those interested in applying to the M.A. in English will complete their application through the Cal State Apply website (<https://www2.calstate.edu/apply> (<https://www2.calstate.edu/apply/>)). Our

program's application process does not require that you submit GRE scores. However, you may submit your scores if you wish to do so.

Note that in addition to the materials that the Cal State Apply system requires, *you must also submit a personal statement, writing sample, and two letters of recommendation*. Applicants who do not include these materials cannot be considered for admission to the program.

Questions about the application process should be directed to Dr. Ryan Hatch at rahatch@calpoly.edu.

Blended BA + MA English Program

A blended program can provide an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

Eligibility

Students majoring in BA English are eligible for the blended program in MA English.

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education](#) (p. _____) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the English department for any additional eligibility criteria.

Program of Study

The typical student in the blended program will be able to complete the English BA and MA in five years. Students will complete the senior project by the conclusion of the 4th year and all of the BA degree requirements by the fall of the 5th year. The culminating experience for the English MA will be a supervised graduate project.

Teaching English to Speakers of Other Languages Certificate

A minimum 2.0 GPA is required in all units counted for completion of the certificate. A maximum of two non-core courses taken at other institutions may be substituted with approval.

In addition to the coursework for the certificate, students must satisfy the modern language requirement. One year of a modern language at the college level or completion of a course such as FR 103, GER 103, or SPAN 103 is required.

Core Courses

ENGL 497	Theories of Language Learning and Teaching	4
ENGL 498	Approaches to Teaching English to Speakers of Other Languages	4
ENGL 499	Practicum in Teaching English to Speakers of Other Languages	2

Linguistics

ENGL 290 or ENGL 503	Introduction to Linguistics Graduate Introduction to Linguistics	4
ENGL 390	The Linguistic Structure of Modern English	4

ENGL 391	Topics in Applied Linguistics	4
ENGL 495	Topics in Applied Language Study	4
Communications		
COMS 316	Intercultural Communication	4
Total units		30

Technical and Professional Communication Certificate

Core Courses

ENGL 221	Introduction to Technical and Professional Communication	4
ENGL 317	Technical Editing	4
ENGL 319	Information Design and Production	4
ENGL 421	Advanced Topics in Technical and Professional Communication	4

Practicum

Internship, Independent study, or Senior Project related to technical or professional communication (requires approval of the program director)	4
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Approved Electives

Select from the following: 8

COMS 217	Small Group Communication	
COMS 301	Business and Professional Communication	
COMS 316	Intercultural Communication	
COMS 317	Technology and Human Communication	
COMS 390	Environmental Communication	
COMS 395	Science Communication	
COMS 418	Health Communication	
COMS 422	Rhetorics of Science, Technology, and Medicine	
ENGL 310	Corporate Communication	
ENGL/HNRS 380	Literary Themes ¹	
ENGL/HNRS 411	New Media Arts I	
ENGL/HNRS 412	New Media Arts II	
ENGL 467	Topics in Rhetoric and Writing ¹	
ES/WGQS/HNRS 350	Gender, Race, Culture, Science & Technology	
PHIL 321	Philosophy of Science	
PHIL 323	Ethics, Science and Technology	
PHIL 337	Business Ethics	
ISLA 303/ HNRS 304	Values and Technology	
ISLA/HNRS 320	Topics and Issues in Values, Media and Culture	
RPTA 450	Resource and Grant Development	
Total units		28

¹ Certificate program director's approval required. Approval is dependent on topic.

BA English

Program Learning Objectives

Learning Outcomes

1. Explicate texts from a diverse range of traditions, including texts from historically underrepresented groups.
2. Analyze how power structures and cultural practices shape textual production and reception.
3. Critique and produce texts that account for the rhetorical relationships among audience, writer, text, genre, and discourse.
4. Write clearly and effectively in a variety of genres and media.
5. Successfully incorporate scholarly research into papers.
6. Identify and define an array of historical and critical literary, rhetorical, and linguistic terms and categories.

Learning Goals

1. Understand how texts reflect, critique, and produce culture and power structures.
2. Pursue deeper knowledge of particular authors and works, including those from underrepresented groups.
3. Explore the ways identities and affiliations shape texts and traditions.
4. Understand the structure of language and how language varies over time, across social situations and social groups.
5. Participate in face-to-face exchanges of ideas with faculty, fellow students, and authors in the classroom and other academic or social settings.
6. Participate in small seminars where ideas are tested and sharpened.
7. Cultivate relational thinking that encourages students to make connections between the arts and humanities and other fields of study.
8. Sustain a life-long engagement and involvement in aesthetic, cultural, and intellectual matters, including social and political issues.
9. Draw upon multiple literacies to interpret literary, visual, and cultural texts.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

ENGL 202	Introduction to Literary Studies	4
ENGL 203	Sequence I: Fifth Century to Fifteenth Century	4
ENGL 204	Sequence II: Sixteenth Century to Late Seventeenth Century	4
ENGL 205	Sequence III: Mid-Seventeenth to Late Eighteenth Century	4
ENGL 220	Introduction to Writing Studies	4

or ENGL 221	Introduction to Technical and Professional Communication	
ENGL/HNRS 251	Introduction to Classical Literature (C2) ¹	4
ENGL 290	Introduction to Linguistics	4
ENGL 303	Sequence IV: Late Eighteenth to Mid-Nineteenth Century	4
ENGL 304	Sequence V: Mid-Nineteenth Century to Late Nineteenth Century	4
ENGL 305	Sequence VI: Late Nineteenth to Mid-Twentieth Century	4
ENGL 306	Sequence VII: Mid-Twentieth Century to Present	4
Select from the following (Upper-Division C) (USCP): ¹		4
ENGL 345	Women Writers of the Twentieth and Twenty-First Centuries	
ENGL 346	Ethnic American Literature	
ENGL 347	African American Literature	
ENGL 348	Asian American Literature	
ENGL 349	Gender in Twentieth and Twenty-First Century Literature	
ENGL 381	Diversity in Twentieth and Twenty-First Century American Literature	
ENGL 382	LGBT Literature and Media	
ENGL 300-level Elective		4
ENGL 300-level Non-literature Elective, select from the following:		4
ENGL 310	Corporate Communication	
ENGL 311	Advanced Rhetorical Inquiry and Composing	
ENGL 312	Translingual Rhetorical Inquiry and Writing	
ENGL 317	Technical Editing	
ENGL 319	Information Design and Production	
ENGL 361	Reading Instruction for the Teaching of Young Adult Literature	
ENGL 368	Theory and Practice of Peer-to-Peer Writing Instruction	
ENGL 370	World Cinema	
ENGL 371	Film Styles and Genres	
ENGL 372	Film Directors	
ENGL 373	Topics on Gender Representations in Film	
ENGL 387	Fiction Writing	
ENGL 388	Poetry Writing	
ENGL 390	The Linguistic Structure of Modern English	
ENGL 391	Topics in Applied Linguistics	
ENGL 395	History of the English Language	
ENGL 400-level Diversity Elective, select from the following:		4
ENGL 439	Topics in British Literature (Topic: Gender in Medieval Literature)	
ENGL 439	Topics in British Literature (Topic: Jane Austen Fiction and Film)	
ENGL 449	Topics in American Literature (Topic: American Modernism in Black and White)	
ENGL 449	Topics in American Literature (Topic: Califia, Delany, & Pornography)	
ENGL 449	Topics in American Literature (Topic: Mixed-Race Subjects in the US Literary Imagination)	
ENGL 449	Topics in American Literature (Topic: Walt Whitman and James Baldwin)	
ENGL 449	Topics in American Literature (Topic: Women's Fiction, 1861-1914)	
ENGL 459	Topics in Transatlantic and/or World Literature (Topic: Trickster Literatures)	
ENGL 467	Topics in Rhetoric and Writing (Topic: Women's Rhetoric(s))	
ENGL 495	Topics in Applied Language Study (Topic: World Englishes)	
ENGL 400-level Electives (see Optional Creative Writing Emphasis, below) ²		20
ENGL 461	Senior Project	4
SUPPORT COURSES		
Foreign Language at the Intermediate Level		
Select from the following: ³		4
CHIN 201	Intermediate Mandarin Chinese I	
CHIN 202	Intermediate Mandarin Chinese II	
FR 201	Intermediate French I	
FR 202	Intermediate French II	
GER 201	Intermediate German I	
GER 202	Intermediate German II	
ITAL 201	Intermediate Italian I	
JPNS 201	Intermediate Japanese I	
SPAN 201	Intermediate Spanish I	
SPAN 202	Intermediate Spanish II	
Arts and Humanities Breadth:		
Upper-Division C (General Education) course not in ENGL (GE Electives) ¹		4
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		60
FREE ELECTIVES		
Free Electives		28
Total units		180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Minimum 12 units in literature (ENGL 439, ENGL 449, or ENGL 459).

³ Student can substitute for this requirement by demonstrating a comparable level of proficiency in a foreign language.

Optional Creative Writing Emphasis

Students interested in creative writing may use 16 of their upper-division ENGL units and their senior project to pursue a fiction- or poetry-writing emphasis. Examples are:

Fiction Writing Emphasis:

ENGL 387	Fiction Writing (4)	
ENGL 487	Advanced Creative Writing: Fiction (4, 4)	
400-level ENGL literature course in modern or contemporary fiction (4)		
ENGL 461	Senior Project (4)	

Poetry Writing Emphasis:

ENGL 388	Poetry Writing (4)	
ENGL 488	Advanced Creative Writing: Poetry (4, 4)	
400-level ENGL literature course in modern or contemporary poetry (4)		
ENGL 461	Senior Project (4)	

General Education (GE) Requirements

- 72 units required, 12 of which are specified in Major and/or Support.
- If any of the remaining 60 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning	4
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English (4 units in Major) ¹	0
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C (4 units in Major) ¹		0
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4

Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		60

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

English Minor

Required Courses

Lower Division World Literature		
Select from the following:		4
ENGL 251	Introduction to Classical Literature	
ENGL 252	Introduction to Medieval through Enlightenment Literature	
ENGL 253	Introduction to Romantic through Modernist Literature	

British Literature

Select from the following:		4
ENGL 330	British Literature: Beginnings to 1485	
ENGL 331	British Literature: 1485-1660	
ENGL 332	British Literature: 1660-1798	
ENGL 333	British Literature: 1798-1832	
ENGL 334	British Literature: 1832-1914	
ENGL 335	British Literature: 1914-Present	
ENGL 339	Introduction to Shakespeare	

American Literature

Select from the following:		4
ENGL 340	American Literature: Beginnings-1865	
ENGL 341	American Literature: 1865-1914	
ENGL 342	American Literature: 1914-1956	
ENGL 343	American Literature: 1956-Present	
ENGL 346	Ethnic American Literature	
ENGL 347	African American Literature	
ENGL 348	Asian American Literature	

World Literature, Modern Literature and/or Film

Select from the following:		4
ENGL 345	Women Writers of the Twentieth and Twenty-First Centuries	
ENGL 349	Gender in Twentieth and Twenty-First Century Literature	
ENGL 350	The Modern Novel	
ENGL 351	Modern Poetry	
ENGL 352	Modern Drama	
ENGL 370	World Cinema	
ENGL 371	Film Styles and Genres	

ENGL 372	Film Directors	
ENGL 380	Literary Themes	
ENGL 381	Diversity in Twentieth and Twenty-First Century American Literature	
ENGL 382	LGBT Literature and Media	
Linguistics		
Select from the following:		4
ENGL 390	The Linguistic Structure of Modern English	
ENGL 395	History of the English Language	
Composition, Creative Writing, Technical Communications		
Select from the following:		4
ENGL 310	Corporate Communication	
ENGL 311	Advanced Rhetorical Inquiry and Composing	
ENGL 317	Technical Editing	
ENGL 319	Information Design and Production	
ENGL 386	Creative Nonfiction	
ENGL 387	Fiction Writing	
ENGL 388	Poetry Writing	
Elective		
One additional 4 unit course from the lists above		4
Total units		28

Linguistics Minor

Required Courses

ENGL 290	Introduction to Linguistics	4
ENGL 391	Topics in Applied Linguistics	4
ENGL 395	History of the English Language	4

Approved Electives ¹

May include (at least 6 units must be at the 300-400 level):		16
COMS 316	Intercultural Communication	
ENGL 390	The Linguistic Structure of Modern English	
ENGL 495	Topics in Applied Language Study	
ENGL 497	Theories of Language Learning and Teaching	
Total units		28

¹ Select approved electives in consultation with faculty advisor.

MA English

Program Learning Objectives

1. Understand how British and American literary traditions developed, becoming familiar with significant writers, their works, and the connections between them.
2. Understand the structure of language and its change over time and across social situations and groups.
3. Understand the movements and traditions of Composition and Rhetoric Studies.
4. Be able to think creatively and critically and to write effectively within all these areas of English Studies.

5. Know how to conduct original research and integrate criticism (secondary sources) into your own analyses.
6. Be prepared for lifelong learning.
7. Be ready and able to pursue a wide range of personal and professional goals or to undertake further graduate studies.

Required "Foundations" Courses

ENGL 501	Introduction to English Studies	4
ENGL 502	Seminar in Critical Analysis	4
ENGL 503	Graduate Introduction to Linguistics	4
ENGL 505	Composition Theory	4

Required Literature Courses

ENGL 511	Seminar in American Literature	4
ENGL 512	Seminar in British Literature	4

Capstone Research Portfolio

ENGL 598	Graduate Project	2
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Elective Courses ¹

Select from the following:		20
ENGL 506	Pedagogical Approaches to Composition ²	
ENGL 510	Seminar in Authors	
ENGL 511	Seminar in American Literature	
ENGL 512	Seminar in British Literature	
ENGL 513	Seminar in Special Topics	
ENGL 518	Graduate Technical Communication	
ENGL 519	Seminar in Rhetoric and Writing	
ENGL 570	Selected Advanced Topics	
Total units		46

¹ Students must complete at least one pre-1850 literature course and at least one post-1850 literature course.

² Students must be accepted to the Teaching Assistant program in order to enroll in ENGL 506.

Ethnic Studies

Math and Science Bldg. (38), Room 136

Phone: 805.756.1707

<https://ethnicstudies.calpoly.edu>

Department Chair: Jenell Navarro

Academic Programs

Program name	Program type
Comparative Ethnic Studies	BA
Ethnic Studies	Minor
Indigenous Studies in Natural Resources and the Environment	Minor

Ethnic Studies is an intellectual and political project that uses inter- and multidisciplinary approaches to understand and transform enactments of power, to which, in the modern era, productions of race and ethnicity have been central. The aim of Ethnic Studies is to provide students with an understanding of the historical processes (including slavery, capitalism, genocide, colonialism, nativism, war) that form the United States as a nation-state and as an imagined community, and their differential impact on diverse communities within local, national, and global contexts. The field of Ethnic Studies critically attends to research methodologies and frameworks of knowledge to examine how these legacies impact access to political power, allocate economic resources, and influence cultural expression. Ethnic Studies courses draw from and engage with a number of academic fields, including: post/decolonial studies, cultural studies, human rights studies, Indigenous studies, migration studies, legal studies, environmental studies, gender studies, sexuality and queer studies, and science and technology studies. Through a critical and comparative study of interlocking and intersecting systems of oppression embedded in the formation of the U.S. nation, students develop a greater understanding of the legacies of racism, discrimination, and inequity in the United States as well as of the movements for social justice. Students also learn about the diverse peoples of the Americas, specifically Indigenous and Latinx Peoples, and the African and Asian diasporas who have been historically displaced, disenfranchised, and silenced. Ethnic Studies seeks to provide a relevant education—one that has a deep commitment to justice, equity, and social and institutional transformation.

Housed in the College of Liberal Arts, the Ethnic Studies Department at Cal Poly encourages critical dialogue about race, ethnicity, and decolonization across the entire university curriculum. The department offers a number of courses that fulfill general education, Ethnic Studies, and United States Cultural Pluralism graduation requirements. A minor in Ethnic Studies is open to all majors and provides a useful complement to the differing types of inquiry used in the wide variety of disciplines throughout the University.

Undergraduate Programs

BA Comparative Ethnic Studies

It is expected that students who demonstrate the foregoing learning outcomes will be better prepared to understand the social, cultural, political, historical, and economic factors that have shaped their own social and occupational identities, as well as the social and occupational identities of others. This knowledge should better prepare students to

work, collaborate, and interact more responsibly and effectively in an increasingly diverse and globalized workplace and world.

Ethnic Studies Minor

An Ethnic Studies minor provides students with special competence in the histories and experiences of historically marginalized communities in the United States, and with the critical skills with which to understand their complex social issues. Students majoring in subjects across the university curriculum find Ethnic Studies useful, particularly when their interests require a deeper understanding of race, ethnicity, class, gender and sexuality in the United States and beyond. The minor prepares students for careers in education, government, and community organizations among other areas; and, prepares them for graduate and professional schools in areas such as the law, social work, health, and the arts and sciences.

Indigenous Studies in Natural Resources and the Environment Minor

An interdisciplinary minor sponsored by the departments of Natural Resources Management and Environmental Sciences and Ethnic Studies. For more information, see the Natural Resources Management and Environmental Sciences (p. 117) section.

BA Comparative Ethnic Studies

Program Learning Objectives

It is expected that students who demonstrate the foregoing learning outcomes will be better prepared to understand the social, cultural, political, historical, and economic factors that have shaped their own social and occupational identities, as well as the social and occupational identities of others. This knowledge should better prepare students to work, collaborate, and interact more responsibly and effectively in an increasingly diverse and globalized workplace and world.

1. Define and apply key concepts, contexts, and scholarship in Ethnic Studies.
2. Demonstrate understanding of the specificities of heterogeneous communities shaped by and shaping the U.S. nation-state in addition to broad ethnic studies concepts and contexts.
3. Apply inter- and multidisciplinary, comparative, and intersectional approaches to critically analyze discourses, practices, and institutions that maintain structural inequality.
4. Communicate in writing and in alternative media one's own arguments and the arguments of others within the field of ethnic studies and in at least one other discipline.
5. Design and implement research projects that account for the limits and potentials of humanities and social science methodologies and acknowledge competing frameworks of knowledge to understand US racial formations.
6. Apply acquired knowledge and skills toward academic, professional, personal, and community development.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

ES 112	Race, Culture, and Politics in the United States (D1) (USCP) ¹	4
ES 114	Introduction to Ethnic Studies	4

Survey Electives

Select from the following: 8

ES 252	Global Origins of Race in the U.S. (F) ¹	
ES 253	Introduction to American Indian Studies (F) ¹	
ES 254	Introduction to African American Studies (F) ¹	
ES 255	Introduction to Latino/a/x Studies (F) ¹	
ES 256	Introduction to Asian American Studies (F) ¹	

Cultural Electives

Select from the following: 12

ES 320	African Americans in Popular Culture	
ES 321	Native Americans in Popular Culture	
ES 322	Asian Americans in Popular Culture	
ES 323	Latina/os in Popular Culture	
ES 340	Cultural Production and Ethnicity	
ES 345	Queer Ethnic Studies (Upper-Division D) ¹	4
ES 350	Gender, Race, Culture, Science & Technology (Upper-Division B) ¹	4
ES 380	Critical Race Theory (GE Electives) ¹	4
ES 390	Research Methodology in Comparative Ethnic Studies	4
ES 450	Fieldwork in Comparative Ethnic Studies	4
ES 461	Senior Project	4

Upper-Division Ethnic Studies Electives

Select ES courses at the 300-400 level^{2,3,4} 12

Approved Electives

Select from the Approved Electives list below^{2,3,4,5} 20

SUPPORT COURSES

STAT 217	Introduction to Statistical Concepts and Methods (B4) ¹	4
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GENERAL EDUCATION (GE)

(See GE program requirements below.) 48

FREE ELECTIVES

Free Electives⁴ 44

4 units of free electives may need to be at the 300-400 level to ensure completion of the required minimum of 60 units of upper-division courses. Consult college advisor for additional information.

Total units

180

Approved Electives

Select from the following (at least 8 units must be at the 300-400 level):^{2,3,4,5} 20

AG/EDES/ENGR/ISLA/SCM/UNIV 350	The Global Environment
AGB 370	World Food Economy
ANT 201	Cultural Anthropology
ANT/ISLA 393	Action-oriented Ethnography
ANT 401	Culture and Health
ANT 415	Native American Cultures
ANT 460	Queer Anthropology
ARCH 320	Topics in Architectural History
ARCH/ES 326	Native American Architecture and Place
ART 317	Asian Art Survey
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements
BUS 302	International and Cross Cultural Management
BUS 433	International Finance
BUS 446	International Marketing
CD/EDUC 207	Children's Learning and Development in Educational Settings
CD 424	Children's Development in Diverse Cultures
COMS 316	Intercultural Communication
COMS 319	Critical Cultural Studies and Communication
COMS 421	Gender and Communication
CRP 211	Cities: Form, Culture and Evolution
CRP/ES 215	Planning for and with Multiple Publics
CRP 334	Cities in a Global World
DANC 321	Cultural Influence on Dance in America
ECON/HNRS 303	Economics of Poverty, Discrimination and Immigration
ECON 330	International Trade Theory
EDES 406	Sustainable Environments
ENGL 345	Women Writers of the Twentieth and Twenty-First Centuries
ENGL 346	Ethnic American Literature
ENGL 347	African American Literature
ENGL 349	Gender in Twentieth and Twenty-First Century Literature
ENGL 370	World Cinema

ENGL 381	Diversity in Twentieth and Twenty-First Century American Literature	JOUR 219	Multicultural Society and the Mass Media
ENGL 382	LGBT Literature and Media	JOUR 401	Global Communication
ERSC/GEOG 325	Climate and Humanity	KINE 323	Sport and Gender
ES/NR 308	Fire and Society	MU 121	Introduction to Non-Western Musics
ES/WGQS 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development	MU 221	Jazz Styles
ES/NR 360	Ethnicity and the Land	MU 228	Music of the 60's: War and Peace
ES/NR 406	Indigenous Peoples and International Law and Policy	MU 325	America's Music
FSN 250	Food and Nutrition: Culture and Customs	MU 326	Cultural Concepts and Structures in Music
FSN 415	Nutrition Education and Communications	MU 336	Jazz History and Theory
GEOG 150	Human Geography	PHIL 335	Social Ethics
GEOG 308	Global Geography	PHIL/WGQS 336	Feminist Ethics, Gender, Sexuality and Society
GEOG 340	Geography of California	POLS 225	Introduction to International Relations
GEOG 370	Geography of Latin America	POLS 229	Introduction to Comparative Politics
GEOG 380	Geography of the Caribbean	POLS 310	The Politics of Race, Class, Gender and Sexuality
GEOG 408	Geography of International Development	POLS 324	International Relations Theory
HIST 206	United States Cultures	POLS 325	Global Political Issues
HIST 208	Survey of California History	POLS 328	Politics of Developing Areas
HIST 216	Comparative Social Movements	POLS 337	U.S. and China in the Contemporary World
HIST/HNRS 223	World History, 1800 - Present	POLS 332	World Food Systems
HIST 308	The Trans-Atlantic Slave Trade	POLS 339	Authoritarian and Democratic Rule
HIST 310	East Asian Culture and Civilization	POLS 343	Civil Rights in America
HIST 313	Modern Middle East	POLS 419	Social Movements and Political Protest
HIST 337	Colonial Latin America	POLS 420	Contemporary U.S. Foreign Policy
HIST 338	Modern Latin America	POLS 426	International Organizations and Law
HIST 341	Modern Central America	POLS 427	Politics of the Global Economy
HIST 405	African-American History to 1865	POLS 445	Voting Rights and Representation
HIST 406	African-American History from 1865	POLS/WGQS 457	U.S. Reproductive Politics
HIST 416	Modern Japan	POLS 459	The Politics of Poverty
HIST 417	20th Century China	PSY 252	Social Psychology
HIST 418	Chinese Film and History	PSY 260	African American Psychology
HIST 419	Modern Southeast Asia	PSY 304	Intergroup Dialogues
HIST/WGQS 421	The History of Prostitution	PSY/WGQS 324	Psychology of Gender
HIST 429	Precolonial African History	PSY 372	Multicultural Psychology
HIST 430	Modern African History	PSY 465	Cross-Cultural International Psychology
HIST 433	History of the American West, Southwest Borderlands, and California	PSY 475	The Social Psychology of Prejudice
HIST/WGQS 434	American Women's History to 1870	RELS 301	Religions of Asia
HIST/WGQS 435	American Women's History from 1870	RELS 302	Abrahamic Religions: Judaism, Christianity, and Islam
HIST 442	Topics and Issues in Latin American History	RELS 306	Hinduism
HIST 443	Topics and Issues in Asian History	RELS 307	Buddhism
HIST 444	Topics and Issues in African History	RELS/WGQS 370	Religion, Gender, and Society
HIST 459	Imperialism and Postcolonial Studies	RELS/POLS 380	Religion and Politics in the Israeli-Palestinian Conflict
HLTH 255	Personal Health: A Multicultural Approach	SOC 110	Comparative Societies
		SOC 218	International Political Economy
		SOC 309	The World System and Its Problems

SOC/WGQS 311	Sociology of Genders and Sexualities
SOC 315	Global Race and Ethnic Relations
SOC 323	Social Stratification
SOC 327	Social Change
SPAN 233	Introduction to Hispanic Readings
SPAN 305	Significant Works in Spanish
SPAN 340	Chicano/a Authors
SPAN 350	Hispanic Literature in English Translation
SPAN 351	Chicano/Latino Writers in the United States
SPAN 410	Advanced Literature in Spanish
TH 305	Topics in Diversity on the American Stage
TH 390	Global Theatre and Performance
WGQS 301	Contemporary Issues in Women's and Gender Studies
WGQS 320	Women, Gender and Sexuality in Global Perspective
WGQS 450	Feminist Theory
WGQS 455	Queer Theory
WLC 312	Humanities in Chicano/a Culture
WLC 315	Critical Issues in Latin American Studies

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Be aware that some courses on this list may have prerequisites and that these prerequisites may need to be taken as Free Electives.
- ³ Consultation with advisor is recommended prior to selecting electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ⁴ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- ⁵ Approved Electives can be selected from any unused ES course or from the Approved Electives list. Courses not on the Approved Electives list may still be selected, but are subject to department approval. A minimum of 8 units of Approved Electives must be at the 300-400 level.

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4

A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement) (4 units in Major) ¹	0
D2	Lower-Division D	4
Upper-Division D (4 units in Major) ¹		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies (4 units in Major) ¹	0
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		48

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Ethnic Studies Minor

Required Courses

ES 112	Race, Culture, and Politics in the United States	4
ES 252	Global Origins of Race in the U.S.	4
or ES 253	Introduction to American Indian Studies	
or ES 254	Introduction to African American Studies	
or ES 255	Introduction to Latino/a/x Studies	
or ES 256	Introduction to Asian American Studies	
ES 320	African Americans in Popular Culture	4
or ES 321	Native Americans in Popular Culture	
or ES 322	Asian Americans in Popular Culture	

or ES 323	Latina/os in Popular Culture	
or ES 340	Cultural Production and Ethnicity	
or ES 345	Queer Ethnic Studies	
or ES 380	Critical Race Theory	
Approved Electives ^{1,2}		
See Approved Electives list below (8 units must be at the 300-400 level)		12
Total units		24

Approved Electives

Select from the following:

AG/EDES/ENGR/ ISLA/SCM/UNIV 350	The Global Environment	
AGB 370	World Food Economy	
ANT 201	Cultural Anthropology	
ANT/ISLA 393	Action-oriented Ethnography	
ANT 401	Culture and Health	
ANT 415	Native American Cultures	
ANT 460	Queer Anthropology	
ARCH 320	Topics in Architectural History	
ARCH/ES 326	Native American Architecture and Place	
ART 317	Asian Art Survey	
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements	
BUS 302	International and Cross Cultural Management	
BUS 433	International Finance	
BUS 446	International Marketing	
CD/EDUC 207	Children's Learning and Development in Educational Settings	
CD 424	Children's Development in Diverse Cultures	
COMS 316	Intercultural Communication	
COMS 319	Critical Cultural Studies and Communication	
COMS 421	Gender and Communication	
CRP 211	Cities: Form, Culture and Evolution	
CRP/ES 215	Planning for and with Multiple Publics	
CRP 334	Cities in a Global World	
DANC 321	Cultural Influence on Dance in America	
ECON/HNRS 303	Economics of Poverty, Discrimination and Immigration	
ECON 330	International Trade Theory	
EDES 406	Sustainable Environments	
ENGL 345	Women Writers of the Twentieth and Twenty-First Centuries	
ENGL 346	Ethnic American Literature	
ENGL 347	African American Literature	
ENGL 349	Gender in Twentieth and Twenty-First Century Literature	

ENGL 370	World Cinema	
ENGL 381	Diversity in Twentieth and Twenty-First Century American Literature	
ENGL 382	LGBT Literature and Media	
ERSC/GEOG 325	Climate and Humanity	
ES 252	Global Origins of Race in the U.S.	
ES 253	Introduction to American Indian Studies	
ES 254	Introduction to African American Studies	
ES 255	Introduction to Latino/a/x Studies	
ES 256	Introduction to Asian American Studies	
ES/NR 308	Fire and Society	
ES/WGQS 345	Queer Ethnic Studies	
ES 350/ HNRS 353/ WGQS 350	Gender, Race, Culture, Science & Technology	
ES/WGQS 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development	
ES/NR 360	Ethnicity and the Land	
ES/NR 406	Indigenous Peoples and International Law and Policy	
FSN 250	Food and Nutrition: Culture and Customs	
FSN 415	Nutrition Education and Communications	
GEOG 150	Human Geography	
GEOG 308	Global Geography	
GEOG 340	Geography of California	
GEOG 370	Geography of Latin America	
GEOG 380	Geography of the Caribbean	
GEOG 408	Geography of International Development	
HIST 206	United States Cultures	
HIST 208	Survey of California History	
HIST 216	Comparative Social Movements	
HIST/HNRS 223	World History, 1800 - Present	
HIST 308	The Trans-Atlantic Slave Trade	
HIST 310	East Asian Culture and Civilization	
HIST 313	Modern Middle East	
HIST 337	Colonial Latin America	
HIST 338	Modern Latin America	
HIST 341	Modern Central America	
HIST 405	African-American History to 1865	
HIST 406	African-American History from 1865	
HIST 416	Modern Japan	
HIST 417	20th Century China	
HIST 418	Chinese Film and History	
HIST 419	Modern Southeast Asia	
HIST/WGQS 421	The History of Prostitution	
HIST 429	Precolonial African History	
HIST 430	Modern African History	

HIST 433	History of the American West, Southwest Borderlands, and California	PSY 465	Cross-Cultural International Psychology
HIST/WGQS 434	American Women's History to 1870	PSY 475	The Social Psychology of Prejudice
HIST/WGQS 435	American Women's History from 1870	RELS 301	Religions of Asia
HIST 442	Topics and Issues in Latin American History	RELS 302	Abrahamic Religions: Judaism, Christianity, and Islam
HIST 443	Topics and Issues in Asian History	RELS 306	Hinduism
HIST 444	Topics and Issues in African History	RELS 307	Buddhism
HIST 459	Imperialism and Postcolonial Studies	RELS/WGQS 370	Religion, Gender, and Society
HLTH 255	Personal Health: A Multicultural Approach	RELS/POLS 380	Religion and Politics in the Israeli-Palestinian Conflict
JOUR 219	Multicultural Society and the Mass Media	SOC 110	Comparative Societies
JOUR 401	Global Communication	SOC 218	International Political Economy
KINE 323	Sport and Gender	SOC 309	The World System and Its Problems
MU 121	Introduction to Non-Western Musics	SOC/WGQS 311	Sociology of Genders and Sexualities
MU 221	Jazz Styles	SOC 315	Global Race and Ethnic Relations
MU 228	Music of the 60's: War and Peace	SOC 323	Social Stratification
MU 325	America's Music	SOC 327	Social Change
MU 326	Cultural Concepts and Structures in Music	SPAN 233	Introduction to Hispanic Readings
MU 336	Jazz History and Theory	SPAN 305	Significant Works in Spanish
PHIL 335	Social Ethics	SPAN 340	Chicano/a Authors
PHIL/WGQS 336	Feminist Ethics, Gender, Sexuality and Society	SPAN 350	Hispanic Literature in English Translation
POLS 225	Introduction to International Relations	SPAN 351	Chicano/Latino Writers in the United States
POLS 229	Introduction to Comparative Politics	SPAN 410	Advanced Literature in Spanish
POLS 310	The Politics of Race, Class, Gender and Sexuality	TH 305	Topics in Diversity on the American Stage
POLS 324	International Relations Theory	TH 390	Global Theatre and Performance
POLS 325	Global Political Issues	WGQS 301	Contemporary Issues in Women's and Gender Studies
POLS 328	Politics of Developing Areas	WGQS 320	Women, Gender and Sexuality in Global Perspective
POLS 332	World Food Systems	WGQS 450	Feminist Theory
POLS 337	U.S. and China in the Contemporary World	WGQS 455	Queer Theory
POLS 339	Authoritarian and Democratic Rule	WLC 312	Humanities in Chicano/a Culture
POLS 343	Civil Rights in America	WLC 315	Critical Issues in Latin American Studies
POLS 419	Social Movements and Political Protest		
POLS 420	Contemporary U.S. Foreign Policy		
POLS 426	International Organizations and Law		
POLS 427	Politics of the Global Economy		
POLS 445	Voting Rights and Representation		
POLS/WGQS 457	U.S. Reproductive Politics		
POLS 459	The Politics of Poverty		
PSY 252	Social Psychology		
PSY 260	African American Psychology		
PSY 304	Intergroup Dialogues		
PSY/WGQS 324	Psychology of Gender		
PSY 372	Multicultural Psychology		

¹ Electives reinforce and enhance the student's understanding of issues of culture, race and gender.

² Approved Electives can be chosen from any unused ES prefix course or from the Approved Electives listed above. Courses not on the Approved Elective list may still be chosen, but are subject to department approval.

Graphic Communication

Graphic Arts Bldg. (26), Room 201
Phone: 805.756.1108; Fax: 805.756.7118
<http://www.grc.calpoly.edu/>

Department Chair: Colleen Twomey

Academic Programs

Program name	Program type
Graphic Communication	BS, Minor

The Graphic Communication Department offers a curriculum leading to the Bachelor of Science degree, yet the discipline is both an art and a science. It appeals to students having an interest in creativity, science, technology, and management.

The Graphic Communication Department occupies approximately 33,000 square feet of laboratories in the Graphic Arts Building and in the adjacent specialty print and packaging prototyping building. Theory and practice are taught in modern classrooms incorporating the latest in teaching techniques. Fourteen well-equipped laboratories provide students with diverse experiences in the practical aspects of graphic media development and functional printing.

The Graphic Communication Department receives support from an advisory board comprised of industry leaders representing major graphic communication companies.

Undergraduate Programs

BS Graphic Communication

The field of graphic communication represents a large profession, one of the largest in the world. The profession embraces change, requiring those pursuing graphic communication careers to learn new and diverse skills. Graphic communication includes digital and conventional printing, publishing, packaging, digital imaging, computer graphics, digital design, digital photography, printable electronics, functional imaging, web and app development, user interface and user experience design, human-computer interaction design, and related areas. The discipline includes media and mass communication involving the creation, production, management, and distribution of advertising, marketing, websites, apps, books, magazines, newspapers, catalogs, packages, printed electronics, and other media in printed and digital form. Graduates are in high demand by leading national and international corporations in the graphic communication field.

The Bachelor of Science program in Graphic Communication is accredited by the Accreditation Council for Collegiate Graphic Communications, Inc. (ACCGC), an independent body dedicated to the improvement and recognition of collegiate level curricula in graphic communication.

Beyond acquiring a foundation in graphic communication, students select a specialization among the department's concentrations of design reproduction technology, user experience/user interface, graphic communication management, graphics for packaging, and individualized study in graphic communication.

Concentrations

BS Majors select one of the following concentrations based upon their interests and career goals.

Design Reproduction Technology¹

Emphasis on design and technology for print and web publishing. Coursework includes typography, branding, color theory, and design for packaging and for the publication of books, magazines, and web sites. The Graphic Communication Department's Design Reproduction Technology concentration focuses on the technical and electronic aspects of transforming design for reproduction in print and digital media. The concentration focuses on printing, web development, publishing, packaging, digital imaging, computer graphics, and related areas of mass media preparation and production.

Graphic Communication Management

A flexible program for students interested in management and administrative careers in the graphic communication industry. Concentration graduates enter careers focused on project management, marketing management, product development, account management, scheduling, estimating or other support roles. In addition to the major requirements in graphic communication, coursework includes multiple business management related disciplines.

Graphics for Packaging

Designed for students who desire a career in the growing field of package graphics and printing. This program provides students with the opportunity to learn all components of graphic preparation for packaging, print reproduction and conversion, while also providing aspects of structural design and food safety. Consumer and industrial print packaging is addressed.

User Experience/User Interface

Emphasis on the latest trends in interface development and the production and distribution of digital media. In addition to major requirements, coursework includes the study of user experience, visual design, and web and mobile interface design. The concentration leads to careers in user experience/user interface design, digital media production, product management, and opportunities with hardware and software manufacturers that service the graphic communication industry.

Individualized Course of Study

An opportunity to pursue a course of study that meets a student's individual needs and interests.

Graphic Communication Minor

A minor in Graphic Communication benefits students interested in pursuing careers in graphic communication or who anticipate using graphic communication skills in another career. Students in the minor have a competitive edge when applying for many jobs by understanding concepts, and gaining knowledge and skills in print and digital media. Additionally, students develop an understanding of the effective design and reproduction technologies, practical file preparation, and design requirements for various output processes including print and digital media. In addition, students will gain an understanding of typography, digital photography, and user experience. Information and application forms for this minor are available in the Graphic Communication Department office.

Graduate Program

MBA, Graphic Communication Document Systems Management Specialization

In cooperation with the Orfalea College of Business, a student can earn an MBA with a graphic communication emphasis in document systems management. This program is designed to prepare professionals having diverse backgrounds with a strong and advanced business orientation along with a grounding in graphic communication. For more information, see the Orfalea College of Business (p. 177) section.

BS Graphic Communication

Program Learning Objectives

1. Integrate effective design and functionality into graphic communication products, optimizing user experience and adoption.
2. Produce professional graphic media, demonstrating competence using current tools and methods.
3. Articulate and defend graphic communication strategies using effective oral, written, visual and/or demonstration means.
4. Apply appropriate production and workflow methods for various media.
5. Evaluate business principles related to starting and/or developing a graphic communication business.
6. Analyze current and future trends, market drivers, and continuous learning opportunities in graphic communication.
7. Evaluate diversity in the graphic communication profession and identify attitudes and behaviors that affect workforce and product development.
8. Demonstrate the use of sustainability practices in various print and screen-based applications.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

GRC 101	Introduction to Graphic Communication	3
GRC 102	Orientation to Graphic Communication	2
GRC 201	Digital Publishing Systems	3
GRC 203	Digital File Preparation and Workflow	4
GRC 204	Introduction to Contemporary Print Management and Manufacturing	4
GRC 211	Materials for Graphic Communication Applications	4

GRC 301	Digital Photography and Motion Graphics	4
GRC 316	Flexographic Printing Technology	3
GRC 318	Digital Typography	4
GRC 320	Managing Quality in Graphic Communication	4
GRC 328	Digital and Offset Printing Methods	4
GRC 331	Color Management	4
GRC 337	Consumer Packaging	4
GRC 338	Web Development and Content Management	4
GRC 361	Marketing and Sales Management for Print and Digital Media	4
GRC 372	Applied Graphic Communication Practices	2
GRC 402	Digital Printing and Emerging Technologies in Graphic Communication	3
GRC 404	Data Management, Estimating and Visualization in Graphic Communication	4
GRC 411	Strategic Trends and Profitability Issues in Print and Digital Media	4
GRC 422	Human Resource Management Issues for Print and Digital Media	4

Senior Project		
Select from the following:		3
GRC 461	Senior Project - Independent Study	
GRC 462	Senior Project	
GRC 463	Senior Project - Applied Practices	

Concentration Courses 29

SUPPORT COURSES

CHEM 110	World of Chemistry (B1 & B3) ¹	4
MATH 118	Precalculus Algebra (B4) ^{1,2}	4
PHYS 104	Introductory Physics (GE Electives) ¹	4
	or PHYS 121 College Physics I	
STAT 217	Introduction to Statistical Concepts and Methods	4

GENERAL EDUCATION (GE)

(See GE program requirements below.) 60

FREE ELECTIVES

Free Electives 0

Total units 180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² MATH 116 and MATH 117 substitute.

Concentrations

- Design Reproduction Technology (p. 295)
- Graphic Communication Management (p. 295)
- Graphics for Packaging (p. 296)
- User Experience/User Interface (p. 296)

Individualized Course of Study

This concentration consists of 29 units; a minimum of 18 units must be upper-division and a minimum of 8 units must be Graphic Communication. The student selects the courses in consultation with the concentration coordinator and department head, and provide written justification for the courses and the way they constitute a cohesive, integrated program of study. The list of courses serves as a contract between the student and the Graphic Communication Department.

General Education (GE) Requirements

- 72 units required, 12 of which are specified in Major and/or Support.
- If any of the remaining 60 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities²	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	

F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		60

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Students in the User Experience/User Interface Concentration need to take a lower-division PHIL course in GE Area C.

Design Reproduction Technology Concentration

ART 102	Art and Design Foundation Studies I	4
GRC 322	Advanced Digital Typography	3
GRC 347	Packaging Graphics Technology and Design	3
GRC 429	Mobile User Experience	3
GRC 439	Book Design Technology	4
GRC 440	Magazine Design Technology	4
Select from the following:		8
ART 313	Design History	
GRC 220	Introduction to Applied Social Media in Graphic Communication	
GRC 339	Web Design and Production	
GRC 400	Special Problems for Advanced Undergraduates	
GRC 451	Management Topics in Graphic Communication	
GRC 452	Emerging Technologies in Graphic Communication	
GRC 453	Design Reproduction Topics in Graphic Communication	
Other courses as approved by faculty advisor		
Total units		29

Graphic Communication Management Concentration

BUS 207	Legal Responsibilities of Business	4
BUS 212	Financial Accounting for Nonbusiness Majors	4
BUS 418	Listening to the Customer	4
COMS 213	Organizational Communication	4
GRC 420	Graphic Communication in Integrated Marketing Communications	4
GRC 421	Production Management for Print and Digital Media	4
Select from the following:		5
BUS 303	Introduction to International Business	
BUS 310	Introduction to Entrepreneurship	

BUS 382	Leadership and Organizations	
ENGL 310	Corporate Communication	
GRC 220	Introduction to Applied Social Media in Graphic Communication	
GRC 357	Specialty Imaging and Graphics Technologies	
GRC 451	Management Topics in Graphic Communication	
GRC 452	Emerging Technologies in Graphic Communication	
Other courses as approved by academic advisor		
Total units		29

Graphics for Packaging Concentration

FSN 354	Packaging Function in Food Processing	3
GRC 357	Specialty Imaging and Graphics Technologies	3
GRC 421	Production Management for Print and Digital Media	4
ITP 330	Packaging Fundamentals	4
ITP 408	Fiber-Based Packaging	4
Approved Electives		
Select from the following:		11
GRC 329	Tangible Interactive Product Development	
GRC 347	Packaging Graphics Technology and Design	
GRC 437	Advanced Consumer Packaging	
GRC 452	Emerging Technologies in Graphic Communication	
ITP 341	Packaging Polymers and Processing	
ITP 411	Packaging Sustainability	
ITP 430	Healthcare Packaging	
ITP 475	Distribution Packaging Dynamics	
Other courses as approved by academic advisor		
Total units		29

User Experience/User Interface Concentration

CPE/CSC 123	Introduction to Computing ¹	4
GRC 339	Web Design and Production	4
GRC 429	Mobile User Experience	3
PHIL 323	Ethics, Science and Technology ²	4
Advisor Approved Electives		
Select from the following:		14
BUS 458	Solving Big World Challenges	
CSC courses (any, up to 8 units)		
ENGR 234	Introduction to Design Thinking	
GRC 220	Introduction to Applied Social Media in Graphic Communication	

GRC 322	Advanced Digital Typography	
GRC 329	Tangible Interactive Product Development	
GRC 340	Front-end Web Development	
GRC 347	Packaging Graphics Technology and Design	
GRC 400	Special Problems for Advanced Undergraduates	
GRC 433	User Experience Methods for Digital Innovation	
GRC 437	Advanced Consumer Packaging	
GRC 451	Management Topics in Graphic Communication	
GRC 452	Emerging Technologies in Graphic Communication	
GRC 453	Design Reproduction Topics in Graphic Communication	
Total units		29

- ¹ Only during Winter quarter may GRC students enroll in CPE/CSC 123.
² The prerequisite requires a lower-division PHIL course in GE Area C.

Graphic Communication Minor

Required Courses

GRC 101	Introduction to Graphic Communication	3
GRC 376	Web and Print Publishing	3-4
or GRC 201	Digital Publishing Systems	
GRC 211	Materials for Graphic Communication Applications	4
GRC 301	Digital Photography and Motion Graphics	4
GRC 318	Digital Typography	4
GRC 328	Digital and Offset Printing Methods	4
GRC 429	Mobile User Experience	3
or GRC 433	User Experience Methods for Digital Innovation	

Approved Electives

Select from the following:		2-4
GRC 372	Applied Graphic Communication Practices	
GRC 357	Specialty Imaging and Graphics Technologies	
GRC 420	Graphic Communication in Integrated Marketing Communications	

Total units **27-30**

History

Faculty Office Bldg. (47), Room 27C
Phone: 805.756.2543
<https://history.calpoly.edu>

Department Chair: Thomas Trice

Academic Programs

Program name	Program type
Asian Studies	Minor
History	BA, MA, Minor

Historians study the past in its variety and complexity. With such an analysis, students of history gain multiple perspectives on the present and an aptitude to plan intelligently for the future. Although the lessons to be learned from the past are rarely simple, solutions to present-day problems rest on comprehension of historical forces and events. History deepens our understanding of other peoples and cultures. All courses offered in the History Department seek to examine the issues of race, gender, class, and cultural diversity.

The study of history and its methods prepares students for a wide range of careers while also sensitizing them to the complexity and diversity of the past and present. History is an excellent foundation for a broadly based education in the liberal arts.

Undergraduate Programs

BA History

A degree in history is excellent preparation for students interested in a teaching career, the legal profession, or advanced work in the discipline. Students wishing to become business executives, administrators, and public servants profit immensely by gaining the methodological skills of the historian. Historians learn to gather, synthesize, analyze, and interpret evidence; they become skilled in presenting their conclusions to a general audience in a lucid and logical manner.

Asian Studies Minor

Provides interdisciplinary understanding of Asia – particularly its rich and varied histories, arts, languages, philosophies, religions and social patterns. Details and application forms are available from the History Department.

History Minor

Students choosing to add a strong historical dimension to their major field may enroll in the minor program in history. The curriculum stresses reading and writing skills as well as the ability to weigh evidence and think critically. Details and application forms are available from the History Department.

Master of Arts Degree in History

General Characteristics

The program in history emphasizes concentrated study in area specialties, with students gaining a thorough grounding in the latest historiography. In addition, the program maintains that historical study

must be predicated upon sustained research, engagement with historical problems, and written communication. The Cal Poly History MA Program:

- is tailored to students who want to pursue further graduate studies and careers in public history, education, museums and local or state government.
- takes students deep into particular cultures and eras and hones their command of historical research and analysis.
- develops students' critical thinking, written and oral communication, and their understanding of the rich diversity of human experience.
- allows students to work closely with faculty mentors in seminars and in a range of independent projects.

Program of Study

- Rigorous seminar work over a diverse range of historical topics and fields.
- Two tracks of study with unique culminating experiences.
- The Comprehensive Examinations option concludes with in-depth supervised study of two different general historical fields (48 units total).
- The MA Thesis option concludes with the writing of an original historical thesis over three academic quarters, supervised by three committee members (49 units total).

Foreign Language Study

Students are encouraged to learn and use foreign languages in the MA program. Students who plan further graduate study in history are particularly encouraged in this direction since proficiency in two foreign languages is usually required in doctoral programs.

Applications

Applications for admission are submitted through the Cal State Apply (<https://www2.calstate.edu/apply/>) website. Requests for further information should be directed to the Admissions Office or the Graduate Coordinator of the MA History program. All applications should include a writing sample (preferably an extended historical research paper), two recommendation letters, and undergraduate transcripts.

BA History

Program Learning Objectives

Upon completion of the BA in History, students should be able to:

1. Demonstrate a breadth and depth of historical knowledge of diverse regions of the world, and apply that knowledge toward a more critical and contextual understanding of the world today.
2. Recognize and understand the historical experiences and contributions of members of diverse groups of people throughout history, including those who have been historically marginalized and/or underrepresented in historical sources and historiography.
3. Identify and evaluate multiple perspectives and interpretations of the past, and grasp different approaches (e.g. political, social, cultural, intellectual, legal, economic) to historical research, both qualitative and quantitative.
4. Engage in and make constructive use of relevant theoretical concepts and historiographic debates.

- Locate, critically analyze, and interpret diverse types of primary sources used by historians, and synthesize information in primary and secondary sources in historical analysis.
- Effectively communicate historical knowledge and formulate convincing arguments, verbally and in analytical writing.
- Design, research, and produce original and sustained projects.
- Achieve Cal Poly's Diversity Learning Objectives (https://academicprograms.calpoly.edu/content/academicpolicies/diversity_lo/).
- Pursue diverse careers that require advanced skills in critical thinking, oral and written communication, synthesis-based research, intellectual innovation, and information literacy.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

HIST 100	Introduction to the Study of History	2
HIST 110	Western Civilization: Ancient to Renaissance	4
HIST 111	Western Civilization: Reformation to the Present	4
HIST 201	United States History to 1865 (D1) (USCP) ¹	4
HIST 202	United States History Since 1865	4
HIST 213	Modern Political Economy (D2) ¹	4
HIST 210	World History to 1800 (GE Electives) ¹	4
or HIST 221	World History, Beginnings to 1000 CE	
or HIST 222	World History, 1000-1800	
or HIST 223	World History, 1800 - Present	
HIST 303	Research and Writing Seminar in History	5
HIST 304	Historiography	4
HIST 460	Senior Project I	2
HIST 461	Senior Project II	2
History Electives		
Select upper-division HIST courses ²		24
Select a minimum of 12 units at the 400 level		
Select a minimum of 12 units from the following Non-U.S., Non-European courses		
HIST 308	The Trans-Atlantic Slave Trade	
HIST 309	Cultures of West Africa and the African Diaspora	
HIST 310	East Asian Culture and Civilization	
HIST 311	Comparative World Environmental History & Sustainability Since 1492	
HIST 313	Modern Middle East	

HIST 316	Modern East Asia	
HIST 317	The Lure of the Sea	
HIST 318	The City in the Modern World	
HIST 319	Modern South and Southeast Asia	
HIST 337	Colonial Latin America	
HIST 338	Modern Latin America	
HIST 341	Modern Central America	
HIST 409	Vietnam War at Home and Abroad	
HIST 416	Modern Japan	
HIST 417	20th Century China	
HIST 418	Chinese Film and History	
HIST 419	Modern Southeast Asia	
HIST 421	The History of Prostitution	
HIST 422	Japanese Postwar Film and History	
HIST 423	The History of Vietnam	
HIST 426	Imperial Russia	
HIST 427	Soviet Russia	
HIST 428	The Indian Ocean	
HIST 429	Precolonial African History	
HIST 430	Modern African History	
HIST 442	Topics and Issues in Latin American History	
HIST 443	Topics and Issues in Asian History	
HIST 444	Topics and Issues in African History	
HIST 445	Topics and Issues in Comparative History	
HIST 459	Imperialism and Postcolonial Studies	
HIST 475	Arabia and the Arab Gulf States	
Foreign Language Requirement		
Select from the following:		4
CHIN 201	Intermediate Mandarin Chinese I	
FR 201	Intermediate French I	
GER 201	Intermediate German I	
ITAL 201	Intermediate Italian I	
JPNS 201	Intermediate Japanese I	
SPAN 201	Intermediate Spanish I	
or equivalent course		
SUPPORT COURSES		
Society and the Individual Breadth:		
Upper-Division D (General Education) course not in HIST ¹		4
Any upper-division courses (300-400, including HIST)		24
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		56
FREE ELECTIVES		
Free Electives ³		29
Total units		180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Excluding HIST 400, HIST 467, HIST 485, HIST 495.

³ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning	4
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement) (4 units in Major) ¹	0
D2	Lower-Division D (4 units in Major) ¹	0
Upper-Division D (4 units in Support) ¹		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		56

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Asian Studies Minor

Required Courses

CHIN 103 or JPNS 103	Elementary Mandarin Chinese III Elementary Japanese III	4
HIST 310 or HIST 316 or HIST 319	East Asian Culture and Civilization Modern East Asia Modern South and Southeast Asia	4
PHIL 361 or PHIL 362 or RELS 301	Indian Philosophy Chinese and East Asian Philosophy Religions of Asia	4

Approved Electives

(At least 8 units must be upper-division) 16

Lower-Division:

ANT 201	Cultural Anthropology
CHIN 201	Intermediate Mandarin Chinese I
GEOG 150	Human Geography
HIST 221	World History, Beginnings to 1000 CE
HIST 222	World History, 1000-1800
HIST 223	World History, 1800 - Present
JPNS 201	Intermediate Japanese I
LA 211	History of Landscape Architecture: Ancient Civilizations through Colonial America
MU 121	Introduction to Non-Western Musics
POLS 225	Introduction to International Relations

Upper-Division:

ARCH 320	Topics in Architectural History
ART 317	Asian Art Survey
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements
BUS 304	International Supply Chains (Topic: China)
ENGL 348	Asian American Literature
ES 322	Asian Americans in Popular Culture
ES 330	The Chinese American Experience
ES 335	The Filipina/o American Experience
HIST 409	Vietnam War at Home and Abroad
HIST 416	Modern Japan
HIST 417	20th Century China
HIST 418	Chinese Film and History
HIST 419	Modern Southeast Asia
HIST 421	The History of Prostitution
HIST 422	Japanese Postwar Film and History
HIST 423	The History of Vietnam
HIST 443	Topics and Issues in Asian History
MU 324	Music and Society (Topic: World Musics)
POLS 328	Politics of Developing Areas (Topic: East Asia)
POLS 337	U.S. and China in the Contemporary World

POLS 428	Issues and Topics in Comparative Politics (Topic: Chinese Politics)
RELS 306	Hinduism
RELS 307	Buddhism
WLC 310	Humanities in World Cultures (Topics: China, Japan, Thailand)

Total units 28

History Minor

Required Courses

HIST 303	Research and Writing Seminar in History	5
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Select from the following lower-division courses: 12

HIST 110	Western Civilization: Ancient to Renaissance
HIST 111	Western Civilization: Reformation to the Present
HIST 201	United States History to 1865
HIST 202	United States History Since 1865
HIST 206	United States Cultures
HIST 210	World History to 1800
HIST 213	Modern Political Economy
HIST 221	World History, Beginnings to 1000 CE
HIST 222	World History, 1000-1800
HIST 223	World History, 1800 - Present

History Electives

Select from 300-400 level HIST courses 12

Total units 29

MA History

Program Learning Objectives

1. Diversity: Construct a self-critical academic perspective on human diversity and social, cultural, political, economic and philosophical traditions.
2. Critical Thinking: Demonstrate skills of historical critical thinking and intellectual discipline: conceptualizing, applying, analyzing, synthesizing, and evaluating materials originating from historical observation, experience, reflection, and reasoning.
3. Knowledge: Demonstrate a breadth and depth of historical knowledge and an understanding of change over time.
4. Historiography: Demonstrate the ability to engage in, interpret, assess, critique, evaluate, and make constructive use of major historiographic debates in various historical fields.
5. Research: Demonstrate the research skills appropriate to a master's-level historian, analyzing and interpreting primary and secondary historical materials from different fields.
6. Communication: Demonstrate the ability to effectively communicate historical knowledge, interpretations, and arguments, in writing and in oral presentations.
7. Engagement: Participate in vibrant intellectual communities, seeking out and respecting others' ideas while working to construct one's own positions and approaches as a historian.

8. Perspective: Construct a broad perspective on the past that enables one to better understand and evaluate the complexities of history and its relevance to one's own time.

There are two options for the MA degree in History, Comprehensive Exam or Thesis.

Required Courses

HIST 504	Graduate Study in History	4
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History Seminars

Select from the following: 20

Each course is repeatable up to 12 units.

HIST 505	Graduate Seminar in United States History
HIST 506	Graduate Seminar in European History
HIST 507	Graduate Seminar in East Asian History
HIST 508	Graduate Seminar in Latin American History
HIST 509	Graduate Seminar in African History
HIST 510	Graduate Seminar in Comparative History
HIST 511	Graduate Seminar in Middle Eastern History

History Electives

HIST Electives (400-500 level) ¹ 16

Culminating Experience

Select from the following: 8-9

Comprehensive Exam Option (total 48 units)

HIST 512	Supervised Reading for Comprehensive Exams (2) (2)
HIST Electives (500 level) (4)	

Thesis Option (total 49 units)

HIST 599	Thesis (3) (3) (3)
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Total units 48-49

¹ All courses must be taken after undergraduate degree has been awarded. Undergraduate courses or their equivalent may not be repeated.

Interdisciplinary Studies in the Liberal Arts

Faculty Office Building (Bldg. 47), Room 36L
Phone: 805.756.2740
<https://isla.calpoly.edu>
<https://sts.calpoly.edu>

Department Chair: David Kirby

Academic Programs

Program name	Program type
Ethics, Public Policy, Science and Technology	Minor
Gender, Race, Culture, Science and Technology	Minor
Interdisciplinary Studies	BA
Media Arts, Society and Technology	Minor
Science Communication	Minor

The Department offers interdisciplinary and international classes in a wide variety of subject areas, from applied practice in media arts and technologies; to the study of social, cultural, political, and ethical issues involved in science and technology; to courses that examine world cultures. Many ISLA classes satisfy University general education and breadth requirements.

In addition to the BA in Interdisciplinary Studies, ISLA also offers four interdisciplinary Science, Technology and Society (STS) minors: Ethics, Public Policy, Science and Technology; Gender, Race, Culture, Science and Technology; Media Arts, Society and Technology and Science Communication. These STS minors are available to students throughout the University, regardless of their technical backgrounds.

Undergraduate Programs BA Interdisciplinary Studies

The BA Interdisciplinary Studies degree provides a flexible, coherent and rigorous baccalaureate education designed around a central theme or guiding question and culminating in an interdisciplinary senior project that draws upon the perspectives or methodologies of at least two disciplines.

The degree reflects the university's commitment to empower students with a holistic, interdisciplinary experience that prepares them for success in the global economy. The core IS courses facilitate students' integration of the multidisciplinary perspectives and knowledges they gain through their other coursework. The culminating senior project draws upon the insights and methodologies gained through students' chosen course of study. This process of honing a guiding question or theme, identifying the methodologies and knowledges necessary to pursue it, and completing an original research or creative project in response to it, develops the habits of mind of a lifelong learner.

The program also reflects the university's commitment to learn by doing, most notably through the senior project, in which students will produce a piece of original interdisciplinary scholarship or a hands-on project that integrates the methods and perspectives of more than one discipline. Students' experiential learning will be further enhanced through the varied opportunities to participate in learn by doing that occurs in classes throughout the college's curriculum, including through internships and project-based coursework.

Ethics, Public Policy, Science and Technology Minor

The Ethics, Public Policy, Science and Technology (EPPST) minor enables students to understand the complexities of contemporary science and technology policies as they relate to the broader public, ethical theories and applications, and personal and societal values; appreciate the historical influences on existing policies and practices; evaluate current policies; and assess the potential outcomes of proposed policy changes. A broad range of elective courses provides students with the opportunity to customize the EPPST minor to their particular interests, allowing them to pursue further knowledge in a focused subject area—such as biotechnology, sustainability and the environment, genetic engineering, health, development, agriculture, and the technologies of war. Students completing the EPPST minor will gain important skills for creating, proposing, promoting, and evaluating policies that respond to the profound challenges and choices we face related to science and technology in the 21st century at local, national, and international levels. The EPPST minor is not open to students who have declared a minor in one of the other STS minors: Gender, Race, Culture, Science and Technology (GRCST); Media Arts, Society and Technology (MAST); and Science Communication (SC).

Gender, Race, Culture, Science and Technology Minor

The Gender, Race, Culture, Science and Technology (GRCST) minor provides students with the opportunity to explore and analyze the historical and contemporary relationships between gender, race, culture, science, technology, and medicine in local, national, and transnational contexts. Utilizing feminist and critical race approaches from the fields of gender and ethnic studies, the GRCST minor examines the role of cultural, ethical, social, political, and economic factors in determining the norms, values and meanings of scientific, technological, and medical practices, with an emphasis on the ways in which the production and applications of science, technology, and medicine shape and are shaped by knowledge and beliefs about gender, race, class, and sexuality. Students completing the GRCST minor will gain important intellectual and practical skills for creating, enacting, and evaluating efforts to create more socially just, equitable, and inclusive science, technology, and medicine in an increasingly diverse and globalized world. The GRCST minor is not open to students who have declared a minor in one of the other STS minors: Ethics, Public Policy, Science and Technology (EPPST); Media Arts, Society and Technology (MAST); and Science Communication (SC).

Media Arts, Society and Technology Minor

The Media Arts, Society and Technology (MAST) minor encourages students to explore the ways in which the media arts are enabled and shaped by progress in science and technology while also being uniquely situated to promote engagement with and critical reflection about the meanings of scientific, technical, and social progress. Throughout the MAST minor, students are provided with the opportunity to develop and refine their expertise in the creative, visual, communicative, and performing arts, such as film, video, still photography, sound design, stage and lighting design, computer graphics, and interactive entertainment. Through hands-on projects and explorations of media history and theory, students completing the MAST minor will develop and apply knowledge and skills in conceptual and critical thinking,

media literacy, teamwork, leadership, interdisciplinary collaboration, and project management, and will be prepared to function as both cultural commentators and creators positioned to address and respond to the profound challenges and choices we face in the 21st century. The MAST minor is not open to students who have declared a minor in one of the other STS minors: Ethics, Public Policy, Science and Technology (EPPST); Gender, Race, Culture, Science and Technology (GRCST); and Science Communication (SC).

Science Communication Minor

The Science Communication (SC) minor enables students to investigate how individuals and societies create, disseminate, maintain, and challenge perceptions of science, technology, and risk in multiple contexts. The minor focuses on key debates and controversies involving science and technology, public understandings and misunderstandings of scientific and technical expertise, industry-public relations, cultures of regulation and compliance, hazards, uncertainties, crisis management, and the politics of evidence. Through hands-on projects, SC students will develop and practice specific skills for communicating about science and technology to various audiences across multiple media formats. A broad range of elective courses allows students to customize the SC minor to their particular interests, enabling them to pursue knowledge in a focused subject area or further refine communication production skills. Students completing the SC minor will be prepared to understand, engage with, respond to, and communicate about the profound challenges and choices we face related to science and technology in the 21st century. The SC minor is not open to students who have declared a minor in one of the other STS minors: Ethics, Public Policy, Science and Technology (EPPST); Gender, Race, Culture, Science and Technology (GRCST); and Media Arts, Society and Technology (MAST).

BA Interdisciplinary Studies

Program Learning Objectives

1. Identify and think critically about the assumptions, strategies, and potential biases underlying discipline-based and interdisciplinary inquiries.
2. Conduct interdisciplinary research and/or engage in creative activities that incorporate and synthesize information, theory, and methodological approaches from more than one discipline in a culturally-competent way.
3. Apply interdisciplinary approaches to understand, contextualize, and propose solutions to complex issues or problems, especially those relating to students' emphasis areas.
4. Communicate effectively both in writing and orally.
5. Collaborate productively in pluralistic settings and with people of diverse experiences, identities, and worldviews.
6. Make reasoned, ethical, and socially responsible decisions.
7. Engage in self-motivated and self-directed learning, in order to become life-long learners.
8. Employ the intellectual and practical skills necessary to create and engage with a more inclusive, just and equitable world.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

Introductory-level Interdisciplinary Course

Select from the following: ¹		4
ES 112	Race, Culture, and Politics in the United States	
HIST 206	United States Cultures	
HIST 216	Comparative Social Movements	
ISLA 123	Introduction to Science, Technology & Society	
JOUR 219	Multicultural Society and the Mass Media	
JOUR 228	Media, Self and Society	
RELS 201	Religion, Dialogue, and Society	
WGQS 201	Gender and Sexuality in US Society and Politics	
WGQS 210	Gender and Sexuality in Visual and Popular Culture	
ISLA 201	Introduction to Interdisciplinary Studies	4
ISLA 255	Introduction to Interdisciplinary Theory and Methods	4

Basic Statistics Course

Select from the following: ^{1,2}		4
STAT 130	Introduction to Statistical Reasoning (B4)	
STAT 217	Introduction to Statistical Concepts and Methods (B4)	
STAT 218	Applied Statistics for the Life Sciences (B4)	

Communication Course

Select from the following: ^{1,3}		4
COMS 213	Organizational Communication	
COMS 322	Persuasion	
COMS 385	Media Criticism	
ENGL 311	Advanced Rhetorical Inquiry and Composing	
ENGL 312	Translingual Rhetorical Inquiry and Writing	
ENGL 317	Technical Editing	
ENGL 467	Topics in Rhetoric and Writing ⁴	
PSY 304	Intergroup Dialogues	

Upper-Division ISLA Electives

Select from the following: ^{1,3}		8
COMS/ISLA 395	Science Communication	
ISLA 303	Values and Technology	
ISLA 305	Topics in Public Engagements with STEM ⁴	

ISLA 320	Topics and Issues in Values, Media and Culture ⁴	
ISLA/WGQS 335	Feminist Studies of Popular Culture and Whiteness	
ISLA 340	Media Arts and Technologies: Storytelling	
ISLA 341	Media Arts and Technologies: Cinematic Process	
ISLA 350	The Global Environment	
ISLA 465	Internship	
ISLA 355	Interdisciplinary Research Methods	4
ISLA 440	Advanced Interdisciplinary Studies Seminar ^{4,5}	4
ISLA 461	Senior Project	4
Concentration		
See list of Interdisciplinary Studies concentrations below.		32
GENERAL EDUCATION (GE) (See GE program requirements below.)		68
FREE ELECTIVES		
Free Electives ⁶		40
8 units of free electives may need to be at the 300-400 level to ensure completion of the required minimum of 60 units of upper-division courses.		
Total units		180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Any GE Upper-Division STAT course may be substituted to fulfill this Major requirement. Non-GE courses teaching statistical or quantitative analysis methods may be substituted to satisfy this requirement but only with the consent of the ISLA Department Chair. A major support substitution should be initiated with the ISLA Department Chair for any upper-division STAT course. In those cases, students will then have to take an additional course to satisfy the GE requirement.
- ³ If course is taken to meet the Communication Course or Upper-Division Electives requirement, it cannot be double-counted in the Concentration. Please consult with academic advisor.
- ⁴ Topics courses may be used to satisfy a Major requirement and are repeatable in the Concentrations with a different topic. Total credit limited to 8 units.
- ⁵ ISLA 440 total credit limited to 8 units.
- ⁶ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentrations

Students may select one of the following concentrations:

- Ethics, Law and Social Justice (p. 304)
- Global Citizenship and Social Sustainability (p. 304)
- Health and Society (p. 305)
- Science, Technology and Society (p. 306)
- Visual Media and Cultural Studies (p. 307)

General Education (GE) Requirements

- 72 units required, 4 of which are specified in Major and/or Support.
- If any of the remaining 68 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives		8
Total units		68

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Ethics, Law and Social Justice Concentration

Ethics

Select from the following: 8

PHIL 328	Technologies and Ethics of Warfare
PHIL 331	Ethics
PHIL 332	History of Ethics
PHIL 343	Power, Alienation, and Political Life
PHIL 439	Selected Problems in Ethics and Political Philosophy
WGQS 336	Feminist Ethics, Gender, Sexuality and Society

Law

Select from the following: 8

ES 406	Indigenous Peoples and International Law and Policy
JOUR 302	Mass Media Law
JOUR 418	Copyright, Trademark, Patent and Commercial Speech in Digital Media
PHIL 334	Philosophy of Law
POLS 334	Jurisprudence
POLS 341	American Constitutional Law
POLS 342	Constitutional Theory
POLS 426	International Organizations and Law
POLS 445	Voting Rights and Representation
PSY 375	Forensic Psychology
SOC 402	Gender, Crime, and Violence
WGQS 417	Feminist Legal Theory

Social Justice

Select from the following: 8

ES 325	African American Gender & Sexuality
ES 380	Critical Race Theory
ES 381	The Social Construction of Whiteness
POLS 343	Civil Rights in America
POLS 344	Civil Liberties
POLS 419	Social Movements and Political Protest
POLS 459	The Politics of Poverty
SOC 406	Juvenile Justice and Delinquency
SOC 412	Contemporary Issues in Criminal Justice
WGQS 301	Contemporary Issues in Women's and Gender Studies (Topic Requires Department Approval)
WGQS 302	Contemporary Issues in Queer Studies (Topic Requires Department Approval)
WGQS 370	Religion, Gender, and Society
WGQS 457	U.S. Reproductive Politics

Ethics, Law & Social Justice Electives

Select from the following: 8

Any courses that were not taken to satisfy the core requirements above can count as electives.

ISLA 440	Advanced Interdisciplinary Studies Seminar
RELS 374	Religion and Violence
RELS 378	Religion and Contemporary Values

Total units 32

- ¹ To ensure an interdisciplinary course of study, courses chosen should be from at least two different disciplines (as indicated by distinct course prefixes) and no more than half of them can have the same course prefix.
- ² If a course is taken to fulfill a Major requirement, it cannot be double-counted in the Concentration. There are some exceptions for topic courses. Please consult with academic advisor.
- ³ The student is responsible for checking prerequisites for all courses.
- ⁴ ISLA 440 is required in the Major core and repeatable in the Concentration with a different topic as long as the topic has been approved. Total credit limited to 8 units.
- ⁵ Topic courses require department approval. Please contact department for a list of approved topics.

Global Citizenship and Social Sustainability Concentration

Sustainability and Global Environment

Select from the following: 4

BRAE 348	Energy for a Sustainable Society
GEOG 333	Human Impact on the Earth
GEOG 408	Geography of International Development
ISLA 330	Cal Poly Land: Nature, Technology, and Society
ISLA 350	The Global Environment
NR 323	Human Dimensions in Natural Resources Management
NR 324	Social Dimensions of Sustainable Food and Fiber Systems
PHIL 340	Environmental Ethics
PSC 320	Energy, Society and the Environment

Global and Cross-Cultural Communication

Select from the following: 4

COMS 316	Intercultural Communication
COMS 320	Intergroup Communication
COMS 390	Environmental Communication
JOUR 401	Global Communication
Any 300 or 400-level Language course	

Global Political Economy

Select from the following: 4

POLS 308	Political Violence and Conflict Resolution
POLS 310	The Politics of Race, Class, Gender and Sexuality
POLS 321	Comparative Political Culture
POLS 325	Global Political Issues

POLS 328	Politics of Developing Areas
POLS 332	World Food Systems
POLS 339	Authoritarian and Democratic Rule
POLS 452	Technology and International Development
POLS 459	The Politics of Poverty

Ethnicity and Culture

Select from the following: 4

ES 360	Ethnicity and the Land
HIST 309	Cultures of West Africa and the African Diaspora
HIST 313	Modern Middle East
HIST 316	Modern East Asia
HIST 319	Modern South and Southeast Asia
HIST 335	Modern Europe, 1914-Present
HIST 338	Modern Latin America
HIST 341	Modern Central America
SOC 309	The World System and Its Problems
SOC 315	Global Race and Ethnic Relations

Global Citizenship & Social Sustainability Electives

Select from the following: 16

Any courses that were not taken to satisfy the core requirements above can count as electives.	
CRP 334	Cities in a Global World
ES 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development
GEOG 308	Global Geography
HIST 310	East Asian Culture and Civilization
ISLA 440	Advanced Interdisciplinary Studies Seminar
PHIL 361	Indian Philosophy
PHIL 362	Chinese and East Asian Philosophy
PSY 311	Environmental Psychology
PSY 352	Conflict Resolution: Violent and Nonviolent
RELS 301	Religions of Asia
RELS 302	Abrahamic Religions: Judaism, Christianity, and Islam
RELS 380	Religion and Politics in the Israeli-Palestinian Conflict
SOC 301	Social Work and Social Welfare Institutions
SOC 305	Social Movements
SOC 323	Social Stratification
SOC 327	Social Change
WGQS 320	Women, Gender and Sexuality in Global Perspective
WLC 310	Humanities in World Cultures

Total units 32

¹ To ensure an interdisciplinary course of study, courses chosen should be from at least two different disciplines (as indicated by distinct course prefixes) and no more than half of them can have the same course prefix.

- ² If a course is taken to fulfill a Major requirement, it cannot be double-counted in the Concentration. There are some exceptions for topic courses. Please consult with academic advisor.
- ³ The student is responsible for checking prerequisites for all courses.
- ⁴ ISLA 440 is required in the Major core and repeatable in the Concentration with a different topic as long as the topic has been approved. Total credit limited to 8 units.

Health and Society Concentration

Environmental Health

Select from the following: 4

ES 360	Ethnicity and the Land
ISLA 330	Cal Poly Land: Nature, Technology, and Society
ISLA 350	The Global Environment
PHIL 340	Environmental Ethics
PSY 311	Environmental Psychology
SOC 308	Sociology of the Environment
WGQS 301	Contemporary Issues in Women's and Gender Studies (Topic Requires Department Approval)

Gender, Race, Culture, and Health

Select from the following: 4

ANT 460	Queer Anthropology
ISLA 320	Topics and Issues in Values, Media and Culture (Topic Requires Department Approval)
PSY 324	Psychology of Gender
PSY 372	Multicultural Psychology
PSY 475	The Social Psychology of Prejudice
WGQS 302	Contemporary Issues in Queer Studies (Topic Requires Department Approval)
WGQS 311	Sociology of Genders and Sexualities
WGQS 340	Sexuality Studies
WGQS 350	Gender, Race, Culture, Science & Technology
WGQS 450	Feminist Theory

Health Systems

Select from the following: 4

BIO 308	Genetic Engineering Technology
HLTH 305	Drugs in Society
POLS 332	World Food Systems
WGQS 457	U.S. Reproductive Politics

Medical Anthropology

Select from the following: 4

ANT 344	Sex, Death, and Human Nature
ANT 401	Culture and Health
ANT 402	Nutritional Anthropology
SOC 326	Sociology of the Life Cycle
SOC 470	Selected Advanced Topics (Topic Requires Department Approval)

Health & Society Electives

Select from the following: 16

Any courses that were not taken to satisfy the core requirements above can count as electives.

ANT 345	Human Behavioral Ecology
BIO 302	Human Genetics
BIO 305	Biology of Cancer
COMS 418	Health Communication
COMS 422	Rhetorics of Science, Technology, and Medicine
HLTH 320	Media and Technology in Health Promotion
ISLA 305	Topics in Public Engagements with STEM
ISLA 440	Advanced Interdisciplinary Studies Seminar ⁴
PHIL 339	Biomedical Ethics
PSY 306	Adolescence
PSY 310	Psychology of Death
PSY 318	Psychology of Aging
PSY 320	Health Psychology
PSY 344	Behavioral Genetics
PSY 465	Cross-Cultural International Psychology
PSY 480	Cognitive Neuroscience
RELS 372	Spiritual Extremism: Asceticism, Mysticism, and Madness
SOC 326	Sociology of the Life Cycle

Total units **32**

¹ To ensure an interdisciplinary course of study, courses chosen should be from at least two different disciplines (as indicated by distinct course prefixes) and no more than half of them can have the same course prefix.

² If a course is taken to fulfill a Major requirement, it cannot be double-counted in the Concentration. There are some exceptions for topics courses. Please consult with academic advisor.

³ The student is responsible for checking prerequisites for all courses.

⁴ ISLA 440 is required in the Major core and repeatable in the Concentration with a different topic as long as the topic has been approved. Total credit limited to 8 units.

⁵ Topic courses require department approval. Please contact department for a list of approved topics.

Science, Technology and Society Concentration

Science Communication

Select from the following: 4

AGC 475	Crisis Communication in Food and Agriculture
COMS 317	Technology and Human Communication
COMS 390	Environmental Communication
COMS 395	Science Communication
COMS 418	Health Communication

COMS 422	Rhetorics of Science, Technology, and Medicine
ISLA 305	Topics in Public Engagements with STEM

Philosophy of Science and Technology

Select from the following: 4

PHIL 321	Philosophy of Science
PHIL 322	Philosophy of Technology
PHIL 323	Ethics, Science and Technology
PHIL 327	Robot Ethics
PHIL 328	Technologies and Ethics of Warfare
PHIL 340	Environmental Ethics

Gender, Race, Culture, Science & Technology

Select from the following: 4

ANT 425	Meaning, Gender, and Identity in Anthropological Theory
ISLA 320	Topics and Issues in Values, Media and Culture (Topic Requires Department Approval)
LAES 411	Technology and Community Engagement
SOC 308	Sociology of the Environment
WGQS 301	Contemporary Issues in Women's and Gender Studies (Topic Requires Department Approval)
WGQS 302	Contemporary Issues in Queer Studies (Topic Requires Department Approval)
WGQS 350	Gender, Race, Culture, Science & Technology
WGQS 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development

Science, Technology, and Society Electives

Select from the following: 20

Any courses that were not taken to satisfy the core requirements above can count as electives.	
BRAE 348	Energy for a Sustainable Society
GEOG 325	Climate and Humanity
HIST 350	The Scientific Revolution, c. 1500-1800
HIST 355	History of Network and Information Technologies
HIST 407	Science and Society in Cold War America
HIST 432	United States Environmental History
ISLA 303	Values and Technology
ISLA 330	Cal Poly Land: Nature, Technology, and Society
ISLA 350	The Global Environment
ISLA 440	Advanced Interdisciplinary Studies Seminar ⁴
ISLA 456	Advanced Project-Based Learning in Science, Technology & Society
POLS 451	Technology and Public Policy

PSC 307	Nuclear Energy and Weapons in the Modern World
PSC 320	Energy, Society and the Environment
WLC 370	Language, Technology and Society
Total units	32

- ¹ To ensure an interdisciplinary course of study, courses chosen should be from at least two different disciplines (as indicated by distinct course prefixes) and no more than half of them can have the same course prefix.
- ² If a course is taken to fulfill a Major requirement, it cannot be double-counted in the Concentration. There are some exceptions for topics courses. Please consult with academic advisor.
- ³ The student is responsible for checking prerequisites for all courses.
- ⁴ ISLA 440 is required in the Major core and repeatable in the Concentration with a different topic as long as the topic has been approved. Total credit limited to 8 units.
- ⁵ Topic courses require department approval. Please contact department for a list of approved topics.

Visual Media and Cultural Studies Concentration

Art, Dance, Music, and Theatre

Select from the following:		4
ART 314	History of Photography	
ART 315	Art History - Art Since 1945	
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements	
ART 375	Intersectional Feminist Art Histories	
DANC 321	Cultural Influence on Dance in America	
ENGL 411	New Media Arts I	
ENGL 412	New Media Arts II	
MU 324	Music and Society	
MU 325	America's Music	
MU 328	Women in Music	
TH 305	Topics in Diversity on the American Stage	
TH 390	Global Theatre and Performance	

Literature

Select from the following:		4
ENGL 345	Women Writers of the Twentieth and Twenty-First Centuries	
ENGL 346	Ethnic American Literature	
ENGL 347	African American Literature	
ENGL 348	Asian American Literature	
ENGL 349	Gender in Twentieth and Twenty-First Century Literature	
ENGL 381	Diversity in Twentieth and Twenty-First Century American Literature	
ENGL 382	LGBT Literature and Media	
FR 350	French Literature in English Translation	

GER 350	German Literature in English Translation
SPAN 350	Hispanic Literature in English Translation
SPAN 351	Chicano/Latino Writers in the United States
SPAN 410	Advanced Literature in Spanish

Popular Culture

Select from the following:		4
COMS 319	Critical Cultural Studies and Communication	
COMS 384	Media Effects	
COMS 385	Media Criticism	
ENGL 370	World Cinema	
ENGL 371	Film Styles and Genres	
ENGL 372	Film Directors	
ENGL 373	Topics on Gender Representations in Film	
ES 310	Hip-Hop, Poetics and Politics	
ES 311	Beyoncé: Race, Feminism and Politics	
ES 320	African Americans in Popular Culture	
ES 321	Native Americans in Popular Culture	
ES 322	Asian Americans in Popular Culture	
ES 323	Latina/os in Popular Culture	
ES 340	Cultural Production and Ethnicity	
ISLA 320	Topics and Issues in Values, Media and Culture (Topic Requires Department Approval)	
KINE 324	Sports, Media and American Popular Culture	
SPAN 307	Spanish and Latin American Film	
WGQS 301	Contemporary Issues in Women's and Gender Studies (Topic Requires Department Approval)	
WGQS 302	Contemporary Issues in Queer Studies (Topic Requires Department Approval)	
WGQS 401	Seminar in Women's and Gender Studies (Topic Requires Department Approval)	

Technology and Human Expression

Select from the following:		4
COMS 317	Technology and Human Communication	
HIST 355	History of Network and Information Technologies	
ISLA 303	Values and Technology	
ISLA 340	Media Arts and Technologies: Storytelling	
ISLA 341	Media Arts and Technologies: Cinematic Process	
MU 311	Introduction to Recording, Synthesis, and Production	

MU 312	Advanced Recording, Synthesis, and Production	
WLC 370	Language, Technology and Society	
Visual, Media, and Cultural Studies Electives		
Select from the following:		16
Any courses that were not taken to satisfy the core requirements above can count as electives.		
ISLA 440	Advanced Interdisciplinary Studies Seminar	
Total units		32

- ¹ To ensure an interdisciplinary course of study, courses chosen should be from at least two different disciplines (as indicated by distinct course prefixes) and no more than half of them can have the same course prefix.
- ² If a course is taken to fulfill a Major requirement, it cannot be double-counted in the Concentration. There are some exceptions for topic courses. Please consult with academic advisor.
- ³ The student is responsible for checking prerequisites for all courses.
- ⁴ ISLA 440 is required in the Major core and repeatable in the Concentration with a different topic as long as the topic has been approved. Total credit limited to 8 units.
- ⁵ Topic courses require department approval. Please contact department for a list of approved topics.

Ethics, Public Policy, Science and Technology Minor

Required Courses

ES/WGQS 350	Gender, Race, Culture, Science & Technology	4
ISLA 123	Introduction to Science, Technology & Society	4
ISLA 456	Advanced Project-Based Learning in Science, Technology & Society	4

Ethics, Science and Technology Core

Select from the following:		4
PHIL 323	Ethics, Science and Technology	
PHIL 327	Robot Ethics	
PHIL 328	Technologies and Ethics of Warfare	
PHIL 339	Biomedical Ethics	
PHIL 340	Environmental Ethics	

Public Policy, Science and Technology Core

Select from the following:		4
POLS 332	World Food Systems	
POLS 351	Public Policy and Administration	
POLS 451	Technology and Public Policy	
POLS 452	Technology and International Development	
POLS 457	U.S. Reproductive Politics	

EPPST Electives ^{1,2}

Select from the following:		7-8
BIO 227	Wildlife Conservation Biology	
BIO 308	Genetic Engineering Technology	
BRAE 348	Energy for a Sustainable Society	

BUS 311	Managing Technology in the International Legal Environment	
COMS 422	Rhetorics of Science, Technology, and Medicine	
CRP/NR 404	Environmental Law	
CRP/NR 408	Water Resource Law and Policy	
CSC 121	Computing for All I	
ENGL 316	Writing Sustainability	
ES/NR 406	Indigenous Peoples and International Law and Policy	
FSN 319	The Science of Food for the Consumer	
GEOG 325	Climate and Humanity	
HIST 407	Science and Society in Cold War America	
HIST 432	United States Environmental History	
ISLA 303	Values and Technology	
ISLA 305	Topics in Public Engagements with STEM	
ISLA 350	The Global Environment	
HLTH 265	Introduction to Community and Public Health	
LAES 411	Technology and Community Engagement	
MATE 232	Materials, Ethics, and Society	
NR 142	Environmental Management	
NR 323	Human Dimensions in Natural Resources Management	
PHIL 321	Philosophy of Science	
PHIL 322	Philosophy of Technology	
POLS 426	International Organizations and Law	
PSC 307	Nuclear Energy and Weapons in the Modern World	
PSC 320	Energy, Society and the Environment	
SCM 360	Selected Environmental Issues of California's Central Coast	
SOC 308	Sociology of the Environment	
SOC 435	Sociology of Health and Illness	

Total units **27-28**

¹ EPPST Elective courses may also be selected from unused courses in Ethics, Science and Technology, or Public Policy, Science and Technology Core, or with minor advisor approval.

² Please check prerequisites. Your ability to select specific elective courses may vary depending upon the curriculum requirements for your major.

Gender, Race, Culture, Science and Technology Minor

Required Courses

ES/WGQS 350	Gender, Race, Culture, Science & Technology	12
ISLA 123	Introduction to Science, Technology & Society	

ISLA 456	Advanced Project-Based Learning in Science, Technology & Society
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Gender, Race, Culture, Science and Technology Core

Select from the following: 8

ANT 393	Action-oriented Ethnography
ANT 401	Culture and Health
ANT 425	Meaning, Gender, and Identity in Anthropological Theory
ANT 460	Queer Anthropology
ES/NR 308	Fire and Society
ES/WGQS 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development
ES/NR 360	Ethnicity and the Land
ES 390	Research Methodology in Comparative Ethnic Studies
or ISLA 355	Interdisciplinary Research Methods
or WGQS 305	Feminist Methodologies
ES/NR 406	Indigenous Peoples and International Law and Policy
SOC 435	Sociology of Health and Illness
WGQS 301	Contemporary Issues in Women's and Gender Studies ¹
WGQS 302	Contemporary Issues in Queer Studies

Gender, Race, Culture, Science and Technology Electives

Select from the following: ^{2,3} 7-8

ANT 360	Human Cultural Adaptations
ANT 402	Nutritional Anthropology
ARCH/ES 326	Native American Architecture and Place
ENGL 349	Gender in Twentieth and Twenty-First Century Literature
ENGL 374	Disability and Diversity in American Film
ENGL 382	LGBT Literature and Media
ES 112	Race, Culture, and Politics in the United States
HIST 350	The Scientific Revolution, c. 1500-1800
HIST 355	History of Network and Information Technologies
HLTH 255	Personal Health: A Multicultural Approach
HLTH 260	Women's Health Issues
HLTH 265	Introduction to Community and Public Health
ISLA 255	Introduction to Interdisciplinary Theory and Methods
ISLA 303/ HNRS 304	Values and Technology
ISLA/HNRS 320	Topics and Issues in Values, Media and Culture (topic must be approved by STS director) ¹
ISLA/GEOG 350	The Global Environment

JOUR 219	Multicultural Society and the Mass Media
LA 330	Cultural Landscapes: People, Places and Ethical Decisions
PHIL 339	Biomedical Ethics
POLS/WGQS 457	U.S. Reproductive Politics
PSY 252	Social Psychology
PSY 260	African American Psychology
PSY/WGQS 324	Psychology of Gender
SOC 308	Sociology of the Environment
WGQS 201	Gender and Sexuality in US Society and Politics
WGQS 320	Women, Gender and Sexuality in Global Perspective
WLC 370	Language, Technology and Society

Total units **27-28**

- ¹ Minor advisor approval required for this course to count as a GRCST Elective. Approval is dependent on the subtitle.
- ² GRCST Electives may also be selected from unused Gender, Race, Culture, Science and Technology Core courses or with minor advisor approval.
- ³ Please check prerequisites. Your ability to select specific elective courses may vary depending upon the curriculum requirements for your major.

Media Arts, Society and Technology Minor

Required Courses **12**

ISLA 123	Introduction to Science, Technology & Society
ES/WGQS 350	Gender, Race, Culture, Science & Technology
ISLA 456	Advanced Project-Based Learning in Science, Technology & Society

Media Arts, Society and Technology Practicum Sequence

Select from the following: ¹ 10-12

3D Graphics	
ART 182 & ART 484	Foundation in Digital Art I and Animation, Video, and Interactive Design ²
ART 376 or ART 474	The Art of Mixed Reality ² Collaborative Studio: Storyboarding, Modeling, Animation and Rendering
Digital Video	
ART 122 or ART 224	Introduction to Digital Photography Introduction to Artificial Lighting for Photography
ART 383	Digital Video I
ART 483	Digital Video II
Filmmaking	

ISLA 240 & ISLA 340 & ISLA 341	Introduction to Media Arts and Technologies and Media Arts and Technologies: Storytelling and Media Arts and Technologies: Cinematic Process	ART 489	Advanced Interactive Media Art
Graphic Communication and User Experience		COMS 317	Technology and Human Communication
GRC 376 & GRC 433	Web and Print Publishing and User Experience Methods for Digital Innovation	COMS 384	Media Effects
GRC 340 or GRC 420	Front-end Web Development Graphic Communication in Integrated Marketing Communications	COMS 385	Media Criticism
Intermedia and Sculpture ³		CSC/CPE 123	Introduction to Computing
ART 148 & ART 348 & ART 353	Beginning Sculpture and Intermediate Sculpture and Intermedia / Art	CSC/CPE 471	Introduction to Computer Graphics
Interactive Entertainment ⁴		CSC 473	Advanced Rendering Techniques
CSC/CPE 202 & CSC 371 & CSC 378	Data Structures and Game Design and Interactive Entertainment Engineering	CSC/CPE 476	Real-Time 3D Computer Graphics Software
Multimedia Story Production		CSC 478	Current Topics in Computer Graphics
JOUR 203 & JOUR 303 & JOUR 403	News Reporting and Writing and Web Audio and Video and Multimedia Production for Public Relations and Advertising	DANC 340	Dance Composition
New Media		ENGL 370	World Cinema
ISLA 240 & ENGL 411 & ENGL 412	Introduction to Media Arts and Technologies and New Media Arts I and New Media Arts II	ENGL 371	Film Styles and Genres
Sound Design		ENGL 372	Film Directors
MU 101 or MU 120	Introduction to Music Theory Music Appreciation	ES 320	African Americans in Popular Culture
MU 311 & MU 312	Introduction to Recording, Synthesis, and Production and Advanced Recording, Synthesis, and Production	ES 321	Native Americans in Popular Culture
Technology and Community Engagement		ES 322	Asian Americans in Popular Culture
ISLA 240 & ISLA 411	Introduction to Media Arts and Technologies and Technology and Community Engagement ⁵	ES 323	Latina/os in Popular Culture
Approved Electives		ES 340	Cultural Production and Ethnicity
Select from the following: ^{6,7}		GRC 338	Web Development and Content Management
ART 183	Foundation in Digital Art II	GRC 339	Web Design and Production
ART 222	Black and White Photography	GRC 429	Mobile User Experience
ART 237	Graphic Design I	GRC 452	Emerging Technologies in Graphic Communication
ART 288	Interaction Design I	HIST 418	Chinese Film and History
ART 314	History of Photography	HIST 422	Japanese Postwar Film and History
ART 324	Photographic Expression	HLTH 320	Media and Technology in Health Promotion
ART 373	New Media Art History	ISLA 303	Values and Technology
ART 383	Digital Video I	ISLA 320	Topics and Issues in Values, Media and Culture (Pop Culture) ⁸
ART 388	Interaction Design II	JOUR 219	Multicultural Society and the Mass Media
ART 470	Selected Advanced Topics ⁸	JOUR 285	Introduction to Multimedia Journalism
		JOUR 346	Broadcast Announcing and Production
		JOUR 350	Data Journalism
		JOUR 385	Media Innovation and Entrepreneurship
		JOUR 390	Visual Communication for the Mass Media
		JOUR 401	Global Communication
		JOUR 402	Journalism Ethics
		JOUR 410	Advanced Digital Journalism
		JOUR 418	Copyright, Trademark, Patent and Commercial Speech in Digital Media
		PHIL 351	Philosophy of Literature
		SPAN 307	Spanish and Latin American Film
		TH 230	Stagecraft I
		TH 330	Stagecraft II
		TH 430	Scenic Design

TH 434 Lighting Design

Total units 26-28

- ¹ It is the students' responsibility to make sure that they have taken any other required prerequisite courses in the Practicum Sequence.
- ² We recommend taking ART 484 before ART 376.
- ³ This practicum sequence requires additional prerequisites that would not be counted towards the units for the MAST minor. ART 348 requires ART 104 or ART 107. ART 353 requires ART 101 and ART 102 or ART 106.
- ⁴ This practicum sequence requires an additional prerequisite that would not be counted towards the units for the MAST minor. CSC 202 requires CSC 101.
- ⁵ ISLA/LAES 411 must be taken for 8 units across two quarters.
- ⁶ MAST Elective courses may also be selected from unused MAST Practicum courses or with minor advisor approval.
- ⁷ Please check prerequisites. Your ability to select specific elective courses may vary depending upon the curriculum requirements for your major.
- ⁸ Minor advisor approval is required for this course to count as a MAST Elective. Approval is dependent on the subtitle or topic.

Science Communication Minor

ES/WGQS 350 Gender, Race, Culture, Science & Technology 4

ISLA 123 Introduction to Science, Technology & Society 4

ISLA 456 Advanced Project-Based Learning in Science, Technology & Society 4

Science Communication Core
 Select from the following: ^{1,2} 8

AGC 475 Crisis Communication in Food and Agriculture

COMS 390 Environmental Communication

COMS/ISLA 395 Science Communication

COMS 418 Health Communication

COMS 422 Rhetorics of Science, Technology, and Medicine

ENGL 221 Introduction to Technical and Professional Communication

HLTH 320 Media and Technology in Health Promotion

ISLA 305 Topics in Public Engagements with STEM

JOUR 350 Data Journalism

JOUR 412 Public Relations and Crisis Management

Science Communication Electives
 Select from the following: ^{1,2,3} 8

AGC 205 Agricultural Communications

COMS 317 Technology and Human Communication

ENGL 316 Writing Sustainability

ENGL 317 Technical Editing

ENGL 319 Information Design and Production

ENGL 380 Literary Themes (topic must be approved by STS director)

ENGL 421 Advanced Topics in Technical and Professional Communication ⁴

HIST 350 The Scientific Revolution, c. 1500-1800

HIST 355 History of Network and Information Technologies

HLTH 298 Introduction to Epidemiology

ISLA 303 Values and Technology

JOUR 303 Web Audio and Video

JOUR 350 Data Journalism

JOUR 402 Journalism Ethics

JOUR 413 Public Relations Campaigns

MATE 359 Living in a Material World

NR 323 Human Dimensions in Natural Resources Management

POLS 451 Technology and Public Policy

PSY 311 Environmental Psychology

Total units 28

- ¹ Please check prerequisites. Your ability to select specific courses may vary depending upon the curriculum requirements for your major.
- ² At least half of the units completed for the Science Communication Minor must be upper-division (300-400 level).
- ³ Science Communication Electives courses may also be selected from unused Science Communication Core.
- ⁴ Minor advisor approval required for this course to count as an Science Communication Elective. Approval is dependent on subtitle.

Journalism

Graphic Arts Bldg. (26), Room 228
Phone: 805.756.2508
<https://journalism.calpoly.edu>

Department Chair: Brady Teufel

Academic Program

Program name	Program type
Journalism	BS

The Journalism Department offers professional preparation leading to the Bachelor of Science degree in Journalism. The focus is on core media skills including information gathering, writing, visual and multimedia storytelling, editing, and strategic and critical thinking. We emphasize the core values of accuracy, ethical behavior, diversity and inclusion, and freedom of speech. All majors must complete the basic journalism core courses in addition to a sequence of courses selected from a concentration in either News, Public Relations, Media Innovation or an Individualized Course of Study (ICS).

All journalism majors are enrolled in courses that contribute to the department's award-winning student media organization, Mustang Media Group. Here, students gain hands-on experience working on digital, print and broadcast editions of Mustang News; the internal public relations firm; Cal Poly's radio station, KCPR-FM; and program operations of Cal Poly's TV station, MNTV. They also apply acquired skills and develop professional abilities in an approved media internship.

Undergraduate Program

BS Journalism

Journalism students learn the skills, values and competencies that lead to a successful career in a variety of media professions. All majors complete basic journalism core courses and select a concentration in News, Public Relations, Media Innovation or, in select circumstances, choose an Individualized Course of Study. Students are strongly encouraged to take a minor to satisfy their elective units.

Concentrations

News

Students will learn how to ethically report on events and trends, interview sources and produce accurate, timely news stories for digital, print and broadcast platforms while covering the campus and the local communities.

Public Relations

The focus of the Public Relations Concentration is on developing accurate and ethical communications that influence, engage and build relationships between an organization and its stakeholders. Students will learn how to analyze public opinion and attitudes, plan, implement and assess public relations campaigns and produce multimedia content while working with organizations in the greater San Luis Obispo community.

Media Innovation

This concentration lies at the intersection of journalism, technology and business. Its focus is on telling multimedia stories on multiple platforms (including emerging technologies), understanding audiences, making decisions with analytics, and solving problems responsibly and ethically.

Students in Media Innovation will learn how to analyze audience needs, develop new storytelling approaches, create media products, experiment with revenue models, foster inclusive civic participation and drive change within media organizations.

Individualized Course of Study

Concentration consists of a minimum of 20 units, 16 of which must be upper division units. The student selects the courses in consultation with the concentration coordinator and department head and provides written justification for the courses and the way they constitute a cohesive, integrated program of study. The list of courses serves as a contract between the student and the Department.

BS Journalism

Program Learning Objectives

Graduates with a BS in Journalism will:

1. Apply the principles and laws of freedom of speech and press, in a global context, and for the United States.
2. Demonstrate an understanding of the multicultural history and role of professionals and institutions in shaping communications.
3. Demonstrate communication that empowers those traditionally disenfranchised in society, especially as grounded in race, ethnicity, gender, sexual orientation, ability and socioeconomic status, domestically and globally, across communication and media contexts.
4. Present images and information effectively and creatively, using appropriate tools and technologies.
5. Write correctly and clearly in forms and styles appropriate for the communications professions, audiences and purposes they serve.
6. Demonstrate an understanding of professional ethical principles and work ethically in pursuit of truth, accuracy, fairness and equity.
7. Apply critical thinking skills in conducting research and evaluating information by methods appropriate to the communications professions in which they work.
8. Effectively and correctly apply basic numerical and statistical concepts.
9. Critically evaluate their own work and that of others for accuracy and fairness, clarity, appropriate style, grammatical correctness and equity-minded reporting.
10. Apply tools and technologies appropriate for the communications professions in which they work.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: Up to 4 units of credit/no credit grading may be selected for courses in Major or Support.

MAJOR COURSES

Journalism Core

JOUR 102	Introduction to Journalism	1
JOUR 203	News Reporting and Writing	4
JOUR 219	Multicultural Society and the Mass Media	4
or JOUR 401	Global Communication	
JOUR 228	Media, Self and Society (D2) ¹	4
JOUR 285	Introduction to Multimedia Journalism	4
JOUR 302	Mass Media Law	4
JOUR 303	Web Audio and Video	4
JOUR 312	Public Relations	4
JOUR 334	Editing	4
JOUR 390	Visual Communication for the Mass Media	4
JOUR 402	Journalism Ethics	4
JOUR 444	Media Internship	3

Concentration
(See list of Concentrations below) 20

Journalism Electives
Select from the following: ² 12

Any JOUR course, including those listed above, if not used to meet Major requirements, and:

JOUR 201	News Media and Democracy	
JOUR 220	Introduction to Radio Broadcasting	
JOUR 270	Selected Topics	
JOUR 320	Cal Poly Radio Laboratory	
JOUR 331	Contemporary Advertising	
JOUR 387	Sports Communication	
JOUR 400	Special Problems for Advanced Undergraduates	
JOUR 418	Copyright, Trademark, Patent and Commercial Speech in Digital Media	
JOUR 455	Media Management Laboratory	
JOUR 470	Selected Advanced Topics	
JOUR 471	Selected Advanced Laboratory	

Approved Electives
Students are encouraged to pursue minors or develop other areas of interest outside of Journalism through Approved Electives and with the following restrictions: 36

At least 24 units must be upper-division courses with a lecture or seminar component. This excludes activity-only, lab-only, or supervision courses such as internships.

SUPPORT COURSES
Select from the following (B4): ¹ 4

STAT 130	Introduction to Statistical Reasoning	
STAT 217	Introduction to Statistical Concepts and Methods	
STAT 218	Applied Statistics for the Life Sciences	
STAT 251	Statistical Inference for Management	

GENERAL EDUCATION (GE)
(See GE program requirements below.) 64

FREE ELECTIVES	
Free Electives ³	0
Total units	180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² If a course is taken to fulfill the Journalism Electives requirement, it cannot be double-counted in the ICS concentration.
- ³ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentrations (select one)

- Media Innovation (p. 314)
- News (p. 314)
- Public Relations (p. 314)
- Individualized Course of Study (p. 314)

General Education (GE) Requirements

- 72 units required, 8 of which are specified in Major and/or Support.
- If any of the remaining 64 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	

D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Major) ¹	0
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives		8
Total units		64

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Media Innovation Concentration

JOUR 350	Data Journalism	4
or BUS 310	Introduction to Entrepreneurship	
JOUR 345	Social Media for Strategic Communication	4
or JOUR 410	Advanced Digital Journalism	
JOUR 352	Advanced News Reporting Practicum	4
or JOUR 353	Advanced Broadcast Journalism Practicum	
JOUR 385	Media Innovation and Entrepreneurship	4
JOUR 462	Senior Project: Media Practicum	4
Total units		20

News Concentration

JOUR 304	Public Affairs Reporting	4
JOUR 462	Senior Project: Media Practicum	4
Select one of the following paths:		12
Writing/Digital Path		
JOUR 350	Data Journalism	
JOUR 352	Advanced News Reporting Practicum	
JOUR 407	Feature Writing	
Audio/Visual Path		
JOUR 333	Broadcast News	
JOUR 338	Podcasting	
or JOUR 346	Broadcast Announcing and Production	
or JOUR 348	Electronic News Gathering	
or JOUR 378	Advanced Sportscasting	
JOUR 353	Advanced Broadcast Journalism Practicum	
Total units		20

Public Relations Concentration

JOUR 342	Public Relations Writing and Editing	4
JOUR 345	Social Media for Strategic Communication	4
or JOUR 403	Multimedia Production for Public Relations and Advertising	
or JOUR 412	Public Relations and Crisis Management	
JOUR 347	Public Relations Research	4
JOUR 413	Public Relations Campaigns	4
JOUR 415	Senior Project: Public Relations Practicum	4
Total units		20

Individualized Course of Study - BS Journalism

Writing Intensive

Select from the following:		4
JOUR 333	Broadcast News	
JOUR 342	Public Relations Writing and Editing	
JOUR 407	Feature Writing	

Public Relations Research

Select from the following:		4
JOUR 304	Public Affairs Reporting	
JOUR 347	Public Relations Research	
JOUR 385	Media Innovation and Entrepreneurship	

Media Technology

Select from the following:		4
JOUR 201	News Media and Democracy	
JOUR 331	Contemporary Advertising	
JOUR 338	Podcasting	
JOUR 345	Social Media for Strategic Communication	
JOUR 346	Broadcast Announcing and Production	
JOUR 348	Electronic News Gathering	
JOUR 350	Data Journalism	
JOUR 378	Advanced Sportscasting	
JOUR 387	Sports Communication	
JOUR 403	Multimedia Production for Public Relations and Advertising	
JOUR 410	Advanced Digital Journalism	
JOUR 412	Public Relations and Crisis Management	
JOUR 418	Copyright, Trademark, Patent and Commercial Speech in Digital Media	

Media Practicum

Select from the following:		4
JOUR 352	Advanced News Reporting Practicum	
JOUR 353	Advanced Broadcast Journalism Practicum	
JOUR 413	Public Relations Campaigns	

Senior Project

Select from the following:	4
JOUR 415 Senior Project: Public Relations Practicum	
JOUR 462 Senior Project: Media Practicum	
Total units	20

¹ The student is responsible for checking prerequisites for all courses and should meet with an advisor to discuss their Individualized Course of Study Concentration.

² If a course is taken to fulfill the Journalism Electives requirement in the major, it cannot be double-counted in the concentration.

Music

Davidson Music Center (45), Room 129
 Phone: 805.756.2406; Fax: 805.756.7464
 Email: music@calpoly.edu
music.calpoly.edu (<https://music.calpoly.edu/>)

Department Chair: India D'Avignon

Academic Programs

Program name	Program type
Music	BA, Minor

The Bachelor of Arts in Music introduces a student to the role of music in today's world, helps form personal goals, and provides the discipline, skills and knowledge to accomplish those goals. The program develops musical skills, encourages creativity, and cultivates vision for the future. The University's polytechnic emphasis also provides an excellent opportunity to explore music in conjunction with a wide range of other fields. Graduates are prepared to begin specialized study at the graduate level and to enter a wide variety of professional careers.

The Music Department is a valuable resource for the non-music major. Its courses and performing ensembles are open to all students who wish to enrich their lives through music. Qualified students may explore the subject in depth by minoring in music.

The Music Department also serves as a cultural center for both the university and the community through a program of public performances by student and faculty groups and through clinics, workshops, concerts, and lectures by outstanding individuals from outside the university.

Acceptance into the music major program requires a demonstrated ability on an instrument, in voice, or talent through other musical media, plus the ability to read music at a fundamental level.

Undergraduate Programs

BA Music

Designed for the student who wants a broad education in music, the Bachelor of Arts degree offers a balanced program of study in a wide range of subjects. In addition to the traditional emphasis on music theory, history, and performance, Cal Poly's program includes American music, music of non-Western cultures, and the application of sound design. The program provides a large number of elective courses which allows the student to concentrate in a particular area or combine music with other subjects.

Bachelor of Arts Degree Requirements

1. All new students will take placement examinations in piano skills, music theory, and musicianship. Students who audition in person for the major will take the placement exams at the time of their audition. Students who submit a recording with their application will be contacted by the Music Department to schedule the placement exams during the application period. Separate auditions are required for assignment to performing ensembles. Students who wish to take piano, theory, or musicianship courses beyond the beginning level must pass the appropriate placement test. Regardless of courses taken prior to coming to Cal Poly, students are required to remedy deficiencies before enrolling in advanced music theory or music history courses.

2. Each music major must be enrolled in at least 6 units of music courses each quarter, including a performance ensemble and lessons, until curricular requirements are met. (See the Department for details regarding appropriate ensembles and applied study policies.) Each student enrolled in private instruction must take an applied music jury at the end of Spring Quarter.
3. Each student is required to attend a minimum of 6 concerts per quarter.
4. At the end of the sixth quarter of enrollment a student must take a mid-point evaluation to verify progress and potential in music. External transfer students must take the theory and musicianship portions of the mid-point evaluation at the beginning of their first quarter of enrollment; they must take performance skills (jury) and piano proficiency exams by the end of their third quarter of enrollment. The testing timetable for internal transfers will be established on a case-by-case basis. The mid-point evaluation includes the following:
 - a. individual performance skills (should be at the MU 250 level; tested through a jury)
 - b. musicianship skills up through the level of Musicianship III
 - c. knowledge of music theory up through the level of Theory II
 - d. piano proficiency (see No. 5 below)
5. Each student must pass examinations in six areas of piano proficiency (repertoire, sightreading, transposition, harmonization of a melody, accompanying, score-reading) as part of the mid-point evaluation.
6. Use of Music Department instruments, scheduled practice rooms, electronic studio, or lockers requires a Music Use Fee. See the Music Department Office for details.
7. It is important that each student stay closely in touch with his/her advisor in order to progress through the music major program in the most efficient manner.
8. The Music Department is not able to offer the full complement of performing ensembles and private instruction during the Summer Quarter; it is important to take this into consideration when planning coursework for completion of the major.

A music major handbook giving complete details of the program, policies, and forms is available from the Music Department.

Music Minor

A minor is available to students who desire documented competency in music. An individualized curriculum (incorporating theory, history, and performance) based on the following guidelines is developed in consultation with a member of the music faculty. Students must complete one academic music lecture course at Cal Poly, such as MU 101 or MU 120, before applying for the minor. Information and application forms for the declaration of a Music minor are available in the Music Department Office, as well as online at music.calpoly.edu (<https://music.calpoly.edu/>).

BA Music

Program Learning Objectives

1. Understand the role of music in today's diverse world
2. Understand the applications of technology to musical activities
3. Form personal goals in the field of music and complete a capstone project related to those goals

4. Demonstrate understanding of music theory within a cultural context
5. Demonstrate understanding of music history within a cultural context
6. Demonstrate competence in musical performance within a cultural context
7. Demonstrate competence in musicianship skills
8. Communicate effectively

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

MU 103	Music Theory I: Diatonic Materials	4
MU 104	Musicianship I	2
MU 105	Music Theory II: Chromatic Materials	4
MU 106	Musicianship II	2
MU 108	Musicianship III	2
MU 121	Introduction to Non-Western Musics	4
MU 303	Music Theory III: Advanced Chromaticism	4
MU 305	Music Theory IV: Contemporary Practices	4
MU 311	Introduction to Recording, Synthesis, and Production	4
MU 320	Music Research and Writing	4
MU 325	America's Music	4
or MU 326	Cultural Concepts and Structures in Music	
or MU 336	Jazz History and Theory	
or MU 470	Music History: Selected Advanced Topics	
MU 331	Music of the Middle Ages and Renaissance	4
MU 332	Music of the Baroque and Early Classic Eras	4
MU 431	Music of the Classic and Romantic Eras	4
MU 432	Music of the Modern Era	4
MU 461	Senior Project	3

Approved Music Lecture Courses (300-400 level)

Select from the following: ¹		12
MU 301	Counterpoint	
MU 312	Advanced Recording, Synthesis, and Production	
MU 324	Music and Society	
MU 325	America's Music	
MU 326	Cultural Concepts and Structures in Music	
MU 328	Women in Music	

MU 336	Jazz History and Theory
MU 340	Conducting: Fundamentals
MU 341	Conducting: Choral
MU 342	Conducting: Instrumental
MU 352	Orchestration
MU 360	Music for Classroom Teachers
MU 411	Sonic Interactions with Technology
MU 412	Sculpting Experience with Sound
MU 465	Choral Literature and Rehearsal Techniques
MU 466	Instrumental Literature and Rehearsal Techniques
MU 470	Music History: Selected Advanced Topics

Major Ensemble 100-level

Select from the following:		6
MU 168	Piano Accompanying	
MU 170	University Jazz Band	
MU 171	Instrumental Ensembles	
MU 172	Wind Orchestra	
MU 173	Wind Ensemble	
MU 174	Symphony Orchestra	
MU 177	Chamber Winds	
MU 181	PolyPhonics	
MU 183	Vocal Ensemble	
MU 185	University Singers	
MU 186	Chamber Choir	
MU 188	Arab Music Ensemble	

Major Ensemble at 300-level

Select from the following:		3
MU 368	Piano Accompanying	
MU 370	University Jazz Band	
MU 371	Instrumental Ensemble	
MU 372	Wind Orchestra	
MU 373	Wind Ensemble	
MU 374	Symphony Orchestra	
MU 377	Chamber Winds	
MU 381	PolyPhonics	
MU 383	Vocal Ensemble	
MU 385	University Singers	
MU 386	Chamber Choir	
MU 388	Arab Music Ensemble	

Applied Study

Select from the following:		9
MU 150	Applied Music	
MU 250	Applied Music	
MU 350	Applied Music	
MU 450	Applied Music	

GENERAL EDUCATION (GE)

(See GE program requirements below.) 72

FREE ELECTIVES

Free Electives ²	21
Total units	180

¹ MU 325, MU 326, MU 336, MU 470 can satisfy this requirement if not previously used to satisfy another required music course.

² If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning	4
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		

GE Electives	8
Total units	72

Music Minor

Required Courses

Select from the following Music Theory courses		4
MU 101	Introduction to Music Theory	
MU 103	Music Theory I: Diatonic Materials	
Select from the following Music Theory or Music History courses		4
Theory Courses		
MU 103	Music Theory I: Diatonic Materials	
MU 105	Music Theory II: Chromatic Materials	
MU 114	Introduction to Composing	
History Courses		
MU 120	Music Appreciation	
MU 121	Introduction to Non-Western Musics	
MU 221	Jazz Styles	
MU 227	Popular Music of the USA	
MU 228	Music of the 60's: War and Peace	
Select from the following Theory, History or Performance Courses ¹		4
Theory Courses		
MU 105	Music Theory II: Chromatic Materials	
MU 114	Introduction to Composing	
History Courses		
MU 120	Music Appreciation	
MU 121	Introduction to Non-Western Musics	
MU 221	Jazz Styles	
MU 227	Popular Music of the USA	
MU 228	Music of the 60's: War and Peace	
Performance Courses		
Musicianship		
MU 104	Musicianship I	
MU 106	Musicianship II	
MU 108	Musicianship III	
Beginning Jazz Improvisation		
MU 259	Beginning Jazz Improvisation	
Class Voice		
MU 154	Beginning Voice	
Class Piano		
MU 151	Beginning Class Piano	
MU 152	Elementary Class Piano	
MU 253	Advanced Class Piano	
Class Guitar		
MU 155	Beginning Guitar	
Any Lower-division Ensemble		
MU 168	Piano Accompanying	
MU 170	University Jazz Band	
MU 171	Instrumental Ensembles	
MU 172	Wind Orchestra	
MU 173	Wind Ensemble	

MU 174	Symphony Orchestra	
MU 176	Mustang Band	
MU 177	Chamber Winds	
MU 178	Field Show Marching Skills	
MU 181	PolyPhonics	
MU 183	Vocal Ensemble	
MU 185	University Singers	
MU 186	Chamber Choir	
MU 188	Arab Music Ensemble	
Upper-Division Electives		
Select upper-division MU courses	^{1,2,3,4}	12
Total units		24

¹ In the area of performance, there is a required minimum of 2 units, either lower or upper-division; the maximum number of performance units that can be applied to the minor is 8, with no more than 4 units at each level.

² No more than 4 units in the minor may be satisfied by the following upper-division performance courses: MU 368, MU 370, MU 371, MU 372, MU 373, MU 374, MU 376, MU 377, MU 378, MU 381, MU 383, MU 385, MU 386, MU 388, MU 389.

³ No more than 2 units in the minor may be satisfied by MU 400.

⁴ If NO lower-division units were in music history, then at least 4 units must be an upper-division music history course: MU 324, MU 325, MU 328.

Philosophy

Faculty Office Bldg. (47), Room 37
Phone: 805.756.2041
<https://philosophy.calpoly.edu>

Department Chair: Kenneth Brown

Academic Programs

Program name	Program type
Philosophy	BA, Minor
Religious Studies	Minor
Western Intellectual Tradition	Minor

The Philosophy Department at Cal Poly is one of the largest in the CSU system. It prides itself on excellence in teaching and the high standards met by its students. A degree in philosophy is one of the best preparations for graduate or professional school and the evidence for this is substantial. Nationally, philosophy majors outscore everyone but majors in mathematics and physics on the Law School Admissions Test (LSAT). Similar trends are also seen for scores in all sections of the Graduate Record Exam (GRE) and on the Graduate Management Admission Test (GMAT), the exam required by most MBA programs.

The reason for this is unsurprising. The study of philosophy requires the meticulous development of general analytical reasoning skills. Even students not planning to go on to graduate or professional school are well served by the analytical and verbal skills developed by the study of philosophy. The ability to communicate clearly and forcefully is increasingly rare and, as a result, increasingly sought after in the job market.

Undergraduate Programs

BA Philosophy

Students can pursue a curriculum leading to a Bachelor of Arts degree in Philosophy, including optional concentrations in Philosophy and Religion, Ethics of Science and Technology, and Ethics and Society. The department also offers a minor in Philosophy, courses and a minor in Religious Studies, and directs an interdisciplinary minor in The Western Intellectual Tradition. An unusually large number of courses is offered in the history of philosophy, as well as courses in specific areas of philosophy (logic, ethics, metaphysics, epistemology), courses that deal with the philosophical issues arising in other disciplines (e.g., philosophy of science, philosophy of literature, aesthetics), courses in eastern philosophy, and applied ethics courses especially in areas related to science and technology.

Concentrations

Students may choose to complete 20 units of 300-400 level philosophy courses *or* choose one of three concentrations.

Ethics and Society

Designed for students with an interest in pursuing professional careers in which they will need to address practical ethical issues, especially careers in business, medicine, politics and law.

Ethics of Science and Technology

Designed for students with an interest in careers involving science and technology, whether as makers or other roles (such as in business, law,

policy, advocacy, and government) to understand, evaluate, and influence the responsible development of new and emerging innovations.

Philosophy and Religion

Designed for students with an interest in religion, including those interested in pursuing careers in religious ministry or graduate work in Religious Studies or Philosophy of Religion.

Degree Requirements and Curriculum (p. 321)

Philosophy Minor

The minor program in Philosophy is designed for students who want to add to their education an understanding of the history of philosophy, of contemporary trends in philosophy, or of philosophical issues relevant to their major field of study. Interested students are invited to contact the Philosophy Department Office or website for more information and application forms.

Philosophy Minor Objectives:

1. Significant critical skill
2. Competence at philosophical writing
3. Good, general knowledge of the history of philosophy, or grasp of main currents in contemporary philosophy
4. Familiarity with methods of contemporary philosophical inquiry

Religious Studies Minor

The Religious Studies minor program is designed for students who want to enhance their understanding of the great religious traditions of the contemporary world and some of the social issues involving these religions. Interested students are invited to contact the Philosophy Department Office for more information and application forms.

Minor Program Learning Objectives:

1. Demonstrate general knowledge of how various disciplines approach religious phenomena and be able to apply a variety of methodological frameworks to data in the field of Religious Studies.
2. Develop basic religious literacy regarding the literary expressions, worldview, historical formations, ritual & practice, sacred texts, material world, and engagement with contemporary issues for several world religions representing diverse cultural backgrounds.
3. Analyze how a religion interacts with the culture to which it belongs, explaining how it shapes and is shaped by its surrounding society.
4. Demonstrate how religions inform, shape, and shed light upon contemporary issues, concerns, and debates.
5. Show how religious diversity contributes to overall diversity on the planet and specifically how Religious Studies advances student attainment of Cal Poly's Diversity Learning Objectives.
6. Understand how religions can both contribute to and detract from the productive harmony between groups (convivencia)

Western Intellectual Tradition Minor

For information regarding the Western Intellectual Tradition Minor, please see the College of Liberal Arts Interdisciplinary Minors (p. 269) section of the catalog.

BA Philosophy

Program Learning Objectives

1. Significant critical skill
2. Sound command of logic
3. Competence at philosophical writing
4. Good, general knowledge of the history of philosophy
5. Grasp of main currents in contemporary philosophy
6. Familiarity with methods of contemporary philosophical inquiry

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 28) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

PHIL 101	Introduction to Philosophy	4
PHIL 126	Logic and Argumentative Writing (A3) ¹	4
PHIL 230	Philosophical Classics: Knowledge and Reality (C2) ¹	4
PHIL 231	Philosophical Classics: Ethics and Political Philosophy (GE Electives) ¹	4
PHIL 241	Symbolic Logic	4
PHIL 300	Philosophical Writing and Research	4
PHIL 321	Philosophy of Science (Upper-Division C) ¹	4
PHIL 331	Ethics	4
PHIL 411	Metaphysics	4
PHIL 412	Epistemology	4
PHIL 459	Senior Project Preparation	1
PHIL 460	Senior Project I	1
PHIL 461	Senior Project II	2

History of Philosophy Electives

Select from the following:		4
PHIL 309	Early Greek Philosophy through Plato	
PHIL 310	Aristotle and Hellenistic Philosophy	
PHIL 312	Medieval Philosophy	
Select from the following:		4
PHIL 313	Early Modern Rationalism	
PHIL 314	Early Modern Empiricism	
PHIL 315	Kant and 19th Century European Philosophy	
Select from the following:		4
PHIL 317	History of Analytic Philosophy	
PHIL 318	Phenomenology	
PHIL 319	Existentialism	

Select from History of Philosophy Electives listed above or PHIL 429	4
Choose PHIL Electives (20 units) at the 300-400 level, or declare a concentration (see below). ^{2,3}	20
Arts and Humanities Breadth	
Upper-Division C (General Education) course not in PHIL ⁴	4
GENERAL EDUCATION (GE)	
(See GE program requirements below.)	56
FREE ELECTIVES	
Free Electives	40
Total units	180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² At least 12 units must be 400-level if the PHIL Electives option is chosen rather than declaring a concentration.
- ³ If a course is taken to meet a Major or Support requirement, it cannot be double-counted as an Elective for the concentration.
- ⁴ If a Religious Studies (RELS) course is taken to meet the Arts and Humanities Breadth requirement, it cannot be double-counted in the Philosophy and Religion concentration.

Concentrations

- Ethics and Society (p. 322)
- Ethics of Science and Technology (p. 322)
- Philosophy and Religion (p. 322)

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking (4 units in Major) ¹	0
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning	4
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		

C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English (4 units in Major) ¹	0
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C (4 units in Major) ¹		0
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		56

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Ethics and Society Concentration

Required		
PHIL 439	Selected Problems in Ethics and Political Philosophy	4
Ethics Electives		
Select from the following:		12
PHIL 332	History of Ethics	
PHIL 333	Political Philosophy	
PHIL 334	Philosophy of Law	
PHIL 335	Social Ethics (USCP)	
PHIL 336	Feminist Ethics, Gender, Sexuality and Society (USCP)	
PHIL 337	Business Ethics	
PHIL 341	Professional Ethics	
PHIL 343	Power, Alienation, and Political Life	
PHIL 385	Ethics Bowl ¹	
PHIL 439	Selected Problems in Ethics and Political Philosophy ²	
Technology Ethics Electives		
Select from the following or select 4 additional units of Ethics Electives:		4
PHIL 322	Philosophy of Technology	
PHIL 323	Ethics, Science and Technology	
PHIL 327	Robot Ethics	
PHIL 328	Technologies and Ethics of Warfare	

PHIL 339	Biomedical Ethics	
PHIL 340	Environmental Ethics	
Total units		20

¹ Maximum of 8 units may be applied toward concentration: PHIL 385.
² PHIL 439 may be repeated up to 16 units with different subtitles.

Ethics of Science and Technology Concentration

Required		
PHIL 323	Ethics, Science and Technology	4
Ethics and Philosophy of Science and Technology Electives		
Select from the following:		8
PHIL 322	Philosophy of Technology	
PHIL 327	Robot Ethics	
PHIL 328	Technologies and Ethics of Warfare	
PHIL 339	Biomedical Ethics	
PHIL 340	Environmental Ethics	
Senior Seminar Electives		
Select from the following:		4
PHIL 421	Philosophy of Space, Time and Matter	
PHIL 422	Philosophy of Mind	
PHIL 439	Selected Problems in Ethics and Political Philosophy	
Ethics Electives		
Select from the following or select 4 additional units of Ethics and Philosophy of Science and Technology Electives:		4
PHIL 332	History of Ethics	
PHIL 333	Political Philosophy	
PHIL 334	Philosophy of Law	
PHIL 335	Social Ethics	
PHIL 336	Feminist Ethics, Gender, Sexuality and Society	
PHIL 337	Business Ethics	
PHIL 341	Professional Ethics	
PHIL 343	Power, Alienation, and Political Life	
PHIL 385	Ethics Bowl ¹	
Total units		20

¹ Maximum of 4 units may be applied toward concentration: PHIL 385.

Philosophy and Religion Concentration

Required		
PHIL 342	Philosophy of Religion	4
Asian Philosophy and Religion Electives		
Select from the following: ¹		4
PHIL 361	Indian Philosophy	
PHIL 362	Chinese and East Asian Philosophy	

RELS 301	Religions of Asia	
RELS 306	Hinduism	
RELS 307	Buddhism	
Religion Electives		
Select from the following: ¹		8
RELS 302	Abrahamic Religions: Judaism, Christianity, and Islam	
RELS 304	Judaism	
RELS 310	Christianity	
RELS 311	Islam	
RELS 344	Approaches to Religion and Spirituality	
Or any unused Asian Philosophy and Religion Electives		
Senior Level Philosophy Electives		
Select from the following:		4
PHIL 421	Philosophy of Space, Time and Matter	
PHIL 422	Philosophy of Mind	
PHIL 423	Philosophy of Language	
PHIL 429	Special Topics in the History of Philosophy ²	
PHIL 439	Selected Problems in Ethics and Political Philosophy	
PHIL 449	Selected Topics in Recent Philosophy	
Total units		20

¹ If a Religious Studies (RELS) course is taken to meet the Arts and Humanities Breadth requirement, it cannot be double-counted in the Philosophy and Religion Concentration.

² If PHIL 429 was used to fulfill the History of Philosophy Electives in the major, the course may be taken with a different subtitle to fulfill the Senior Level Philosophy Electives.

Philosophy Minor

Required Course

PHIL 230	Philosophical Classics: Knowledge and Reality	4
or PHIL 231	Philosophical Classics: Ethics and Political Philosophy	

Approved Electives

Select from the following:		4
PHIL 411	Metaphysics	
PHIL 412	Epistemology	
PHIL 421	Philosophy of Space, Time and Matter	
PHIL 422	Philosophy of Mind	
PHIL 423	Philosophy of Language	
PHIL 429	Special Topics in the History of Philosophy	
PHIL 439	Selected Problems in Ethics and Political Philosophy	
PHIL 449	Selected Topics in Recent Philosophy	

PHIL Electives (at least 8 units 300-400 level)	16
Total units	24

Religious Studies Minor

Required Courses

Area A: History of World Religious Traditions		
Select from the following:		8
ENGL 354	The Bible as Literature and in Literature and the Arts	
HIST 452	Renaissance and Reformation Europe	
RELS 205	Jesus	
RELS 301	Religions of Asia	
RELS 302	Abrahamic Religions: Judaism, Christianity, and Islam	
RELS 304	Judaism	
RELS 306	Hinduism	
RELS 307	Buddhism	
RELS 310	Christianity	
RELS 311	Islam	
Area B: Method and Theory in the Study of Religion		
Select from the following:		4
PHIL 342	Philosophy of Religion	
PHIL 361	Indian Philosophy	
PHIL 362	Chinese and East Asian Philosophy	
RELS 344	Approaches to Religion and Spirituality	
SOC 377	Sociology of Religion	
Area C: Issues and Themes in the Contemporary Study of Religion		
Select from the following:		4
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements	
HIST 306	The Witch-Hunts in Europe, 1400-1800	
HIST 453	Religious Wars and Absolutism	
RELS 201	Religion, Dialogue, and Society	
RELS/WGQS 370	Religion, Gender, and Society	
RELS 372	Spiritual Extremism: Asceticism, Mysticism, and Madness	
RELS 374	Religion and Violence	
RELS 378	Religion and Contemporary Values	
RELS/POLS 380	Religion and Politics in the Israeli-Palestinian Conflict	
RELS 390	Topics in Religious Studies	
RELS 400	Special Problems for Advanced Undergraduates	
RELS 470	Selected Advanced Topics	
RELS 490	Advanced Topics in Religious Studies	
Approved Electives		
Any additional RELS course (4 units must be at the 300-400 level) ¹		8
Total units		24

¹ No more than 12 units from the PHIL BA Philosophy and Religion concentration may count towards the Religious Studies minor.

Political Science

Faculty Office Bldg. (47), Room 14
Phone: 805.756.2984
<https://politicalscience.calpoly.edu>

Department Chair: Anika Leithner

Academic Programs

Program name	Program type
Global Politics	Minor
Law and Society	Minor
Political Science	Minor, BA
Public Policy	MPP

The Political Science Department offers instruction leading to a Bachelor of Arts degree in Political Science and a Master of Public Policy degree. Through the required and elective courses, the department prepares students to become informed, active individuals. Undergraduate and graduate programs emphasize the comprehension of political thinking and the application of communication and analytical skills, and prepare students for careers in research and survey analysis, administration, teaching, business, graduate studies, or leadership positions in the public, private, and nonprofit sectors.

In addition to the undergraduate major and the graduate program, the department offers minors in Political Science, Global Politics and Law and Society. General Education courses in the department expose students to political thought, the fundamentals of U.S. politics, global issues, and the politics of foreign countries. The department supports internship opportunities in local, state, and federal agencies in federal agencies, applied public policy research, law, and non-profit agencies.

Undergraduate Programs

BA Political Science

The major provides students with insights into the behavior of countries, individuals, and groups as they pursue their political and economic interests. Students considering work in related fields such as law, education, administration, government, and business gain basic knowledge of principles and practices in those areas. Additionally, students who are planning graduate work can establish a sound foundation for advanced studies in political science, law, public administration, business administration, urban planning, and other related fields.

Concentrations

American Politics

Study of American governmental institutions, campaigns and elections, parties, public policy, and social movements. Provides students with a broad knowledge of the American political system that can prepare them for careers in government employment at the local, state, or national level, campaign advising, policy analysis, urban and regional planning, or leadership positions in advocacy groups.

Global Politics

Study of international and comparative politics, politics of developing areas, and U.S. foreign policy. Prepares students for careers in the diplomatic corps, foreign policy analysis, transnational nongovernmental organizations, intelligence analysis, or international business.

Pre-Law

Study of American constitutional law, civil liberties, civil rights, jurisprudence and judicial process. Prepares students for careers in law. Some students may apply to law school to continue their preparation for the legal profession. Others may seek careers in law-related professions such as law enforcement, judicial administration and legal assistance.

Individualized Course of Study

As an alternative option to one of the concentrations, students may pursue a course of study that meets their individual needs and interests.

Global Politics Minor

The minor consists of required coursework and approved electives. Details are available from the Political Science Department. Minor is not open to POLS majors in the Global Politics concentration.

Law and Society Minor

The minor consists of required coursework and approved electives. Details are available from the Political Science Department. Minor is not open to POLS majors in the Pre-Law concentration.

Political Science Minor

The minor consists of required coursework and approved electives. Details are available from the Political Science Department.

Master of Public Policy

General Characteristics

The Master of Public Policy degree program (MPP) is professionally oriented, and open to students who wish to pursue analytic careers in government, nonprofit organizations, consulting, advocacy and related policy occupations. The program is structured to prepare graduates with competence and creativity to excel in careers in the ever-changing world of public policy. The core courses cover public policy, public policy analysis, economic and regulatory policy, research design, quantitative methods, leadership, policy internships, and graduate seminar.

The MPP program is designed to meet the needs of those who have earned baccalaureate degrees in a variety of disciplines, including, but not limited to, economics, history, political science, social sciences, psychology, city and regional planning, business administration, education, environmental studies, and natural resource management.

The program is two years in duration for students taking 8 or more units per term. It consists of 50 approved units (not including courses necessary to compensate for deficiencies). Because of the sequencing of courses, students admitted to the program are expected to begin study in the fall quarter. In their second year, students undertake the development, presentation, and discussion of individual research projects in a two-term seminar (POLS 590). After the completion of POLS 590, students are required to pass a comprehensive exam. The program offers students opportunities to develop close working relationships with faculty. Self-directed study, tailored to student interest and needs, is encouraged.

Prerequisites

Students entering the program are expected to bring with them backgrounds in certain basic subject areas or to make up deficiencies in these areas after admission. These include the following Cal Poly

course or its equivalent: STAT 217 Introduction to Statistical Concepts and Methods.

Admission Requirements

1. Possession of a baccalaureate degree from an accredited college or university;
2. A grade point average of not less than 3.00 in all undergraduate coursework;
3. Related undergraduate coursework or work experience;
4. The quality of previous educational and professional experiences measured by:
 - a. Biographical and career data (resumes, examples of reports, letters of recommendation, etc.),
 - b. Professional training in fields such as budgeting, management, and supervision in the public, health, or nonprofit sectors, and
 - c. A personal statement describing a student's experience and reasons for applying to the program
 - d. GRE scores are recommended, but not required, for admission.
5. For applicants whose preparatory education is principally in a language other than English, a TOEFL score of 550 or higher (or 213 on the new conversation scale for the computer-based TOEFL exam).

Program of Study

Graduate students must file a formal study plan with their major professor, graduate committee, department, college and university graduate studies office no later than the end of the first quarter of study. The formal program of study must include a minimum of 50 units. All courses on the formal study plan must be taken on a graded basis unless specified in the course catalog as credit/no credit (CR/NC).

Blended BA Political Science + Master of Public Policy

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

Eligibility

Students majoring in BA Political Science are eligible for the blended program in Master of Public Policy.

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Political Science department for any additional eligibility criteria.

BA Political Science

Program Learning Objectives

1. **Subject Matter Expertise:** Through their curricular and co-curricular work, students will demonstrate expertise in political science and its subfields, as well as its relationship to the broader worlds of study and practice.

2. **Critical Thinking:** Students will demonstrate critical thinking through their coursework and/or co-curricular activities.
3. **Working Productively and Communicating Effectively:** Through their coursework and/or co-curricular activities, students will demonstrate their ability to work productively, both alone and in groups, their knowledge of the principles of effective communication, and their ability to communicate the results of their work effectively through a variety of tools and techniques.
4. **Ethics, Diversity and Sustainability:** In the context of coursework and/or co-curricular activities, students will demonstrate that they have the knowledge and skills necessary to make reasoned decisions, and that they can bring an understanding of the politics surrounding and the value of ethics, diversity and sustainability to bear on those decisions.
5. **Lifelong Learning and Positive Contribution:** Through their coursework and/or co-curricular activities, students will demonstrate that they have the knowledge and skills to engage in lifelong learning aimed at making a positive contribution to society.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

POLS 112	American and California Government (D1) ¹	4
POLS 180	Political Inquiry	4
POLS 225	Introduction to International Relations	4
POLS 229	Introduction to Comparative Politics	4
POLS 230	Basic Concepts of Political Thought	4
POLS 359	Research Design	4
POLS 361	Data Analysis in Political Science	4
POLS 461	Senior Project I	4
& POLS 462	and Senior Project II	
	Political Science Electives (300-400 level) ²	16
	Political Science Diversity and Inclusion Course, select from the following: ³	4
POLS 308	Political Violence and Conflict Resolution	
POLS 310	The Politics of Race, Class, Gender and Sexuality (USCP)	
POLS 343	Civil Rights in America (USCP)	
POLS 380	Religion and Politics in the Israeli-Palestinian Conflict	
POLS 417	Feminist Legal Theory	
POLS 419	Social Movements and Political Protest	

POLS 445	Voting Rights and Representation (USCP)	
POLS 457	U.S. Reproductive Politics	
POLS 459	The Politics of Poverty	
Concentration or Individualized Course of Study		28
SUPPORT COURSES		
Select from the following:		4
ANT 201	Cultural Anthropology	
GEOG 150	Human Geography	
HIST 110	Western Civilization: Ancient to Renaissance	
HIST 111	Western Civilization: Reformation to the Present	
HIST 222	World History, 1000-1800	
HIST 223	World History, 1800 - Present	
SOC 110	Comparative Societies	
STAT 217	Introduction to Statistical Concepts and Methods (B4) ¹	4
Select any 200 or 300-level ES or WGQS course(s)		4
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		64
FREE ELECTIVES		
Free Electives ⁴		24
Total units		180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² A total of 4 units of either POLS 386 or POLS 387 may count toward upper-division Political Science electives. A total of 4 units of either POLS 386 or POLS 387 may count towards the Concentration. A total of 4 units of either POLS 386 or POLS 387 may count toward Free Electives. Any combination of POLS 386 and POLS 387 may be taken for a maximum of 12 units total credit for the degree.
- ³ Political Science Diversity and Inclusion course cannot be double-counted from Concentration courses.
- ⁴ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentrations or Individualized Course of Study (select one)

- American Politics (p. 327)
- Global Politics (p. 328)
- Pre-Law (p. 328)

Individualized Course of Study

A minimum of 28 units of coursework are selected by the student and approved by the student's academic advisor. 20 of these must be at the 300–400 level and 16 units must carry a POLS prefix.

General Education (GE) Requirements

- 72 units required, 8 of which are specified in Major and/or Support.
- If any of the remaining 64 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement) (4 units in Major) ¹	0
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives		8
Total units		64

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

American Politics Concentration

Select from the following:		8
POLS 315	The American Presidency	

POLS 319	United States Congress	
POLS 341	American Constitutional Law	
POLS 342	Constitutional Theory	
POLS 348	Early American Political Thought	
POLS 349	Contemporary American Political Thought	
POLS 417	Feminist Legal Theory	

Select from the following: 8

POLS 310	The Politics of Race, Class, Gender and Sexuality (USCP)	
POLS 316	Political Participation	
POLS 317	Campaigns and Elections	
POLS 419	Social Movements and Political Protest	
POLS 445	Voting Rights and Representation (USCP)	
POLS 457	U.S. Reproductive Politics	
POLS 459	The Politics of Poverty	

Select from the following: 8

POLS 338	Critical Issues in American Politics	
POLS 351	Public Policy and Administration	
POLS 375	California Politics	
POLS 386	Government Internship ¹	
POLS 387	Research Internship ¹	
POLS 431	Issues and Topics in American Politics	
POLS 440	California Student Bill Project	
POLS 451	Technology and Public Policy	
POLS 470	Selected Advanced Topics	
POLS 471	Urban Politics	

Approved Electives

Select from the following:² 4
Any unused course in this concentration¹

Total units 28

¹ A total of 4 units of either POLS 386 or POLS 387 may count toward concentration requirements.

² Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

Global Politics Concentration

POLS 308	Political Violence and Conflict Resolution	4
or POLS 381	Peace and War	
POLS 321	Comparative Political Culture	4
or POLS 426	International Organizations and Law	
or POLS 427	Politics of the Global Economy	
POLS 328	Politics of Developing Areas	4
or POLS 383	Politics of the European Union	
POLS 382	Comparative Foreign Policy	4
or POLS 420	Contemporary U.S. Foreign Policy	

POLS 428	Issues and Topics in Comparative Politics	4
or POLS 429	Issues and Topics in International Relations	

Approved Electives

Select from the following:¹ 8

POLS 285	Model United Nations	
POLS 324	International Relations Theory	
POLS 325	Global Political Issues	
POLS 332	World Food Systems	
POLS 339	Authoritarian and Democratic Rule	
POLS/RELS 380	Religion and Politics in the Israeli-Palestinian Conflict	
POLS 384	Comparative Law	
POLS 386	Government Internship ²	
POLS 387	Research Internship ²	
POLS 425	Comparative Political Corruption	
POLS 435	Political Communication	
POLS 451	Technology and Public Policy	
POLS 452	Technology and International Development	

Any unused course in this concentration

Total units 28

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² A total of 4 units of either POLS 386 or POLS 387 may count toward concentration requirements.

Pre-Law Concentration

POLS 245	Judicial Process	4
POLS 334	Jurisprudence	4
POLS 341	American Constitutional Law	4
POLS 343	Civil Rights in America (USCP)	4
POLS 344	Civil Liberties	4

Approved electives

Select from the following:¹ 8

BUS 207	Legal Responsibilities of Business	
BUS 409	Law of Real Property	
BUS 410	The Legal Environment of International Business	
CRP/NR 404	Environmental Law	
CRP/NR 408	Water Resource Law and Policy	
CRP 420	Land Use Law	
ES 380	Critical Race Theory	
JOUR 302	Mass Media Law	
LS 214	Constitutional Issues in the History of U.S. and California Education	
PHIL 334	Philosophy of Law	
POLS 295	Foundations of Mock Trial	
POLS 340	American Judicial Politics	
POLS 342	Constitutional Theory	
POLS 384	Comparative Law	

POLS 386	Government Internship ²	
POLS 387	Research Internship ²	
POLS 417	Feminist Legal Theory	
POLS 426	International Organizations and Law	
POLS 445	Voting Rights and Representation	
POLS 457	U.S. Reproductive Politics	
PSY 375	Forensic Psychology	
SOC 402	Gender, Crime, and Violence	
SOC 406	Juvenile Justice and Delinquency	
SOC 412	Contemporary Issues in Criminal Justice	

Total units **28**

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² A total of 4 units of either POLS 386 or POLS 387 may count toward concentration requirements.

Global Politics Minor

Required Courses

POLS 225	Introduction to International Relations	4
POLS 229	Introduction to Comparative Politics	4
Select from the following:		16
POLS 308	Political Violence and Conflict Resolution	
POLS 321	Comparative Political Culture	
POLS 328	Politics of Developing Areas	
POLS 380	Religion and Politics in the Israeli-Palestinian Conflict	
POLS 381	Peace and War	
POLS 382	Comparative Foreign Policy	
POLS 383	Politics of the European Union	
POLS 384	Comparative Law	
POLS 420	Contemporary U.S. Foreign Policy	
POLS 425	Comparative Political Corruption	
POLS 426	International Organizations and Law	
POLS 427	Politics of the Global Economy	
POLS 428	Issues and Topics in Comparative Politics	
POLS 429	Issues and Topics in International Relations	
POLS 451	Technology and Public Policy	
POLS 452	Technology and International Development	

Approved Elective

Elective¹ 4

Total units **28**

¹ Select an elective course in consultation with Minor Advisor or from unused courses listed above.

Law and Society Minor

Required Courses

POLS 245	Judicial Process	4
POLS 341	American Constitutional Law	4
Select from the following:		8
POLS 334	Jurisprudence	
POLS 343	Civil Rights in America	
POLS 344	Civil Liberties	

Approved Electives¹

Select from the following:		11-12
CRP/NR 404	Environmental Law	
CRP/NR 408	Water Resource Law and Policy	
CRP 420	Land Use Law	
ES 380	Critical Race Theory	
JOUR 302	Mass Media Law	
LS 214	Constitutional Issues in the History of U.S. and California Education	
PHIL 334	Philosophy of Law	
POLS 295	Foundations of Mock Trial	
POLS 340	American Judicial Politics	
POLS 342	Constitutional Theory	
POLS 384	Comparative Law	
POLS 386	Government Internship (4 units maximum)	
POLS 387	Research Internship (4 unit maximum)	
POLS 417	Feminist Legal Theory	
POLS 426	International Organizations and Law	
POLS 445	Voting Rights and Representation	
POLS 457	U.S. Reproductive Politics	
PSY 375	Forensic Psychology	
SOC 402	Gender, Crime, and Violence	
SOC 406	Juvenile Justice and Delinquency	
SOC 412	Contemporary Issues in Criminal Justice	

Total units **27-28**

¹ POLS majors must take at least one Approved Elective with a non-POLS prefix.

Political Science Minor

Required Courses

Select from the following:		12
POLS 112	American and California Government	
POLS 225	Introduction to International Relations	
POLS 229	Introduction to Comparative Politics	
POLS 230	Basic Concepts of Political Thought	

Approved Electives

Select from the following: 16

Any 300-400 level POLS courses

Total units**28**

Master of Public Policy

Program Learning Objectives

1. MPP students will be able to think critically and creatively about public policy theory, analysis and application. In particular, students will develop knowledge and skills in quantitative and qualitative analysis, argumentation, and the process and practice of research in general and as applied to a substantive policy area.
2. MPP students will develop skills for the clear, concise, and effective communication of ideas. This includes the communication of evidence, analysis, and arguments via written, visual, and oral methods.
3. MPP students will demonstrate expertise in the field of public policy, including an appreciation of the connections between a particular substantive area and the social, political, economic, and technological context in which it exists.
4. MPP students will develop leadership capacities that will prepare them to work productively as individuals and in groups.
5. MPP students will develop tools that prepare them to participate constructively in the process of creating, implementing and evaluating public policy.
6. MPP students will learn to recognize and reconcile diverse perspectives, and the tradeoffs they entail, in pursuit of the public interest.
7. MPP students will utilize internship experiences and course knowledge to prepare them for dynamic and professional careers in the ever-changing field of public policy.

Required Courses

POLS 510	Research Design	4
POLS 515	Public Policy	4
POLS 518	Public Policy Analysis	5
POLS 540	Leadership and Management in Public Policy	2
POLS 550	Regulatory and Economic Policy	4
POLS 560	Quantitative Methods	5
POLS 586	Policy Internship	4
POLS 590	Graduate Seminar	8
POLS 595	Directed Readings for MPP	2
	Comprehensive Exams	

Approved Electives

Additional 400 and 500-level courses, to be selected with graduate advisor's approval.	12
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At least 4 units must be at the 500 level. This may include 4 additional units of internship.

Total units**50**

Psychology and Child Development

Faculty Office Bldg. (47), Room 24
Phone: 805.756.2033
<https://psyecd.calpoly.edu>

Department Chair: Jennifer Jipson

Academic Programs

Program name	Program type
Child Development	BS, Minor
Gerontology	Minor, Certificate
Psychology	BS, MS, Minor

The department consists of faculty with degrees in psychology, family studies, human development and education who direct programs leading to BS Child Development, BS Psychology, MS Psychology, and minors in Child Development, Psychology and Gerontology.

In addition, courses are offered which fulfill general education requirements, support other programs and serve as a personal development resource for all university students. These courses are designed to acquaint students with the facts, theories and contemporary trends in psychology and child development and how these principles can be incorporated into a more meaningful understanding of oneself and of one's interactions with others. The department supports the concept of international education and encourages students to investigate opportunities for overseas study. For further information, see the Study Abroad programs (p. 443).

Undergraduate Programs

BS Child Development

The Child Development major is designed for students who are interested in professions involving children and adolescents in a variety of settings. The major provides the scientific base for understanding development from birth through emerging adulthood. The program emphasizes the ecological contexts in which development occurs, including family, school, technology, community, and culture. Graduates often continue studies in graduate and credential programs, and pursue a range of careers in education, intervention programs, and human services.

The Child Development major is designed to enable students to develop a program of study suited to their individual needs and become part of a learning community of faculty and students. After completing core courses in child and adolescent development, they will develop a personal program of study by selecting electives, two internships, and a senior project. Each student graduates with a BS in Child Development.

Goals of the Child Development major are for students to:

- Learn about theories and research that have helped us to understand how children and adolescents develop physically, emotionally, socially, and intellectually.
- Study how children and youth affect and are affected by the formal and informal environments in which they grow.
- Gain experience working with children and youth of different ages and backgrounds in various settings.
- Develop expertise in the use of digital technologies to access, create, and disseminate information related to the learning and development of children and youth.

- Develop an understanding of multicultural and anti-discrimination issues and how to lead children and youth into an appreciation of diversity.
- Develop skills in research, leadership, effective communication, and community building.

BS Psychology

The Psychology major offers a broad preparation in the science of psychology. Theoretical approaches, research techniques, laboratory experiences and internships are hallmarks of the psychology program.

Graduates often pursue careers in mental health programs, social services agencies, public health settings, educational institutions, and personnel-related settings. Many majors go on to graduate work in such fields of psychology as: counseling, developmental, family, social, clinical or experimental.

Students may pursue a course of study which meets their individual needs and interests. Electives are selected by the student with the advice of the student's academic advisor.

Child Development Minor

The minor is designed to provide students a broad knowledge base in child and adolescent development. Biological, cognitive, social, and emotional development are examined in context (e.g., family, school, culture). The minor builds upon students' critical thinking skills by approaching child development as a scientific area of study. This minor complements a background in majors such as Liberal Studies, Psychology, Kinesiology, or Recreation, Parks, Tourism and Administration. An application form must be approved by a Child Development Minor advisor. The Child Development minor is not open to Liberal Studies majors with a concentration in Child Development.

Gerontology Minor and Certificate Program

The Gerontology minor/certificate program is an interdisciplinary set of courses that prepares students in various majors whose careers will be directly or indirectly related to gerontology. The certificate program also allows non-matriculated students to develop or upgrade their skills and knowledge for those interested or already working in the field of gerontology. Coursework includes the psychological, biological, and social aspects of aging; changing roles; stress-related problems; and an understanding of the impact of an aging population on social, economic, and political institutions. *Among the requirements for admission to the program is a minimum GPA of 3.00. All applicants are reviewed by the program coordinator.*

Psychology Minor

The minor provides students with a broad background in the principles of psychology in order to develop an appreciation of the human element in the world around them, complement their professional training, and enhance their personal development and interpersonal effectiveness.

An application form must be approved by a Psychology Minor advisor.

Graduate Program MS in Psychology General Characteristics

The Master of Science in Psychology is a 90-quarter unit professional degree program designed to train highly competent master-level clinicians who are academically prepared to obtain the marriage and family therapy (MFT) license in the State of California. The program places a heavy emphasis on clinical skill training and applied experience that begins early in the program and culminates with an intensive supervised traineeship in a community mental health setting.

Admission to the Program

In addition to the general requirements of the University, specific requirements for admission to classified graduate standing are:

- an acceptable baccalaureate degree from an institution accredited by a regional association;
- a minimum grade point average of 3.0 in the last 90 quarter units (60 semester units) attempted;
- satisfactory performance on the General Tests (Verbal, Quantitative, Analytical) of the Graduate Record Examination (GRE); the GRE Advanced Test in Psychology is not required;
- three letters of recommendation;
- autobiographical information;

Related work or volunteer experience is highly desirable as is having received professional counseling.

Prerequisites

Coursework in abnormal psychology, lifespan theories/developmental psychology, personality theory, introductory statistics, and research methods in psychology (or related discipline). Completion of these prerequisites is necessary for admission to the program.

Classified Standing

For admission as a classified graduate student, a student shall have a minimum grade point average of 3.0 in the last 90 quarter units (60 semester units) attempted and shall have earned an acceptable baccalaureate degree from an institution accredited by a regional association. Additionally, the student must have satisfactorily met the professional, personal, scholastic, and other standards for graduate study, including qualifying examinations, as the appropriate university authorities may prescribe. Only those applicants who show promise of success and fitness are admitted, and only those who continue to demonstrate a satisfactory level of scholastic competence and who possess appropriate personal qualities are eligible to continue in the program.

Conditionally Classified Standing

The student may enroll in a graduate degree curriculum if in the opinion of the M.S. Program Committee the student can remedy any deficiencies by additional preparation.

Advancement to Candidacy

Advancement to master's degree candidacy requires completion of a minimum of 30 quarter units of required courses in residence, specified in a formal program of study, with a minimum grade point average of 3.0, fulfillment of the Graduation Writing Requirement, and the formal recommendation of the M.S. Program Committee. Students must

maintain a minimum GPA of 3.0 in all coursework completed subsequent to admission to the program.

Program of Study

The student must maintain a grade point average of 3.0 (B) or better in all courses taken subsequent to program admission. Calculation of the grade point average includes all grades, though only the units in courses with grades of A, B, or C are counted to satisfy requirements for the degree. Required courses with a grade of D or F must be repeated.

All candidates must meet the current Graduation Writing Requirement.

Sixty-four quarter units must be completed in residence. Transfer credits are allowed if acceptable for master's degree credit at the offering institution and approved by the M.S. Program Committee.

The Master of Science degree in Psychology requires a culminating experience that includes either the completion of a thesis or passing a comprehensive exam. Each candidate must file a formal program of study by the end of the first quarter as a classified graduate student. The professional and personal growth of each graduate student is of major importance; consequently, candidates are encouraged to seek the experience of personal therapy. Students must be very aware of course prerequisites and check the catalog carefully to assure enrollment in required courses.

MFT Licensing

The Master of Science in Psychology is designed to meet the educational requirements for the Marriage and Family Therapist license (MFT) in the State of California. Students are advised to acquire and read the laws governing MFT licensure from the California Board of Behavioral Sciences, 1625 North Market Blvd., Suite S-200, Sacramento, CA 95834. State documents must be filed by the applicant within 30 days of program graduation. See the program coordinator for the procedure required for application for this license. State documents must be filed by the applicant within 30 days of program graduation.

Grades

If a candidate for University recommendation for MFT licensure has more than one grade of C or lower among the courses to be verified for the Board of Behavioral Sciences, that form will not be approved by the Chief Academic Officer Designee of Cal Poly.

Practicum and Traineeship

Practicum and traineeship courses represent the student's demonstration of the clinical skills basic to marriage, family and child counseling. A student who receives a grade of NC in practicum or traineeship is on probation regarding continuation in the program. A second grade of NC disqualifies the student from the program and University recommendation for the license. Also, candidates may be disqualified from this program for academic-related actions judged by the M.S. Program Committee to reflect unethical and/or unprofessional conduct.

BS Child Development

Program Learning Objectives

1. Students completing core courses should demonstrate breadth of knowledge in developmental science and application of research and theory to "real-world" problems relevant to children, youth, and families.

2. Students should be able to understand scientific principles, think critically, and interpret, design, and conduct developmental science research.
3. Students will develop intrapersonal knowledge and interpersonal skills to contribute to building a society responsive to multicultural and global concerns.
4. Students should demonstrate competence in writing and in oral and interpersonal communication skills.
5. Students will develop skills and experience to enable them to succeed personally and professionally.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

CD 102	Orientation to the Child Development Major	2
CD 131	Observing and Interacting with Children	4
CD 230	Preschool Laboratory	4
CD/PSY 254	Family Psychology	4
CD/PSY 256	Developmental Psychology	4
CD 302	Developmental Science Technology Lab	2
CD 304	Infant and Toddler Development	4
CD 305	Early and Middle Childhood Development	4
CD/PSY 306	Adolescence	4
PSY 323	The Helping Relationship	4
CD 329	Research Methods in Child Development	4
CD 356	Behavioral Disorders in Childhood	4

Child Development Electives

Select from the following:		12
CD 350	Developmental Issues in Education	
CD 351	Learning in Out-of-School Time	
CD 411	Children, Adolescents & Technology	
CD/PSY 417	Interpersonal Relationships in Childhood and Adolescence	
CD/PSY 431	Assessing Children's Development and Environments	
CD 460	Child Abuse and Neglect	

Supervised Fieldwork and Internship

Select from the following:		10
CD 448	Research Internship	
CD 449	Advanced Research Internship	
CD 453	Supervised Fieldwork Internship	

CD 454	Advanced Supervised Fieldwork Internship	
CD 424	Children's Development in Diverse Cultures	4
CD 450	Perspectives on Child and Adolescent Development	4
CD 461	Senior Project Seminar	2
CD 462	Senior Project	2

SUPPORT COURSES

Select one of the following (B2): ¹		4
BIO 111	General Biology	
BIO 123	Biology of Sex	
BIO 161	Introduction to Cell and Molecular Biology	
Select one of the following (Upper-Division B): ¹		4
BIO 302	Human Genetics	
PSY 344	Behavioral Genetics	
Select one of the following (E): ¹		4
PSY 201	General Psychology	
PSY 202	General Psychology	
STAT 217	Introduction to Statistical Concepts and Methods (B4) ¹	4
Select one of the following:		4
PSY 304	Intergroup Dialogues	
PSY 324	Psychology of Gender	
PSY 372	Multicultural Psychology (USCP)	
PSY 465	Cross-Cultural International Psychology	
PSY 475	The Social Psychology of Prejudice (USCP)	

GENERAL EDUCATION (GE)

(See GE program requirements below.) 56

FREE ELECTIVES

Free Electives ² 26

Total units 180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A English Language Communication and Critical Thinking

A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Support) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives		8
Total units		56

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

BS Psychology

Program Learning Objectives

1. Students completing foundation courses should demonstrate breadth of knowledge and application of psychological ideas to "real-world" problems; Students completing a baccalaureate degree should show depth in their knowledge and application of psychological concepts and frameworks to complex problems. These include: a) understanding of how personality, culture, social context, and intergroup dynamics explain behavior; b) understanding cognitive and perceptual processes and their biological foundations and; c) knowledge of mental and physical health and illness.

2. Students should be able to understand scientific principles, think critically, and interpret, design, and conduct psychological research.
3. Students will develop *intrapersonal* knowledge and *interpersonal* skills to contribute to building a society responsive to multicultural and global concerns.
4. Students should demonstrate competence in writing and in oral and interpersonal communication skills.
5. Students will develop skills and experience to enable them to succeed personally and professionally.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

PSY 102	Orientation to the Psychology Major	2
Select from the following (E): ¹		4
PSY 201	General Psychology	
PSY 202	General Psychology	
PSY 252	Social Psychology	4
PSY/CD 256	Developmental Psychology	4
PSY 323	The Helping Relationship	4
PSY 329	Research Methods in Psychology	4
PSY 333	Quantitative Research Methods for the Behavioral Sciences	4
PSY 340	Biopsychology (Upper-Division B) ¹	4
PSY 372	Multicultural Psychology (USCP)	4

Biological and Cognitive

Select from the following:		8
PSY 330	Behavioral Effects of Psychoactive Drugs	
PSY 357	Cognition	
PSY 430	Sensation and Perception	
PSY 440	Memory	
PSY 458	Learning	
PSY 480	Cognitive Neuroscience	

Social and Personality

Select from the following:		8
PSY 302	Behavior in Organizations	
PSY 305	Personality	
PSY 350	Teamwork	
PSY 352	Conflict Resolution: Violent and Nonviolent	
PSY 360	Applied Social Psychology	
PSY 465	Cross-Cultural International Psychology	
PSY 475	The Social Psychology of Prejudice	

Mental and Physical Health

Select from the following:	8
PSY 318 Psychology of Aging	
PSY 320 Health Psychology	
PSY 325 Introduction to Positive Psychology	
PSY 370 Introduction to Clinical and Counseling Psychology	
PSY 375 Forensic Psychology	
PSY 405 Abnormal Psychology	
PSY/CD 460 Child Abuse and Neglect	

Supervised Fieldwork and/or Research Internship

Select from the following:	10
PSY 448 Research Internship I	
PSY 449 Research Internship II	
PSY 453 Supervised Fieldwork I	
PSY 454 Supervised Field Work II	
PSY 461 Senior Project Seminar	2
PSY 462 Senior Project	2
PSY electives (300-400 level) ²	12

SUPPORT COURSES

Select from the following (B2): ¹	4
ASCI 112 Principles of Animal Science	
BIO 111 General Biology	
BIO 123 Biology of Sex	
BIO 161 Introduction to Cell and Molecular Biology	

Select from the following (GE Electives): ¹	4
BIO 302 Human Genetics	
PSY 344 Behavioral Genetics	
STAT 217 Introduction to Statistical Concepts and Methods (B4) ¹	4

Select from the following:	4
CD 424 Children's Development in Diverse Cultures	
ES 320 African Americans in Popular Culture	
ES 321 Native Americans in Popular Culture	
ES 322 Asian Americans in Popular Culture	
ES 323 Latina/os in Popular Culture	
ES/WGQS 350 Gender, Race, Culture, Science & Technology	
ES 380 Critical Race Theory	
ES 381 The Social Construction of Whiteness	
PSY 260 African American Psychology	
PSY 304 Intergroup Dialogues	
PSY/WGQS 324 Psychology of Gender	
WGQS 301 Contemporary Issues in Women's and Gender Studies	
WGQS 320 Women, Gender and Sexuality in Global Perspective	
WGQS 340 Sexuality Studies	
WGQS/RELS 370 Religion, Gender, and Society	

GENERAL EDUCATION (GE)

(See GE program requirements below.) 52

FREE ELECTIVES

Free Electives ³	28
Total units	180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Any 300-400 level course not already used to satisfy Major requirements listed above.
- ³ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
	Upper-Division B (4 units in Major) ¹	0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
	Lower-Division C Elective - Select a course from either C1 or C2	4
	Upper-Division C	4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
	Upper-Division D	4
Area E	Lifelong Learning and Self-Development	

Lower-Division E (4 units in Major) ¹	0
Area F Ethnic Studies	
F Ethnic Studies	4
GE Electives in Areas B, C, and D	
Select courses from two different areas; may be lower-division or upper-division courses.	
GE Electives (4 units in Support plus 4 units in GE) ¹	4
Total units	52

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Child Development Minor

Note: No more than one minor course may be taken as credit/no credit.

Required Courses

CD/PSY 256 or EDUC 207	Developmental Psychology ¹ Children's Learning and Development in Educational Settings	4
PSY 201 or PSY 202	General Psychology General Psychology	4
STAT 217 or STAT 218 or STAT 251 or STAT 312 or STAT 321	Introduction to Statistical Concepts and Methods Applied Statistics for the Life Sciences Statistical Inference for Management I Statistical Methods for Engineers Probability and Statistics for Engineers and Scientists	4

Electives

Select from the following:		8
CD 304	Infant and Toddler Development	
CD 305	Early and Middle Childhood Development	
CD/PSY 306	Adolescence	
Select from the following:		8
CD 350	Developmental Issues in Education	
CD 351	Learning in Out-of-School Time	
CD/PSY 356	Behavioral Disorders in Childhood	
CD 411	Children, Adolescents & Technology	
CD/PSY 417	Interpersonal Relationships in Childhood and Adolescence	
CD 424	Children's Development in Diverse Cultures	
CD/PSY 431	Assessing Children's Development and Environments	
CD/PSY 460	Child Abuse and Neglect	
Total units		28

¹ CD/PSY 256 is recommended.

Gerontology Minor and Certificate Program

Required Courses

FSN 315	Nutrition in Aging	4
KINE 408	Exercise and Health Gerontology	3
PSY 318	Psychology of Aging	4
SOC 326	Sociology of the Life Cycle	4

Approved Electives

Select from the following:		8
ANT 344	Sex, Death, and Human Nature	
ANT 401	Culture and Health	
BIO 302	Human Genetics	
BIO 305	Biology of Cancer	
COMS 418	Health Communication	
COMS 422	Rhetorics of Science, Technology, and Medicine	
FSN 202 or PSY 256	Introduction to Human Nutrition Developmental Psychology	
PHIL 339	Biomedical Ethics	
PSY 310	Psychology of Death	

Gerontology-Related Fieldwork ¹

Select from the following:		4
PSY 401	Special Problems: Experiential Learning	
Or an advisor approved course		

Total units **27**

¹ May be fulfilled as an elective in the student's major or may be challenged due to previous work.

Psychology Minor

Note: No more than one minor course may be taken as credit/no credit.

Required Courses

PSY 201 or PSY 202	General Psychology General Psychology	4
Select from the following:		4
STAT 217	Introduction to Statistical Concepts and Methods	
STAT 218	Applied Statistics for the Life Sciences	
STAT 251	Statistical Inference for Management I	
STAT 312	Statistical Methods for Engineers	
STAT 321	Probability and Statistics for Engineers and Scientists	

Select from the following:		8
PSY 252 or PSY 256	Social Psychology Developmental Psychology	
PSY 305	Personality	
PSY 340	Biopsychology	
PSY 405	Abnormal Psychology	

Approved PSY Electives (300-400 level)

Select from the following: 12

PSY 302 or BUS 387	Behavior in Organizations Organizational Behavior
PSY 304	Intergroup Dialogues ¹
PSY 305	Personality ²
PSY 310	Psychology of Death
PSY 311	Environmental Psychology
PSY 318	Psychology of Aging
PSY 320	Health Psychology
PSY/WGQS 324	Psychology of Gender ¹
PSY 325	Introduction to Positive Psychology
PSY 330	Behavioral Effects of Psychoactive Drugs
PSY 340	Biopsychology ²
PSY 350	Teamwork
PSY 352	Conflict Resolution: Violent and Nonviolent
PSY 357	Cognition
PSY 360	Applied Social Psychology
PSY 370	Introduction to Clinical and Counseling Psychology
PSY 372	Multicultural Psychology ¹
PSY 375	Forensic Psychology
PSY 405	Abnormal Psychology ²
PSY 410	History and Systems of Psychology
PSY 419	Self and Identity
PSY 430	Sensation and Perception
PSY 432	Psychological Testing
PSY 440	Memory
PSY 458	Learning
PSY 465	Cross-Cultural International Psychology ¹
PSY 475	The Social Psychology of Prejudice ¹
PSY 480	Cognitive Neuroscience

Total units 28

¹ One of these courses may be counted towards both the minor and a CD support course.
² If a course is taken to meet a minor requirement, it cannot be double-counted as an Approved Elective for the minor.

MS Psychology Program Learning Objectives

- Develop the *intrapersonal* and *interpersonal* knowledge and skills required for ethical, efficacious, and culturally responsive clinical practice.
- Demonstrate written, oral, and interpersonal communication skills conducive to empathic, respectful, and collaborative working relationships with diverse individuals, children, couples, families, and professionals.
- Demonstrate legal, ethical, and documentation knowledge of marriage and family therapy practice and how to apply these

standards to diverse populations and contexts, such as public agencies, schools, and private practice.

- Conduct evidence-based, culturally responsive core and advanced counseling and psychotherapy skills with diverse individuals, children, couples, and families.
- Conduct evidence-based, culturally responsive assessment and diagnostic procedures with diverse individuals, children, couples, and families.
- Conduct evidenced-based, culturally responsive treatment planning, progress notation, and discharge planning with diverse individuals, children, couples, and families.
- Demonstrate ability to access and utilize research as critical consumers to implement best practices strategies with diverse clients and issues.

Required Courses

PSY 504	Psychopharmacology	4
PSY 520	Marriage & Family Therapy: Professional Identity, Theory and Practice	4
PSY 535	Child and Adolescent Psychopathology	4
PSY 555	Counseling & Communication	4
PSY 556	Multicultural Counseling and Psychology	4
PSY 560	Individual Therapy: Theory and Application	4
PSY 564	Ethics and the Law: MF Therapy	4
PSY 565	Diagnosis and Treatment: Psychopathology	4
PSY 566	Group Therapy: Theory and Application	4
PSY 569	Counseling Clinic Practicum (3) (3)	6
PSY 571	Advanced Family Therapy: Theory and Application	4
PSY 572	Child and Adolescent Therapy: Theory and Application	4
PSY 574	Psychological Assessment	4
PSY 575	Gender and Couple Therapy	4
PSY 576	Traineeship: Marital and Family Therapy (4) (4) (4) (4)	16
PSY 577	Community Mental Health: Issues and Practices	4
PSY 585	Research Methods for Counseling Psychology	4
PSY 588	Assessment and Treatment of Substance Use Disorders	4

Select from the following: 4

PSY 599	Thesis ¹	
OR		
Written comprehensive exam and one of the following:		
PSY 568	Advanced Psychotherapies	

or an approved 400-level PSY course

Total units **90**

¹ Must register for thesis credit each quarter of advisement.

Social Sciences

Faculty Office Bldg. (47), Room 13-C
Phone: 805.756.2260
<https://socialsciences.calpoly.edu>

Department Chair: Ryan Alaniz

Academic Programs

Program name	Program type
Anthropology and Geography	BS, Minor
Latin American Studies	Minor
Sociology	BA, Minor

The Social Sciences Department offers bachelor's degrees and minors in Anthropology-Geography and Sociology, as well as a minor in Latin American studies.

Within each major, students are required to choose a concentration relevant to their future career endeavors. The Anthropology-Geography major concentrations include environmental studies and sustainability, global studies and international development, and human ecology. Sociology majors can choose a concentration in criminal justice, organizations, or social services.

The strength of our department lies in its focus on practical training, critical thinking, and "Learn by Doing" experiences. Students are trained in applied technical skills including GIS, remote sensing, research design, social data collection, and qualitative/quantitative methodology.

Alongside these skills, students are encouraged to critically investigate contemporary issues, asking hard questions about society, behavior, and the environment in an increasingly diverse and global world. Finally, students are required to bridge classroom learning with the real world through hands-on practical experience such as internships, service learning, study abroad, and senior projects.

Undergraduate Programs

BS Anthropology and Geography

The Anthropology and Geography major provides students with the skills for understanding and examining patterns of human activity and resource utilization across space and time, as well as the interactions between humans and the natural environment. Interdisciplinary in nature, this program focuses on the applied areas of cross-cultural studies, international development, ecological research design and method, the evolution of humans, environmental assessment, and sustainability. Courses in Anthropology and Geography train students to examine human ecology from the ancient past to the modern present through courses in biological evolution, cultural adaptations, behavioral ecology, environmental impacts, and the ecology of human health and disease. In addition, students gain an understanding of the physical environment in which humans are placed, through courses in physical geography, resource management, biogeography, and climatology. Students are trained in relevant skills, including Geographic Information Systems, remote sensing, and quantitative methods.

Students interested in this major should be curious about the relationships between humans and the environment (including biology, behavior, climate and landscapes) from a broad hands-on perspective.

Our students typically have particular interest in study abroad and involvement in international opportunities.

The program offers a four-year curriculum leading to a BS degree that prepares students for careers in environmental and regional planning, cultural resources management, archaeology, international development, climatology, science education, international health research, and federal government work in behavioral analysis.

Internship or Study Abroad Requirement

As a means of promoting relevant job skills, hands-on learning, and field experience, majors are required to complete either an approved internship or study abroad program. Students who do an internship will receive a minimum of 3 units of credit (ANT 465 or GEOG 465). The department will assist students in identifying suitable internships. However, students are encouraged to explore options for themselves based on their interests. In place of an internship, students may choose to participate in a study abroad program. Four units of approved coursework taken while studying abroad will be substituted for the internship course.

Concentrations

Students may select one of the following concentrations or the individualized course of study.

Environmental Studies and Sustainability

Provides students with an understanding of human environmental relationships, resource utilization, and human impact on the Earth. Current environmental issues are explained and evaluated in a global and historical context. Students learn the importance of sustainable land use practices and techniques for their successful implementation. Applied and technical skills important to assessing the environment and promoting sustainability are emphasized.

Global Studies and International Development

Provides students with the theoretical knowledge and applied skills necessary for the study and practice of international development in cross-cultural settings. Students attain an in-depth knowledge of the social, political, economic, and ecological dimensions of international development and gain practical skills through research projects, international study, and applied internships. The concentration provides expertise and training for internationally focused careers, including public and private development institutions, the Peace Corps, the public health field, education, and numerous other careers where cross-cultural and international understanding are essential.

Human Ecology

Students learn about the natural environment, human behavioral and cultural systems, and the complex interrelationships between the three. Major concepts and practice emphasize broad spatial and temporal perspectives. Students acquire knowledge and skills related to global and regional climate and physical geography, human evolution, cultural ecology, behavioral ecology, prehistoric and recent environmental change, indigenous cultures of the New World, methods for analyzing climate change and related human responses in the past and present.

Other Concentration Options

With prior approval of the Social Sciences Department and the Political Science Department, students may select one of the following concentrations: Pre-Law, or Global Politics.

Individualized Course of Study

One of the two opportunities to pursue a course of study which meets a student's individual needs and interests. As their course of study,

students may pursue an academic minor or create a program, with faculty approval, based upon their interests and career goals. The coursework may be specifically tailored for a career in industry, education, government, or as preparation for graduate school.

BA Sociology

Sociology explores the nature and dynamics of human society and the interrelationship between individuals and their social groups. The goal of sociological study at Cal Poly is twofold. The first objective is to develop a sociological imagination that enables students to see their personal circumstances and problems in context of the broader, local, national, and global forces that shape their lives. The second objective is to prepare students for graduate studies and careers in such fields as criminal justice, law, social services, complex organizations, and teaching. Sociology also offers general education courses that provide an understanding of the complexity and diversity of the world's peoples and their problems. Some courses focus on American society, emphasizing issues of class, race, ethnicity and gender. Other courses have a global orientation dealing with both the past and present diversity of the world's societies, economies, politics and religions.

Internship Requirement

As a means of promoting relevant job skills, hands-on learning, and field experience, majors who select the criminal justice or social services concentrations are required to complete an approved internship. Majors who select the organizations concentration will be encouraged to complete an internship, but will not be required to do so. These internships in criminal justice or social services will be up to one year, but with a minimum of two quarters, and count for 8 to 12 units of credit (SOC 440). The department will assist students in identifying suitable internships. However, students are encouraged to explore options for themselves based upon their interests.

Concentrations

Students are required to take one of the following concentrations or the individualized course of study.

Criminal Justice

Prepares students for careers in law, law enforcement, corrections, detention, probation, parole and other criminal justice agencies.

Organizations

Students learn to apply the general principles of human behavior to the understanding of modern organizations. It prepares them for careers in business, government or non-governmental organizations.

Social Services

Provides the general principles of human social behavior and specialized professional courses to prepare for careers in the helping professions such as social work and counseling.

Other Concentration Options

With prior approval of the Social Sciences Department and the Political Science Department, students may select one of the following concentrations: Pre-Law, or Global Politics.

Individualized Course of Study

One of two opportunities to pursue a course of study which meets a student's individual needs and interests. As their course of study, students may pursue an academic minor or create a program, with faculty approval, based upon their interests and career goals. The course

of study may be specifically tailored for a career in industry, education, government, or as preparation for graduate school. When creating an individual program, it should consist of 28 units, with 16 of the 28 at the 300-400 level. Courses are selected by the student in consultation with an advising faculty member. The student must also provide a written justification for the courses and the way they constitute a cohesive, integrated course of study. The list of courses is a contract between the student and the Department.

Anthropology and Geography Minor

The minor develops broad spatial and cultural knowledge of our world. The program consists of foundation courses and directed electives that allow flexibility for students to tailor the program to meet their individual interests and goals. The objectives of the minor are to increase student awareness of the: (1) cultural and ecological diversity of the Earth's surface; (2) inter-relationships between peoples of varying cultures; (3) interactions of different cultures with their resource habitats and environmental alteration; and (4) methodologies and technologies used to evaluate cultures and environments. The goal is to instill a respect for cultural diversity and environmental sustainability. A minimum of 14 units must be upper division and taken at Cal Poly.

Latin American Studies Minor

Latin America is a region of critical importance to the United States. Students gain an interdisciplinary understanding of Latin America, as well as its cultural, political, and economic connections to California. This knowledge is increasingly important for a broad range of careers, including education, health, government, business, agriculture, tourism, and trade. The minor also promotes critical thinking skills and enhances the appreciation of diversity as students confront issues relevant to Latin America and US-Latin America relations.

Sociology Minor

The minor provides students with a broad understanding of contemporary society with a focus on the analysis of social change. The objectives of the program are to increase awareness of the: (1) nature of international social, economic and political structures and their consequences; (2) social results of emerging technology; (3) changes in family life, especially the role of women; and (4) changing ethnic mix in California and the United States and its implications. Coursework includes the study of the shifting demographic patterns in society, emerging life styles, the increase in the percentage of elderly in the population, and the nature of specific subculture influences.

BA Sociology

Program Learning Objectives

1. Achieve an international/global perspective of societies
2. Develop an understanding of the problems of the U.S. as a pluralistic society
3. Learn to apply a holistic/integrated approach to social problems
4. Develop data collection skills and techniques used by modern sociology
5. Be prepared to enter careers which use the skills and knowledge of sociology

- 6. Demonstrate critical thinking concerning global issues
- 7. Demonstrate the writing skills necessary to communicate effectively

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

SOC 110	Comparative Societies (D2) ¹	4
SOC 111	Social Problems	4
SOC 216	US Race and Ethnic Relations	4
SOC 218	International Political Economy (GE Electives) ¹	4
SOC 222	Classical Social Theory	4
SOC 305	Social Movements	4
or SOC 327	Social Change	
SOC 308	Sociology of the Environment	4
or SOC 435	Sociology of Health and Illness	
SOC/WGQS 311	Sociology of Genders and Sexualities	4
SOC 323	Social Stratification	4
SOC 354	Qualitative Research Methods	4
SOC 355	Quantitative Research Methods	4
SOC 461	Senior Project I	2
SOC 462	Senior Project II	2
SOC Electives (4 units must be at the 300-400 level)		12
STAT 217	Introduction to Statistical Concepts and Methods (B4) ¹	4
Select from the following:		4
ANT 201	Cultural Anthropology	
GEOG 150	Human Geography	
Lower-division Social Sciences Course ²		
ANT or GEOG Elective (300-400 level)		4
Concentration or Individualized Course of Study (see list below)		28
GENERAL EDUCATION (GE)		
(See the GE program requirements below.)		60
FREE ELECTIVES		
Free Electives ³		20
Total units		180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Courses from the following disciplines will be acceptable towards the lower-division Social Sciences course: Anthropology, Ethnic Studies, Geography, Sociology, Political Science, Psychology, or Women's, Gender, and Queer Studies.

³ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree. Free electives may need to be at the 300-400 level to ensure completion of the required minimum of 60 units of upper-division courses.

Concentration or Individualized Course of Study

Students are required to take one of the following Concentrations or the Individualized Course of Study.

- Criminal Justice (p. 342)
- Organizations (p. 342)
- Social Services (p. 342)

Individualized Course of Study

When creating an individual program, it should consist of 300-400 level courses selected in consultation with advising faculty. A written justification for the courses selected and the way they constitute a cohesive, integrated study is required. One-half of the units must be courses from the department.

General Education (GE) Requirements

- 72 units required, 12 of which are specified in Major and/or Support.
- If any of the remaining 60 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4

Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Major) ¹	0
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		60

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Criminal Justice Concentration

SOC 402	Gender, Crime, and Violence	4
SOC 406	Juvenile Justice and Delinquency	4
SOC 412	Contemporary Issues in Criminal Justice	4
SOC 440	Internship ¹	8
Applications and Issues Courses		
Select from the following: ²		
POLS 245	Judicial Process	
POLS 344	Civil Liberties	
PSY 352	Conflict Resolution: Violent and Nonviolent	
PSY 375	Forensic Psychology	
PSY 460	Child Abuse and Neglect	
SOC 301	Social Work and Social Welfare Institutions	
SOC 395	Sociology of Complex Organizations	
SOC 414	Theories of Social Work in Counseling Agencies	
SOC 440	Internship ¹	
SOC 444	Incarceration and Society: Perspectives on the Criminal Justice System	
Total units		28

¹ A maximum of 12 units of SOC 440 may be applied to the concentration.

² Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

Organizations Concentration

Select from the following: 20

At least 4 units must be SOC		
BUS 382	Leadership and Organizations	
BUS 384	Human Resources Management	
COMS 213	Organizational Communication	
COMS 320	Intergroup Communication	
POLS 351	Public Policy and Administration	
PSY 252	Social Psychology	
SOC 310	Self, Organizations and Society	
SOC 395	Sociology of Complex Organizations	
SOC 423	Gender and Work	
SOC 440	Internship (up to 8 units) ¹	

Approved Electives: ²

Select from the following: 8

BUS 207	Legal Responsibilities of Business	
BUS 476	Leading Social Innovation in Organizations	
BUS 477	Management Consulting and Change Management	
COMS 217	Small Group Communication	
COMS 413	Advanced Organizational Communication	
ES/WGQS 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development	
POLS 315	The American Presidency	
POLS 319	United States Congress	
PSY 304	Intergroup Dialogues	
SOC 412	Contemporary Issues in Criminal Justice	
SOC 440	Internship	

Total units 28

¹ A maximum of 8 units of SOC 440 may be applied to the concentration.

² Consultation with advisor is recommended prior to selecting Approved Electives, bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

Social Services Concentration

SOC 301	Social Work and Social Welfare Institutions	4
SOC 414	Theories of Social Work in Counseling Agencies	4
SOC 440	Internship	8

Approved Electives ¹

Select from the following: 12

ES 340	Cultural Production and Ethnicity	
ES/WGQS 350	Gender, Race, Culture, Science & Technology	
POLS 310	The Politics of Race, Class, Gender and Sexuality	

POLS 343	Civil Rights in America
POLS 419	Social Movements and Political Protest
POLS 459	The Politics of Poverty
POLS 471	Urban Politics
PSY/CD 306	Adolescence
PSY 310	Psychology of Death
PSY 318	Psychology of Aging
PSY 330	Behavioral Effects of Psychoactive Drugs
SOC 305	Social Movements
SOC 306	Sociology of the Family
SOC 309	The World System and Its Problems
SOC 310	Self, Organizations and Society
SOC 327	Social Change
SOC 402	Gender, Crime, and Violence
SOC 406	Juvenile Justice and Delinquency
SOC 412	Contemporary Issues in Criminal Justice
SOC 420	Practical Interviewing and Counseling Skills in Social Work
SOC 435	Sociology of Health and Illness
WGQS 301	Contemporary Issues in Women's and Gender Studies
WGQS/RELS 370	Religion, Gender, and Society
WGQS 401	Seminar in Women's and Gender Studies
WGQS 450	Feminist Theory

Total units **28**

¹ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

BS Anthropology and Geography Program Learning Objectives

1. Understand and appreciate the cultural and physical attributes of major world regions, key regional issues and linkages between regions, the processes that shape cultural change and interaction, and international development issues.
2. Demonstrate an in-depth knowledge of human ecology with specific emphasis on the ecological, demographic, genetic, developmental, and epidemiological dimensions of modern human adaptations and their evolutionary foundations over time and space.
3. Comprehend the historical place of humans around the globe and apply acquired skills for cultural resource management and conservation.
4. Analyze the processes that shape the earth's physical environment (e.g. climate, landforms, water, soils, biota, and ecosystems), the distributions of natural resources, and the ways in which humans utilize natural resources and impact the environment with an emphasis on sustainability.
5. Apply scientific research methodology and design, including the ability to collect, synthesize, and interpret qualitative and quantitative

cultural and ecological data using a variety of methods including the utilization of geospatial technologies (GIS, remote sensing, and GPS).

6. Critically analyze issues from multiple perspectives and communicate results effectively.
7. Synthesize information and utilize acquired skills locally and globally to improve the state of the environment and the human condition by applying cultural, ecological, and spatial knowledge, methods, and techniques.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

ANT 201	Cultural Anthropology (D2) ¹	4
ANT 202	World History Before Writing (GE Electives) ¹	4
ANT 250	Biological Anthropology (B2) ¹	4
ANT 360	Human Cultural Adaptations	4
ANT 384	Professional Preparation for Anthropologists/Geographers	1
or GEOG 384	Professional Preparation for Anthropologists/Geographers	
ANT/GEOG 455	Anthropology-Geography Research Design and Methods	4
ANT 465	Internship ²	3
or GEOG 465	Internship	
GEOG 150	Human Geography	4
GEOG 218	Applications in GIS	4
GEOG/ERSC 250	Physical Geography	4
GEOG 308	Global Geography (Upper-Division D) ¹	4
GEOG 350	The Global Environment (Upper-Division B) ¹	4
Methodological Elective, select from the following:		4
ANT 310	Archaeological Field Methods	
ANT 311	Archaeological Laboratory Methods	
ANT 393	Action-oriented Ethnography	
GEOG 328	Applications in Remote Sensing and GIS	
GEOG 441	Advanced Applications in Geospatial Technologies	
Regional Geography Elective, select from the following:		4
GEOG 340	Geography of California	
GEOG 370	Geography of Latin America	
GEOG 380	Geography of the Caribbean	
ANT Electives (300-400 level)		8

GEOG Elective (300-400 level)	4
ANT, GEOG, or SOC Elective (300-400 level)	8
Concentration or Individualized Course of Study (see below)	28
STAT 217 Introduction to Statistical Concepts and Methods (B4) ¹	4
Select from the following:	4
ANT 461 Senior Project I & ANT 462 and Senior Project II	
GEOG 461 Senior Project I & GEOG 462 and Senior Project II	
GENERAL EDUCATION (GE)	
(See GE program requirements below.)	48
FREE ELECTIVES	
Free Electives ³	24
Total units	180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Approved study abroad course may substitute.

³ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentrations

Students may select one of the following concentrations or the individualized course of study.

- Environmental Studies and Sustainability (p. 344)
- Global Studies and International Development (p. 345)
- Human Ecology (p. 345)

Individualized Course of Study

An Individualized Course of Study should consist of 28 units, with at least 16 units at the 300-400 level. Courses are selected by the student in consultation with an advising faculty member. The student must also provide a written justification for the courses and the way they constitute a cohesive, integrated course of study. The list of courses is a contract between the student and the Department.

General Education (GE) Requirements

- 72 units required, 24 of which are specified in Major and/or Support.
- If any of the remaining 48 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4

Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science (4 units in Major) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B (4 units in Major)		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Major) ¹	0
Upper-Division D (4 units in Major) ¹		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Majors plus 4 units in GE) ¹		4
Total units		48

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Environmental Studies and Sustainability Concentration

GEOG/ERSC 325	Climate and Humanity	4
GEOG 328	Applications in Remote Sensing and GIS	4
or GEOG 441	Advanced Applications in Geospatial Technologies	
GEOG 414	Global and Regional Climatology	4
or GEOG 415	Applied Meteorology and Climatology	
GEOG 435	Biodiversity and Biogeography Methods	4
Problems and Issues Courses		
Select from the following:		12
AG 315	Principles of Organic Crop Production	
AG 360	Holistic Management	

ANT 312	Introduction to Cultural Resources Management
BIO 114	Plant Diversity and Ecology
BIO 227	Wildlife Conservation Biology
BRAE 345	Aerial Photogrammetry and Remote Sensing
BRAE 348	Energy for a Sustainable Society
CRP/NR 404	Environmental Law
EDES 406	Sustainable Environments
ENVE 324	Introduction to Air Pollution
GEOG 333	Human Impact on the Earth
GEOG 408	Geography of International Development
GEOL 201	Physical Geology
NR 306	Natural Resource Ecology and Habitat Management
POLS 332	World Food Systems
PSC 320	Energy, Society and the Environment
SOC 308	Sociology of the Environment
SOC 431	World Population Processes and Problems
SS 120	Introductory Soil Science

Total units 28

Global Studies and International Development Concentration

ANT 401	Culture and Health	4
GEOG 408	Geography of International Development	4

Problems and Issues Courses

Select from the following: 12

ANT 330	Indigenous South Americans
ANT 344	Sex, Death, and Human Nature
ANT 345	Human Behavioral Ecology
ANT 402	Nutritional Anthropology
GEOG/ERSC 325	Climate and Humanity
GEOG 328	Applications in Remote Sensing and GIS
GEOG 333	Human Impact on the Earth
GEOG 370	Geography of Latin America
GEOG 380	Geography of the Caribbean
GEOG 441	Advanced Applications in Geospatial Technologies

Select two from the following: 8

CRP 334	Cities in a Global World
ECON 222	Macroeconomics
POLS 328	Politics of Developing Areas
POLS 332	World Food Systems
SOC 308	Sociology of the Environment
SOC 309	The World System and Its Problems
SOC 315	Global Race and Ethnic Relations
SOC 321	Migration

SOC 431	World Population Processes and Problems
UNIV 391	Appropriate Technology for the World's People: Development
UNIV 392	Appropriate Technology for the World's People: Design
WLC 310	Humanities in World Cultures
Foreign language at intermediate level (201) or credit for a comparable level of proficiency (4 units max)	

Total units 28

Human Ecology Concentration

ANT 345	Human Behavioral Ecology	4
ANT 309	Elements of Archaeology	4
or ANT 320	California's Native Past	
ANT 401	Culture and Health	4
or ANT 402	Nutritional Anthropology	

Select from the following: 4

GEOG/ERSC 325	Climate and Humanity
GEOG 408	Geography of International Development

Select from the following: 12

ANT 310	Archaeological Field Methods
ANT 311	Archaeological Laboratory Methods
ANT 312	Introduction to Cultural Resources Management
ANT 330	Indigenous South Americans
ANT 344	Sex, Death, and Human Nature
ANT 415	Native American Cultures
ANT 425	Meaning, Gender, and Identity in Anthropological Theory
GEOG 340	Geography of California
GEOG 370	Geography of Latin America
SOC 308	Sociology of the Environment
SOC 321	Migration
SOC 431	World Population Processes and Problems

Total units 28

Anthropology and Geography Minor

Required Courses

ANT 250	Biological Anthropology	4
GEOG 250	Physical Geography	4

Select from the following: 4

ANT 201	Cultural Anthropology
ANT 202	World History Before Writing
GEOG 150	Human Geography

Ecological Courses

Select from the following: 4

ANT 360	Human Cultural Adaptations
GEOG 325	Climate and Humanity
GEOG 333	Human Impact on the Earth

GEOG 350	The Global Environment	
Global and Regional Courses		
Select from the following:		4
ANT 320	California's Native Past	
ANT 330	Indigenous South Americans	
ANT 415	Native American Cultures	
GEOG 308	Global Geography	
GEOG 340	Geography of California	
GEOG 370	Geography of Latin America	
GEOG 380	Geography of the Caribbean	
Special Topics		
Select from the following:		8
ANT 309	Elements of Archaeology	
ANT 310	Archaeological Field Methods	
ANT 311	Archaeological Laboratory Methods	
ANT 344	Sex, Death, and Human Nature	
ANT 345	Human Behavioral Ecology	
ANT 393	Action-oriented Ethnography	
ANT 401	Culture and Health	
ANT 425	Meaning, Gender, and Identity in Anthropological Theory	
ANT 460	Queer Anthropology	
GEOG 328	Applications in Remote Sensing and GIS	
GEOG 408	Geography of International Development	
GEOG 414	Global and Regional Climatology	
GEOG 415	Applied Meteorology and Climatology	
GEOG 441	Advanced Applications in Geospatial Technologies	
Total units		28

Latin American Studies Minor

Required Courses

GEOG 370	Geography of Latin America	4
SPAN 201	Intermediate Spanish I	4
Select from the following:		4
ANT 330	Indigenous South Americans	
GEOG 380	Geography of the Caribbean	
HIST 338	Modern Latin America	
POLS 328	Politics of Developing Areas (Latin America topic only)	
WLC 310	Humanities in World Cultures (Topics: Latin America or Mexico)	
WLC 315	Critical Issues in Latin American Studies	
Select from the following:		4
ES 323	Latina/os in Popular Culture	
SPAN 233	Introduction to Hispanic Readings	
WLC 312	Humanities in Chicano/a Culture	
Approved Electives ¹		

Electives	8
Total units	24

¹ Unused courses from above may count as Approved Electives. A minimum of 4 units must be 300-400 level.

Sociology Minor

Required Courses

SOC 110	Comparative Societies	4
SOC 111	Social Problems	4
SOC 315	Global Race and Ethnic Relations	4
Select from the following:		4
SOC 308	Sociology of the Environment	
SOC 311	Sociology of Genders and Sexualities	
Select from the following:		4
SOC 218	International Political Economy	
SOC 309	The World System and Its Problems	
SOC 323	Social Stratification	
Approved Electives		
Select from the following:		8
(SOC courses at least 4 units at 300-400 level) ¹		
Total units		28

¹ If taking SOC 218 an additional 4 units of 300-400 level SOC course will need to be taken.

Theatre & Dance

Davidson Music Center (45), Room 103

Phone: 805.756.1465

<https://theatredance.calpoly.edu>

Department Chair: Brian Healy

Academic Programs

Program name	Program type
Theatre Arts	BA, Minor
Dance	Minor

The courses offered by the Theatre and Dance Department provide students with well-balanced programs of study, integrating practical production work with classes that examine the principles, theoretical aspects, and historical development of theatre and dance.

A full range of studio dance courses are offered that include ballet, modern, jazz, and ballroom. Composition and dance production are available, as well as courses designed for future teachers of dance. The department also provides general education and breadth courses in the areas of dance history and dance appreciation.

The department acts as a cultural focus for the campus and community. An annual dance concert is presented under the auspices of the Orchesis Dance Company and every spring a student-directed dance concert is produced. Each quarter the department presents three main-stage theatre productions. Recent titles include: *Our Town*, *The Last Five Years*, *Lysistrata*, *Stop Kiss*, *The Tempest*, *Smash*, *Arabian Nights*, *Blood Wedding (Bodas de sangre)*, *Animal Farm*, *Falsettos*, *25th Annual Putnam County Spelling Bee*, and *Stupid F#@king Bird*. In addition, the department also produces original works; sponsors guest lecturers and specialized workshops; and manages a program of student-directed works, field trips, and internships.

Undergraduate Programs

BA Theatre Arts

Students who major in Theatre Arts experience how live theatre explores important ideas, portrays the vastness of human emotions, and promotes the vitality of storytelling. The BA Theatre Arts Program at Cal Poly provides students with a foundation in the theory and practice of theatre, allowing them to participate in a comprehensive, hands-on training program that delivers a balanced and enriched knowledge of theatre arts: history, dramatic literature, playwriting, performing, production, directing, design, and administrative practices. Participation in main-stage productions, as actors and members of the artistic/production crew, is a key component of each student's education. As a small program, the Theatre Arts B.A. allows for faculty to get to know students' abilities and needs as individuals; promoting the selection of special projects, electives, and interests that mesh with their career ambitions. The program is delivered within a Liberal Arts framework, intended to advance the value of collaboration at all levels of study; designed to not only produce theatre artists with strong written and verbal skills, but also globally-minded citizens, prepared to enter into a variety of fields. And, as Theatre majors, students participate as members of a community which promotes the benefits of diversity, equity and inclusion – practicing and advocating openness, respect and fairness.

Dance Minor

The Dance Minor consists of 24 units designed to provide the student with a well-balanced program in the art and education of dance. The curriculum integrates critical thinking; creative investigation; scientific foundations; and significant historical and philosophical constructs of dance training, performance and pedagogy. Admission to the minor is contingent upon prior dance experience, a departmental interview and review. Students must have more than a 2.0 Cal Poly GPA.

Theatre Minor

The Theatre Minor is designed to provide a foundation of 12 required units in three major aspects of theatre: introduction/appreciation, design/production, and diversity. On top of that, the inclusion of 16 additional elective units allows for a degree of specialization in an area of the student's choice. Students should discuss their interests with department faculty.

Admission to the minor is contingent upon a departmental interview and review. Students must have more than a 2.0 GPA.

BA Theatre Arts

Program Learning Outcomes

1. Students will develop a fundamental knowledge of theatrical history as well as dramatic literature;
2. Students will acquire skills necessary to do script/text analysis;
3. Students will demonstrate the theoretical precepts found in both production and performance;
4. Students will be exposed to a variety of theatrical skills and apply this knowledge in practical, Learn by Doing situations;
5. Students will practice values and ethics that foster an inclusive environment where theatrical activity can flourish;
6. Students will develop written proficiency in a wide variety of assignments.

Student Learning Objectives

- 1.1 - Investigate the conventions, innovations, principles and prominent practitioners of the primary periods of theatrical history, including western and non-western forms;
- 1.2 - Recognize and demonstrate knowledge of a significant number of plays that are representative of key theatrical periods;
- 1.3 - Articulate the basic principles of the major genres of dramatic literature;
- 1.4 - Explore the political, social, and aesthetic context in which theatre has occurred;
- 1.5 - Articulate historiographic considerations of the theatrical past;
- 2.1 - Analyze a play from a design perspective, creating an environment that captures the theme and spirit of a play;
- 2.2 - Analyze a play from a directorial point of view, being able to articulate the structure, construct a character analysis for each role, formulate movement, and craft interaction that illuminates the theme and spirit of a play;

2.3 - Analyze a play from a dramaturgical perspective, understanding the historical context and social conventions in which the play was written or is set;

3.1 - Apply scholarly research to the process of design, playwriting, directing, and creating a character;

3.2 - Create and communicate concepts using appropriate visual means and with vocal clarity;

3.3 - Develop investigative skills;

3.4 - Think critically;

3.5 - Integrate other-created and self-imagined solutions;

4.1 - Develop and apply the principles and process involved in creating a design;

4.2 - Synthesize and apply the principles and process in directing a play;

4.3 - Recognize and apply the principles and process in writing a play;

4.4 - Analyze and apply the principles and process in the creation and portrayal of a character;

4.5 - Develop vocal, physical, and imaginative skills in order to express their ideas and vision;

4.6 - Recognize and apply construction techniques used in building and painting scenery or construction costumes;

4.7 - Utilize scene or costume shop machinery in a safe and appropriate manner;

4.8 - Understand the role of the stage manager, publicist, producer, house manager and box office manager;

5.1 - Develop an understanding of diverse and non-traditional theatrical conventions and viewpoints;

5.2 - Practice discipline, develop strong time management skills, and display commitment to process;

5.3 - Work in a respectful, collaborative environment;

5.4 - Create a community that stands for the values of inclusion, participation, and compassion for everyone;

6.1 - Understand the research process and write research reports;

6.2 - Critically analyze theatre performance through written reviews;

6.3 - Write a one-act play;

6.4 - Write coherent, persuasive critical analysis essays in a variety of topics drawn from history, literature, and theory.

• Graduation Writing Requirement (GWR)

• U.S. Cultural Pluralism

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

TH 201	First Year Theatre Experience	4
TH 220	Acting I	4
TH 225	Costume Construction I	4
TH 227	Theatre History I (C1) ¹	4
or TH 228	Theatre History II	
TH 230	Stagecraft I	4
TH 290	Script Analysis	4
TH 295	Foundations in Theatrical Design	4
TH 305	Topics in Diversity on the American Stage (GE Electives) (USCP) ¹	4
TH 325	Costume Construction II	4
or TH 330	Stagecraft II	
TH 345	Mainstage Rehearsal and Performance	4
or TH 355	Mainstage Production	
TH 350	Seminar in Playwriting	4
TH 430	Scenic Design	4
or TH 432	Costume Design	
TH 450	Directing	4
TH 461	Senior Project Seminar	4

Lower-Division Electives

Select from the following:		16
TH 215	Verbatim Theatre	
TH 235	Acting II	
TH 240	Improvisational Theatre	
TH 245	Introduction to Stage Management	
TH 255	Technical Theatre Production	
TH 256	Technology in Theatrical Design	
TH 260	Voice and Diction for the Stage	
TH 265	Scenic Painting	
TH 270	Stage Make-Up	
TH 275	Selected Topics ²	
TH 280	Body Awareness and Expression	
TH 285	Internship	

Upper-Division Electives

Select from the following:		16
TH 305	Topics in Diversity on the American Stage ³	
TH 315	Physical Theatre	
TH 325	Costume Construction II ⁴	
TH 330	Stagecraft II ⁴	
TH 345	Mainstage Rehearsal and Performance ⁵	
TH 355	Mainstage Production ⁵	
TH 370	Costume History	
TH 380	Theatre for Young Audiences	
TH 390	Global Theatre and Performance	

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA

TH 400	Special Problems for Advanced Undergraduates	
TH 425	Acting III	
TH 430	Scenic Design ⁴	
TH 432	Costume Design ⁴	
TH 434	Lighting Design	
TH 470	Selected Advanced Topics ²	
TH 471	Selected Advanced Laboratory ²	
TH 480	Advanced Internship	

SUPPORT COURSE		
ENGL 339	Introduction to Shakespeare (Upper-Division C) ¹	4

GENERAL EDUCATION (GE)		
(See GE program requirements below.)		60

FREE ELECTIVES		
Free Electives ⁶		28

At least 4 units of free electives must be at the 300-400 level to ensure completion of the required minimum of 60 units of upper-division courses. Consult college advisor for additional information.

Total units		180
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- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Repeatable courses can be taken twice with different topics to meet Major electives.
- ³ Repeatable course: if taken twice with different topics, can be used to meet Major electives as well as Major core requirements.
- ⁴ If a course is taken to meet a Major core requirement, it cannot be double-counted as a Major elective.
- ⁵ Maximum of 4 units may be applied to Major courses; additional units may be applied to Free Electives.
- ⁶ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required, 12 of which are specified in Major and/or Support.
- If any of the remaining 60 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4

B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning	4
Upper-Division B		4

Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		

C1	Arts: Arts, Cinema, Dance, Music, Theater (4 units in Major) ¹	0
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C2	Humanities: Literature, Philosophy, Languages other than English	4
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Lower-Division C Elective - Select a course from either C1 or C2		4
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Upper-Division C (4 units in Support) ¹		0
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Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
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D1	American Institutions (Title 5, Section 40404 Requirement)	4
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D2	Lower-Division D	4
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Upper-Division D		4
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Area E	Lifelong Learning and Self-Development	
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Lower-Division E		4
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Area F	Ethnic Studies	
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F	Ethnic Studies	4
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GE Electives in Areas B, C, and D		
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Select courses from two different areas; may be lower-division or upper-division courses.

GE Electives (4 units in Major plus 4 units in GE) ¹		4
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Total units		60
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- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Dance Minor

Program Learning Objectives

1. Students will demonstrate an integrated understanding of dance training principles and competency in a variety of dance techniques that support performance.
2. Students will demonstrate the ability to apply fundamental principles of dance composition to their own creative process. They will recognize various choreographic processes, aesthetic properties of style, and the relationship between form and content.
3. Students will develop a fundamental knowledge of body mechanics, anatomy, kinesiology, and somatic practices applicable to work in dance, physical activity and health.
4. Students will recognize crucial historical developments, significant artistic works and philosophical constructs within dance history.
5. Students will communicate ideas effectively through oral, written, choreographic and performance skills, including technologically mediated work.
6. Students will demonstrate critical thinking and creative problem solving skills in theoretical and practical applications.

7. Students will understand cultural, gender, age, and aesthetic diversity through the study of dance.

Select any TH courses not already used to meet Minor requirements. At least 12 units must be upper division. ¹

Total units **28**

¹ Repeatable course, if taken twice with different topics, can be used to meet Minor electives as well as Minor core requirement.

Required Courses

DANC 221	Dance Appreciation	4
DANC 231	Intermediate Ballet	2
DANC 232	Intermediate Modern Dance	2
DANC 233	Intermediate Jazz Dance	2
DANC 340	Dance Composition	4
DANC 341	Dance Concert Practicum ¹	2

Electives

Select from the following (at least 6 units must be 300-400 level): 8

Lower-Division Electives

DANC 130	Pilates and Conditioning Fundamentals	
DANC 131	Beginning Ballet	
DANC 132	Beginning Modern Dance	
DANC 133	Beginning Jazz Dance	
DANC 134	Beginning Ballroom Dance	
DANC 135	International Folk Dance	
DANC 210	Active Wellness	
DANC 234	Intermediate Ballroom Dance	
DANC/TH 280	Body Awareness and Expression	
TH 220 or TH 235	Acting I Acting II	

Upper-Division Electives

DANC 331	Advanced Ballet and Repertory	
DANC 332	Contemporary Dance Repertory	
DANC 345	Choreography/Workshop in Dance Concert Preparation	
DANC 346	Dance Production	
DANC 381	Dance Teaching Methods for Dance Minors	
DANC 400	Special Problems	
DANC 430	Advanced Selected Techniques	
DANC 470	Selected Advanced Topics	
DANC 471	Selected Advanced Laboratory	
TH 315	Physical Theatre	

Total units **24**

¹ DANC 341 can be substituted with an approved Dance Minor Project course DANC 400. Please see minor advisor.

Theatre Minor

Required Courses

TH 210	Introduction to Theatre	4
TH 230 or TH 225	Stagecraft I Costume Construction I	4
TH 305	Topics in Diversity on the American Stage ¹	4

Theatre Electives

Women's, Gender and Queer Studies

Faculty Office Building (Bldg. 47), Room 25H

Phone: 805.756.1525

Email: wgqs@calpoly.edu

https://wgqs.calpoly.edu/

Department Chair: Elizabeth Adan

Academic Program

Program name	Program type
Queer Studies	Minor
Women's and Gender Studies	Minor

Undergraduate Programs

Queer Studies Minor

The Queer Studies (QS) minor provides students with opportunities to explore how sexuality is central to human societies. The Queer Studies minor promotes intersectional, interdisciplinary scholarly inquiry, education and activism that emphasizes how constructions, experiences and expressions of sexuality (including the invention of homo/heterosexuality and ab/normality, intimacy, kinship networks and embodiment) change over time and are lived in relation to interlocking systems of race, ethnicity, religion, class, nation, age, dis/ability and gender. Students completing the minor will develop the intellectual and practical skills necessary to contribute to scholarship, activism, creative production and innovation in the interdisciplinary field of Queer Studies and to serve as leaders in the creation, enactment and evaluation of efforts to create a more inclusive, just and equitable world.

Program Learning Objectives:

1. Students will develop skills in critical thinking, creativity, lifelong learning and communication (including oral, written and visual) to multiple audiences.
2. Students will demonstrate substantial knowledge of foundational and contemporary research in the interdisciplinary field of Queer Studies, and substantial knowledge of the Queer Studies theoretical literature.
3. Students will gain an understanding of how the interdisciplinary field of Queer Studies creates new knowledge and draws upon and utilizes perspectives from multiple fields across the humanities, arts and social sciences.
4. Students will understand the ways in which constructions, experiences and expressions of sexuality shape and are shaped by social, political, ethical, institutional, economic, legal, cultural, scientific and technological factors in the past and present, with special attention paid to interlocking systems of race, ethnicity, religion, class, nation, age, dis/ability and gender in local, national and transnational contexts.
5. Students will understand the ways in which the dynamics of heterosexism and heteronormativity shape and are shaped by social, political, ethical, institutional, economic, legal, cultural, scientific and technological factors in the past and present, with special attention paid to interlocking systems of race, ethnicity, religion, class, nation, age, dis/ability and gender in local, national and transnational contexts.
6. Students will employ key concepts in Queer Studies to contribute to scholarship, creative production and innovation.

7. Students will develop the intellectual and practical skills necessary to engage with issues of social justice and serve as leaders in the creation, enactment, and evaluation of efforts to create a more inclusive, just and equitable world.

Women's and Gender Studies Minor

The Women's and Gender Studies (WGS) minor promotes scholarly inquiry, education, and activism that utilizes an integrative approach, exploring the intersections of gender, race, class, sexuality, ethnicity, religion, dis/abilities, citizenship status, and other social categories within local, regional, national, and transnational contexts. Areas of exploration include gender identities, social movements, reproductive justice, labor, media representations, and technologies, among other topics, considered via active student learning and emphasizing critical understandings of how genders and sexualities shape and are shaped by social, political, ethical, economic, legal, and cultural institutions, both historically and into the present day. The WGS minor thus empowers students to question and contribute to knowledge creation, community formation, activism, creative practice, and policymaking from interdisciplinary feminist perspectives.

Program Learning Objectives:

1. Students will develop skills in critical thinking, writing, and oral communication.
2. Students will demonstrate substantial knowledge of foundational and contemporary research and theoretical literature in the field of Women's & Gender Studies.
3. Students will gain an understanding of how the interdisciplinary field of Women's and Gender Studies creates new knowledge and draws upon and utilizes the perspective of multiple fields, such as the humanities, arts, and social and behavioral sciences.
4. Students will understand the ways in which genders and sexualities shape and are shaped by social, political, ethical, economic, legal, cultural, scientific and technological factors and institutions in historical and contemporary contexts, with special attention paid to the intersections of gender, race, and class, and sexuality in national and transnational contexts.
5. Students will employ key concepts in Women's & Gender Studies scholarship to conduct independent research and analyses on a variety of topics.
6. Students will develop skills that allow them to identify and engage with issues of social justice.

Queer Studies Minor

Required Courses ¹

WGQS 302	Contemporary Issues in Queer Studies ²	4
or ES 345	Queer Ethnic Studies	
WGQS 455	Queer Theory	4

Core Courses ³

Select from the following:		
ANT 460	Queer Anthropology	
ENGL 382	LGBT Literature and Media	
ES 325	African American Gender & Sexuality	
HIST/WGQS 458	Gender and Sexuality in Modern Europe	

WGQS/HNRS 210	Gender and Sexuality in Visual and Popular Culture	
WGQS 340	Sexuality Studies	
Approved Electives⁴		
Select from the following: 8		
ANT 344	Sex, Death, and Human Nature	
ANT 393	Action-oriented Ethnography	
ANT 425	Meaning, Gender, and Identity in Anthropological Theory	
BIO 123	Biology of Sex	
300 and 400-level	English Topics/Subtitle courses as approved ⁵	
ES 112	Race, Culture, and Politics in the United States	
or ES 253	Introduction to American Indian Studies	
or ES 254	Introduction to African American Studies	
or ES 255	Introduction to Latino/a/x Studies	
or ES 256	Introduction to Asian American Studies	
ES 311	Beyoncé: Race, Feminism and Politics	
ES 340	Cultural Production and Ethnicity	
or ES 380	Critical Race Theory	
or ES 381	The Social Construction of Whiteness	
HIST/HNRS 216	Comparative Social Movements	
HIST 433	History of the American West, Southwest Borderlands, and California	
or HIST 459	Imperialism and Postcolonial Studies	
ISLA 320	Topics and Issues in Values, Media and Culture ⁵	
KINE 323	Sport and Gender	
PHIL/WGQS 336	Feminist Ethics, Gender, Sexuality and Society	
POLS 310	The Politics of Race, Class, Gender and Sexuality	
PSY 304	Intergroup Dialogues	
PSY/WGQS 324	Psychology of Gender	
PSY 475	The Social Psychology of Prejudice	
RELS/WGQS 370	Religion, Gender, and Society	
SOC 306	Sociology of the Family	
or SOC 327	Social Change	
SOC/WGQS 311	Sociology of Genders and Sexualities	
TH 305	Topics in Diversity on the American Stage ⁵	
WGQS 145	Reasoning, Argumentation, and Writing on Gender and Sexuality	
WGQS 201/ HNRS 204	Gender and Sexuality in US Society and Politics	
WGQS 270	Selected Topics ^{5,6}	
WGQS 320	Women, Gender and Sexuality in Global Perspective	
WGQS 325	Masculinity Studies	
WGQS/ART 375	Intersectional Feminist Art Histories	

WGQS 400	Special Problems for Advanced Undergraduates ^{5,6}	
WGQS 401	Seminar in Women's and Gender Studies ⁵	
WGQS 467	Women's and Gender Studies / Queer Studies Internship	
WGQS 470	Selected Advanced Topics ^{5,6}	
Total units		24

- ¹ The Required course not taken (WGQS 302 or ES/WGQS 345) can be used to meet Core or Elective requirements.
- ² This repeatable course, if repeated for 8 units with different subtitles, can also be used to meet Core or Elective requirements.
- ³ Unused Core courses can be used to meet Elective requirements.
- ⁴ Please check prerequisites. Your ability to select specific courses may vary depending upon your major's curriculum requirements.
- ⁵ Minor advisor approval required for topics/subtitle courses. Approval is dependent on topic/subtitle. Contact the Women's and Gender Studies Department for a list of approved subtitles.
- ⁶ At least 4 units of credit must be earned in this course for it to count as an Approved Elective in the minor.

Women's and Gender Studies Minor

Required Courses¹

WGQS 201/ HNRS 204	Gender and Sexuality in US Society and Politics	4
WGQS 301	Contemporary Issues in Women's and Gender Studies ²	4
or WGQS 305	Feminist Methodologies	
or WGQS 325	Masculinity Studies	
WGQS 450	Feminist Theory	4

Core Courses^{3,4}

Select from the following (at least 4 units in core or approved electives must be upper-division): 8		
ES 311	Beyoncé: Race, Feminism and Politics	
WGQS 145	Reasoning, Argumentation, and Writing on Gender and Sexuality	
WGQS/HNRS 210	Gender and Sexuality in Visual and Popular Culture	
WGQS/SOC 311	Sociology of Genders and Sexualities	
WGQS 320	Women, Gender and Sexuality in Global Perspective	
WGQS/PSY 324	Psychology of Gender	
WGQS/ISLA 335	Feminist Studies of Popular Culture and Whiteness	
WGQS/PHIL 336	Feminist Ethics, Gender, Sexuality and Society	
WGQS 340	Sexuality Studies	
WGQS/ES 350	Gender, Race, Culture, Science & Technology	
WGQS/ES 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development	

WGQS/RELS 370	Religion, Gender, and Society
WGQS/ART 375	Intersectional Feminist Art Histories
WGQS 400	Special Problems for Advanced Undergraduates ⁵
WGQS 401	Seminar in Women's and Gender Studies
WGQS/POLS 417	Feminist Legal Theory
WGQS/HIST 421	The History of Prostitution
WGQS/SOC 423	Gender and Work
WGQS/HIST 434	American Women's History to 1870
WGQS/HIST 435	American Women's History from 1870
WGQS/POLS 457	U.S. Reproductive Politics
WGQS/HIST 458	Gender and Sexuality in Modern Europe
WGQS 467	Women's and Gender Studies / Queer Studies Internship
WGQS 470	Selected Advanced Topics ⁵
Approved Electives⁴	4
Select from the following (at least 4 units in core or approved electives must be upper-division):	
ANT 401	Culture and Health
ANT 425	Meaning, Gender, and Identity in Anthropological Theory
COMS 316	Intercultural Communication
COMS 319	Critical Cultural Studies and Communication
COMS 320	Intergroup Communication
COMS 421	Gender and Communication
COMS 428	Family Communication
ENGL 345	Women Writers of the Twentieth and Twenty-First Centuries
ENGL 349	Gender in Twentieth and Twenty-First Century Literature
ENGL 439	Topics in British Literature ⁶
ENGL 449	Topics in American Literature ⁶
ENGL 459	Topics in Transatlantic and/or World Literature ⁶
ES 300	Chicano/a Non-Fiction Literature
ES 301	Latina/o Literature of the United States
ES 302	Chicana/o Literature
ES 324	Chicana/o Film
ES 325	African American Gender & Sexuality
ES 340	Cultural Production and Ethnicity
ES 380	Critical Race Theory
ES 381	The Social Construction of Whiteness
HIST/HNRS 216	Comparative Social Movements
HIST 421	The History of Prostitution
HLTH 260	Women's Health Issues
ISLA 320	Topics and Issues in Values, Media and Culture ⁶
KINE 323	Sport and Gender
MU 328	Women in Music

POLS 310	The Politics of Race, Class, Gender and Sexuality
PSY 304	Intergroup Dialogues
SOC 402	Gender, Crime, and Violence
TH 305	Topics in Diversity on the American Stage ⁶
WGQS 270	Selected Topics ⁵
Total units	24

¹ The Required course not taken (WGQS 301, WGQS 305, or WGQS 325) can be used to meet Core or Elective requirements.

² This repeatable WGS course, if repeated for up to 8 units with different subtitles, can be used to meet Core or Elective requirements.

³ Any course listed in the Core, if not used to meet Core requirements, can be used as an Elective.

⁴ Please check prerequisites. Your ability to select specific courses may vary depending upon your major's curriculum requirements.

⁵ A total of 4 units of credit must be earned to meet the 4 unit course requirement.

⁶ Minor advisor approval required. Approval is dependent on subtitle. Contact the department for a list of approved subtitles.

World Languages and Cultures

Faculty Office Bldg. (47), Room 28

Phone: 805.756.1205

Email: wlc@calpoly.edu

<https://wlc.calpoly.edu/>

Department Chair: Karen Muñoz-Christian

Academic Programs

Program name	Program type
Chinese	Minor
French	Minor
German	Minor
Italian Studies	Minor
Japanese	Minor
Spanish	BA, Minor

The World Languages and Cultures Department offers coursework in beginning, intermediate, and advanced French, German, and Spanish, as well as coursework in beginning and intermediate Mandarin Chinese, Italian, and Japanese. Instruction at all levels emphasizes communicative competence and the use of authentic media to prepare students for cultural, educational, literary and professional needs in California, throughout the United States, and abroad.

Students who wish to enroll in language courses for the first time at Cal Poly, numbered 101 through 203, must take the requisite Placement Examination prior to enrolling. Students who have never studied the desired language must begin at 101. Students should contact the World Languages and Cultures Department for test dates and procedures.

The department supports the concept of international education and encourages students to investigate opportunities for meaningful international study, internships, and educational experiences. The department works with Cal Poly's and the CSU's International Programs to ensure that courses taken in an experience abroad count toward either major, support, minor, general education and/or free electives, as appropriate. Students interested in studying abroad should consult with the Cal Poly International Center Office and their assigned academic advisor well in advance.

The department also supports such student clubs as the Cal Poly Spanish Language Club, the Chinese Cultural Club, and MEXA (Movimiento Estudiantil Xicano de Aztlán), as well as sponsoring a quarterly film series and other cultural events such as the Chinese New Year celebration and the German Winter Festival.

The World Languages Center (WLC) is the department's digital language laboratory and multimedia teaching facility. Students and faculty members use the Center for class activities and presentations, and for drop-in language practice and curriculum development.

Undergraduate Programs

BA Spanish

Students with majors and minors in World Languages and Cultures have been successful in careers in education, international business, non-profit agencies, the viticulture industry, software and Internet-related services, and government. Others have attended graduate and professional schools in various fields, including languages, literatures, and cultures,

applied linguistics, international security and nonproliferation, education, psychology, law, and medicine. Our graduates have also been selected to teach in secondary schools in Spain (North American Language and Culture Assistants) and France (Teaching Assistant Program in France). In collaboration with the Cal Poly School of Education, we also prepare students for the California single-subject World Languages Teaching Credential. Finally, we work closely with our students to integrate junior- or senior-level education abroad experiences, internships or service-learning experiences in the U.S. or another country, or equivalent professional-level hands-on experiences (with departmental approval) as part of their total capstone experience.

Chinese Minor

The Chinese minor incorporates aspects of Chinese language, combined with elective coursework in business, contemporary politics, history, philosophy, natural resources, agribusiness, or languages and cultures. Chinese language and culture are powerful tools for students from all fields of study. The Chinese minor offers opportunities for real world "Learn By Doing" experiences, via study abroad in Taiwan and China. The Chinese minor provides a solid foundation in Chinese language and culture, while at the same time enabling students from all fields of study to become more competitive in the contemporary job market.

French Minor

The French minor provides students the opportunity to become proficient in one of the world's most international languages which is widely spoken in the areas of business, diplomacy, advanced academic research, the arts, fashion, viticulture, and the culinary arts. French minors are strongly encouraged to study abroad, taking advantage of Cal Poly's diverse programs in France and other Francophone countries. French minor students will concentrate on building their language proficiency at the intermediate and advanced levels and will also have the opportunity to take courses in French and Francophone cultures and literatures. Students should begin their French studies during fall quarter of their first year in order to maximize the chances of achieving a useful level of proficiency during their college experience.

German Minor

The German minor at Cal Poly prepares students from all majors for a wide variety of international experiences, including our college- and major-specific exchanges with German universities, study and internships abroad, and lifelong membership in the community of those who have learned more than one language. Students develop creative and critical skills in our courses, which are focused on language as one of many important cultural phenomena, including literature, philosophy, music, visual arts, politics, and film. Students should begin their German studies during fall quarter of their first year in order to maximize the chances of achieving a useful level of proficiency during the college experience.

Italian Studies Minor

The Italian Studies minor provides students with opportunities to explore how the language and culture of Italy are central to the arts, humanities, and sciences in the Western tradition. In addition, students learn about the central role Italy plays on the world stage as one of the founders of Nato, of the European Union, and as one of the seven most industrialized nations (G7). Required coursework focuses on acquiring intermediate

proficiency in the language (Italian 102 through 201), together with a solid foundation in the humanities (WLC 310 Culture of Italy), while the upper-division electives come from a variety of complementary fields, including art, music, history, and political science.

Japanese Minor

The Japanese minor at Cal Poly prepares students from all majors for a variety of international experiences, which include our exchanges with Japanese universities, our study abroad programs and internships in Japan, and affords lifelong membership in the community of those who have learned more than one language. Japanese is spoken by more than 120 million people in Asia and by a large number of speakers in the U.S., our own local area having significant Japanese heritage and an active community. Students develop linguistic and critical-thinking skills in our required courses, which are focused on language as one of many important cultural phenomena. Elective courses emphasize an exploration of diverse cross-cultural issues, especially as they relate to technology and identity, giving students an opportunity to understand Japanese language and culture in wider disciplinary contexts. Students preparing for the minor should take JPNS 101 and JPNS 102, or equivalent to fulfill the prerequisites for the required courses in the minor.

Minor Requirements (p. 359)

Spanish Minor

The Spanish minor is a valuable complement to any Cal Poly major, from agriculture, engineering, and architecture to psychology, business, and political science. With an estimated 450 million Spanish speakers worldwide and growing Latinx populations in every state, advanced Spanish language skills and cultural competence are assets for employment and community involvement. This minor enhances students' career options and makes them highly competitive for admission to graduate and professional schools. The Spanish minor offers students a diverse array of exciting intercultural experiences and opportunities to work with under-served communities. The Spanish minor is not open to BS Liberal Studies majors with a concentration in Spanish.

BA Spanish

Program Learning Objectives

The Spanish major program provides students opportunities to:

1. Learn to communicate effectively in Spanish and other target languages through speaking, listening, reading, and writing in authentic situations.
2. Develop communicative and intercultural competency so that they can work productively both as individuals and in collaboration with others.
3. Gain perspective on cultural and historical achievements in the target-language cultures as well as on relevant issues of diversity.
4. Cultivate awareness of ethical and professional perspectives that reflect linguistic and cultural heritage.
5. Think critically and creatively using Spanish and other target languages and negotiate meaning between the target language(s) and English.
6. Develop the life-long ability to evaluate ways in which language and culture provide perspective on the larger world of the arts, sciences, and technology.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

MAJOR COURSES

SPAN 201	Intermediate Spanish I (GE Electives) ¹	4
SPAN 202	Intermediate Spanish II	4
SPAN 203 or SPAN 206	Intermediate Spanish III Spanish for Heritage Speakers	4
SPAN 207	Introduction to Spanish Linguistics	4
SPAN 233	Introduction to Hispanic Readings (C2) ¹	4
SPAN 301	Advanced Composition in Spanish	4
SPAN 302	Advanced Conversation and Composition in Spanish	4

SPAN 300-level Courses

Select from the following: 12

(see catalog description for credit limits on variable topic courses)

SPAN 303	Introduction to English-Spanish Translation	
SPAN 305	Significant Works in Spanish (Upper-Division C) ¹	
SPAN 307	Spanish and Latin American Film (Upper-Division C) ¹	
SPAN 340	Chicano/a Authors (Upper-Division C) ¹	
SPAN 390	Introduction to Creative Writing in Spanish	

SPAN 400-level Courses

Select from the following: 8

SPAN 402	Advanced Topics in Spanish Linguistics	
SPAN 410	Advanced Literature in Spanish	
SPAN 416	Don Quixote	
SPAN 470	Selected Advanced Topics	

Capstone Courses

WLC 360	Research Methods in World Languages and Cultures	4
WLC 460	Senior Project	4

Approved Language/Culture Electives (300-400 level)

(see list below) 12

Minor and Upper-Division SPAN Courses 32

With department approval, any declared academic minor or coursework from a second major. Minor or second major coursework may not double count with SPAN major requirements or approved electives. (24-30 units depending on minor selected) ^{2,3}

SPAN 300-400 level courses (2-8 units, depending on unit total of selected minor)

GENERAL EDUCATION (GE)

(See GE program requirements below.) 60

FREE ELECTIVES

Free Electives ⁴ 20

Total units 180

Approved Language/Culture Electives (300-400 level)

Select from the following: ⁵ 12

AG/EDES/ENGR/ ISLA/SCM/UNIV 350	The Global Environment
AGB 318	Global Agricultural Marketing and Trade
ANT 330	Indigenous South Americans
ANT 360	Human Cultural Adaptations
ANT 401	Culture and Health
ANT 415	Native American Cultures
ART 311	Art History - Nineteenth Century Art
ART 313	Design History
ART 315	Art History - Art Since 1945
ART 318	Asian Art Topics: National, Religious, and Intellectual Movements
ART/WGQS 375	Intersectional Feminist Art Histories
BUS 410	The Legal Environment of International Business
CD/PSY 306	Adolescence
CD 350	Developmental Issues in Education
COMS 308	Group Performance of Literature
COMS 316	Intercultural Communication
COMS 320	Intergroup Communication
COMS 421	Gender and Communication
DANC 321	Cultural Influence on Dance in America
ECON/HNRS 303	Economics of Poverty, Discrimination and Immigration
ECON 330	International Trade Theory
EDUC 423	Bilingual Literacy
EDUC 433	Foundations of Bilingual Education
ENGL 311	Advanced Rhetorical Inquiry and Composing
ENGL 346	Ethnic American Literature
ENGL/HNRS 380	Literary Themes
ENGL 390	The Linguistic Structure of Modern English
ENGL 391	Topics in Applied Linguistics

ENGL 459	Topics in Transatlantic and/or World Literature
ENGL 495	Topics in Applied Language Study
ENGL 497	Theories of Language Learning and Teaching
ENGL 498	Approaches to Teaching English to Speakers of Other Languages
ENGL 499	Practicum in Teaching English to Speakers of Other Languages
ENGL 503	Graduate Introduction to Linguistics
ES 300	Chicano/a Non-Fiction Literature
ES 321	Native Americans in Popular Culture
ES 322	Asian Americans in Popular Culture
ES 323	Latina/os in Popular Culture
ES/ARCH 326	Native American Architecture and Place
ES 330	The Chinese American Experience
ES 340	Cultural Production and Ethnicity
ES/NR 360	Ethnicity and the Land
ES 380	Critical Race Theory
FR 301	Advanced French Composition and Grammar
FR 302	Advanced French Conversation and Grammar
FR 305	Significant Works in French ⁶
FR 350	French Literature in English Translation ⁶
FR 470	Selected Advanced Topics ⁶
GEOG 308	Global Geography
GEOG 370	Geography of Latin America
GER 301	Advanced German Composition and Grammar
GER 302	Advanced German Conversation and Grammar
GER 305	Significant Works in German ⁶
GER 350	German Literature in English Translation ⁶
GER 470	Selected Advanced Topics ⁶
HIST 306	The Witch-Hunts in Europe, 1400-1800
HIST 310	East Asian Culture and Civilization
HIST 313	Modern Middle East
HIST 316	Modern East Asia
HIST 319	Modern South and Southeast Asia
HIST 337	Colonial Latin America
HIST 338	Modern Latin America
HIST 341	Modern Central America
HIST 416	Modern Japan
HIST 417	20th Century China
HIST 418	Chinese Film and History
HIST 437	Nazi Germany
HIST 452	Renaissance and Reformation Europe
LS 310	Storytelling: Modern Applications of Traditional Narrative

PHIL 312	Medieval Philosophy
PHIL 313	Early Modern Rationalism
PHIL 315	Kant and 19th Century European Philosophy
PHIL 336	Feminist Ethics, Gender, Sexuality and Society
PHIL 350	Aesthetics
PHIL 361	Indian Philosophy
PHIL 362	Chinese and East Asian Philosophy
PHIL 423	Philosophy of Language
POLS 310	The Politics of Race, Class, Gender and Sexuality
POLS 324	International Relations Theory
POLS 325	Global Political Issues
POLS 339	Authoritarian and Democratic Rule
POLS 429	Issues and Topics in International Relations
PSY 458	Learning
RELS 304	Judaism
RELS 306	Hinduism
RELS 307	Buddhism
RELS 310	Christianity
RELS 311	Islam
RELS/WGQS 370	Religion, Gender, and Society
RPTA 314	Sustainable Travel and Tourism Planning
SOC 309	The World System and Its Problems
SOC/WGQS 311	Sociology of Genders and Sexualities
SOC 315	Global Race and Ethnic Relations
SPAN 303	Introduction to English-Spanish Translation
SPAN 305	Significant Works in Spanish ⁶
SPAN 307	Spanish and Latin American Film ⁶
SPAN 340	Chicano/a Authors (USCP)
SPAN 350	Hispanic Literature in English Translation ⁶
SPAN 351	Chicano/Latino Writers in the United States
SPAN 410	Advanced Literature in Spanish ⁶
SPAN 470	Selected Advanced Topics ⁶
TH 350	Seminar in Playwriting
TH 390	Global Theatre and Performance
WGQS 320	Women, Gender and Sexuality in Global Perspective
WGQS/ES 350	Gender, Race, Culture, Science & Technology
WGQS 450	Feminist Theory
WLC 310	Humanities in World Cultures ⁶
WLC 312	Humanities in Chicano/a Culture
WLC 318	Culture of Spain: Activities
WLC 315	Critical Issues in Latin American Studies
WLC 370	Language, Technology and Society

WLC 424	Methods in Teaching Languages Other Than English
WLC 470	Selected Advanced Topics ⁶

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Students may not declare a Spanish minor.
- ³ Courses in a minor may not be used to satisfy Major requirements or Approved Electives in BA Spanish (no double counting of coursework).
- ⁴ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- ⁵ Courses from this list cannot be double-counted in the Major. However, repeatable courses taken with different subtopics are allowed.
- ⁶ May be counted multiple times if taken with different subtopics.

General Education (GE) Requirements

- 72 units required, 12 of which are specified in Major and/or Support.
- If any of the remaining 60 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning	4
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English (4 units in Major) ¹	0
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C (4 units in Major) ¹		0
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	

D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		60

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Chinese Minor

Required Courses

CHIN 201	Intermediate Mandarin Chinese I	4
CHIN 202	Intermediate Mandarin Chinese II	4
CHIN 203	Intermediate Mandarin Chinese III	4
WLC 310	Humanities in World Cultures (Culture of China)	4

Approved Electives

Select from the following:		8
AGB 318	Global Agricultural Marketing and Trade	
BUS 302	International and Cross Cultural Management	
BUS 304	International Supply Chains	
HIST 418	Chinese Film and History	
NR 323	Human Dimensions in Natural Resources Management	
NR 360	Ethnicity and the Land	
PHIL 362	Chinese and East Asian Philosophy	
POLS 337	U.S. and China in the Contemporary World	
WLC 370	Language, Technology and Society	
WLC 400	Special Problems for Advanced Undergraduates ¹	
WLC 470	Selected Advanced Topics ²	
Total units		24

¹ Enrollment in this individualized course requires approval of instructor and department chair.

² Applicable to minor with subtopic course content relevant to Chinese.

French Minor

Required Courses

FR 202	Intermediate French II	4
FR 203	Intermediate French III	4

FR 233	Critical Reading in French Literature	4
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Approved Electives

Select from the following:		12
FR 301	Advanced French Composition and Grammar	
FR 302	Advanced French Conversation and Grammar	
FR 305	Significant Works in French ¹	
FR 350	French Literature in English Translation ¹	
FR 470	Selected Advanced Topics ¹	
WLC 310	Humanities in World Cultures (Culture of France)	
WLC 370	Language, Technology and Society	
WLC 400	Special Problems for Advanced Undergraduates ¹	
WLC 470	Selected Advanced Topics ¹	
Total units		24

¹ Repeatable to 8 units.

German Minor

Required Courses

GER 201	Intermediate German I	4
GER 202	Intermediate German II	4
GER 233	Critical Readings in German Literature	4

Approved Electives

Select from the following:		12
GER 301	Advanced German Composition and Grammar	
GER 302	Advanced German Conversation and Grammar	
GER 305	Significant Works in German ¹	
GER 350	German Literature in English Translation ¹	
GER 470	Selected Advanced Topics ¹	
WLC 307	World Cultures through Film (German Cinema)	
WLC 310	Humanities in World Cultures (Culture of Germany)	
WLC 370	Language, Technology and Society	
WLC 400	Special Problems for Advanced Undergraduates ¹	
WLC 470	Selected Advanced Topics ¹	
Total units		24

¹ Repeatable to 8 units.

Italian Studies Minor

Required Courses

ITAL 102	Elementary Italian II	4
ITAL 103	Elementary Italian III	4
ITAL 201	Intermediate Italian I	4

WLC 310	Humanities in World Cultures (Topic: Culture of Italy)	4
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Approved 300-400 Level Electives

Select from the following:		8
ART 370	Michelangelo	
ART 371	Topics in Renaissance Art (Topics: Art and Politics in Renaissance Italy; Art of Love in the Renaissance)	
HIST 307	European Thought 1800-2000	
HIST 334	Modern Europe, 1789-1914	
HIST/HNRS 335	Modern Europe, 1914-Present	
HIST 452	Renaissance and Reformation Europe	
POLS 329	Ancient and Medieval Political Thought	
POLS 383	Politics of the European Union	
WLC 370	Language, Technology and Society	
WLC 400	Special Problems for Advanced Undergraduates	

Total units **24**

Japanese Minor

Required Courses

JPNS 103	Elementary Japanese III ¹	4
JPNS 201	Intermediate Japanese I	4
JPNS 202	Intermediate Japanese II	4
WLC 310	Humanities in World Cultures (Topic: Cultures of Japan)	4

Approved Electives

Select from the following:		8
ARCH 320	Topics in Architectural History ^{2,3}	
COMS 316	Intercultural Communication	
ES 322	Asian Americans in Popular Culture	
ES 340	Cultural Production and Ethnicity	
ES/WGQS 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development	
ES 380	Critical Race Theory	
PHIL 362	Chinese and East Asian Philosophy	
RELS 301	Religions of Asia	
RELS 307	Buddhism	
WLC 370	Language, Technology and Society	
WLC 400	Special Problems for Advanced Undergraduates ³	
WLC 470	Selected Advanced Topics ³	

Total units **24**

¹ JPNS 101 and JPNS 102 or equivalent are required prerequisites.

² Course requires additional prerequisites.

³ Repeatable to 8 units; variable topic courses subject to approval by minor advisor.

Spanish Minor

Required Courses

SPAN 202	Intermediate Spanish II	4
SPAN 203	Intermediate Spanish III	4
or SPAN 206	Spanish for Heritage Speakers	
SPAN 207	Introduction to Spanish Linguistics ¹	4
or SPAN 233	Introduction to Hispanic Readings	

Approved Electives

Select from the following:		12
SPAN 301	Advanced Composition in Spanish	
SPAN 302	Advanced Conversation and Composition in Spanish	
SPAN 303	Introduction to English-Spanish Translation	
SPAN 305	Significant Works in Spanish ²	
SPAN 307	Spanish and Latin American Film ²	
SPAN 340	Chicano/a Authors	
SPAN 350	Hispanic Literature in English Translation	
SPAN 351	Chicano/Latino Writers in the United States	
SPAN 390	Introduction to Creative Writing in Spanish	
SPAN 402	Advanced Topics in Spanish Linguistics	
SPAN 410	Advanced Literature in Spanish	
SPAN 416	Don Quixote	
SPAN 470	Selected Advanced Topics ²	
WLC 310	Humanities in World Cultures (Culture of Spain, Mexico or Latin America)	
WLC 312	Humanities in Chicano/a Culture	
WLC 370	Language, Technology and Society	
WLC 400	Special Problems for Advanced Undergraduates ²	
WLC 470	Selected Advanced Topics ²	

Total units **24**

¹ SPAN 207 does not serve as prerequisite for upper-division literature or film courses taught in Spanish.

² Repeatable to 8 units.

College of Science & Mathematics

Faculty Offices East (25), Room 229

Phone: 805.756.2226

<https://cosam.calpoly.edu>

Dean: Dean E. Wendt

Associate Dean: Derek Gragson

Associate Dean: Kellie Green Hall

Associate Dean: Camille O'Bryant

Assistant Dean: Kathryn Dilworth

Academic Programs

Program name	Program type
Actuarial Preparation	Minor
Astronomy	Minor
Biochemistry	BS
Biological Sciences	BS, MS
Biology	Minor
Biotechnology	Minor
Chemistry	BS
Cross Disciplinary Studies Minor in Bioinformatics	Minor
Cross Disciplinary Studies Minor in Data Science	Minor
Environmental Studies	Minor
Equity in Education	Minor
Exercise and Sport Studies	Minor
Geology	Minor
Kinesiology	BS
Liberal Studies	BS
Marine Sciences	BS
Mathematics	BS, MS, Minor
Microbiology	BS, Minor
Physics	BA, BS, Minor
Polymers and Coatings Science	MS
Public Health	BS
Statistics	BS, Minor

School of Education Programs

Program name	Program type
Administrative Services	Credential
Agriculture Specialist	Teaching Credential
Curriculum and Instruction	MA
Higher Education Counseling and Student Affairs	MS
Educational Leadership and Administration	MA
Special Education	MS
Special Education (Education Specialist - Mild/Moderate Disabilities)	Credential
Multiple Subject	Teaching Credential
Single Subject	Teaching Credential

See the School of Education (p. 414) section for further information.

Mission

The mission of the College of Science and Mathematics is to facilitate learning, understanding, and appreciation of science and mathematics

as a basis for creative endeavors, intellectual pursuits, careers, and critical consideration of issues confronting society. The College has two equally important roles: (1) to provide specialized coursework for students enrolled in the College's undergraduate, graduate and minor programs, and (2) to provide support and breadth courses in science and mathematics for all students of the university. Cal Poly is a national leader in preparing college students for careers in science, technology, engineering, and mathematics (STEM) professions, including science and mathematics teaching careers.

The College of Science and Mathematics has a tradition and reputation for excellence in teaching and faculty mentored student research and is dedicated to both undergraduate and graduate instruction. The College provides a student-centered learning environment consistent with the University's "learn by doing" philosophy. In laboratories, students have access to modern instrumentation and computer technology. Classroom instruction is done in relatively small classes so that a personal approach by instructors is possible. Because of the College's large role in offering support courses to the rest of the university community, the number of faculty in each department is relatively large and favors student-faculty interaction, both inside and outside of the classroom.

Faculty Mentors

Faculty members are subject-matter experts in their field and take an active role in academic and career advising. It is especially valuable to consult with faculty about curriculum decisions within the major, extracurricular activities, involvement in research/internships, and career/professional opportunities. Students are encouraged to obtain both faculty and professional academic advising to choose appropriate coursework to complement their interests and career goals.

Applying to Graduate School

College of Science and Mathematics faculty have earned advanced degrees from a wide variety of universities and are excellent sources for information and advice about graduate programs, prerequisites and application procedures. Applications to graduate programs should be made in the fall for admission to the following fall term. The Graduate Record Exam (GRE) should be taken early in the application cycle. Generally, two or more letters of reference from faculty are required. Most Ph.D. granting institutions offer financial support in the form of teaching assistantships and research fellowships.

College of Science and Mathematics Student Services

Science North (Bldg. 53), Room 211

Phone: 805.756.2615

<https://csmadvising.calpoly.edu>

Director/Advisor: Kristi Weddige

Advisor: Anya Bergman

Advisor: Meghan Farrier-Nolan

Advisor: Laura Wilson

Student Affairs Analyst: Ryan Lau

Retention Specialist: Tiffany Kwapnoski

Advising Mission Statement

The College of Science and Mathematics Academic and Pre-Health Advisors strive to connect with each student to recognize and support their unique advising needs. Advisors collaborate with students in a

manner which empowers them to make informed, self-directed decisions in order to define and pursue their academic and professional aspirations.

Services Provided

Services include assistance with developing long-range academic plans, interpreting university and college policy and procedures, articulation agreements, scheduling classes, study abroad and informing students of their graduation requirements, as well as academic peer coaching for students experiencing academic difficulty.

The Advising Center provides pre-health career advising services and resources for Cal Poly students and alumni seeking a career in a health professions field. Students are encouraged to seek advice early and often throughout their time at Cal Poly. For more information, please refer to: pre-health career advising (p. 446).

School of Education

The School of Education prepares students to be effective, ethical and informed teachers, counselors and administrators, who have a particular expertise relative to current state and national needs in their respective fields through an inquiry-focused clinical approach. The School of Education offers a range of programs: multiple subject and single subject teaching credentials; agriculture specialist credential; integrated credential and M.S. in Special Education; integrated credential and M.A. Educational Leadership and Administration; M.A. in Curriculum and Instruction; and M.S. Higher Education Counseling and Student Affairs. Single subject credential programs are offered in Agriculture, English, Biology, Chemistry, Mathematics, Physics, Social Science and World Languages.

To prepare students in these fields, faculty from agriculture, science, mathematics, and the liberal arts work collaboratively with faculty in the School of Education to provide outstanding programs that maintain a balance of coursework in subject matter, foundations of education, and pedagogy, integrated with field experiences for applied practice. In the Liberal Studies Program, students can pursue a pre-professional program that leads to a B.S. degree and includes preparation toward a multiple subject credential to teach in elementary school. Cal Poly takes pride in producing school teachers and leaders through a balanced curriculum. More information on the programs offered can be found in the School of Education (p. 414) section of this catalog.

Interdisciplinary Minors

Actuarial Preparation Minor

Actuaries are professional risk managers that assess the likelihood and impact of future, uncertain events. They use their quantitative skills to prepare businesses for the financial impact of the risk to which they are exposed. Actuaries must meet rigorous standards for admission to professional societies. To be called an actuary in the United States, one must become an Associate or Fellow of the Society of Actuaries (SOA) or the Casualty Actuarial Society (CAS).

The Actuarial Preparation Minor provides education in probability, financial mathematics, and mathematical statistics. The coursework will help students satisfy the Validation by Educational Experience (VEE) requirements of the SOA and CAS, and will prepare them for the actuarial exams, which are also prerequisite to SOA or CAS membership. The minor offers VEE courses in the areas of accounting and finance (BUS 214, BUS 342), economics (ECON 221, ECON 222), and mathematical statistics (STAT 425, STAT 426).

The minor is open to any major, but it is especially suited to students majoring in statistics, mathematics, and business or economics (with a Quantitative Analysis concentration). Students should be aware that courses within the minor have MATH 142, a course in computer programming (BUS 392, CPE/CSC 101, CSC 232, CSC 235, ECON 395, or STAT 331), and certain introductory statistics courses (IME 326, STAT 252, STAT 302, STAT 312, or STAT 313) as prerequisites. Many of these courses are already required for the majors most closely aligned with the actuarial profession. Students should complete these prerequisites before applying to the minor. Those interested in the minor should consult the website <https://statistics.calpoly.edu/content/actuary/> (<https://statistics.calpoly.edu/content/actuary/>).

Additional information about the actuarial profession, societies, and exams, as well as additional suggested coursework, is available at the website above.

Biotechnology Minor

Biotechnology is one of the most important areas of growth in the biomedical sciences and has transformed medicine, chemical manufacturing, and agriculture over the last 20 years. Cal Poly's Biotechnology minor is designed to give undergraduate students a grounding in the sciences that underlie biotechnology; in addition, students engage in practical experience in biotechnology lab work.

Students completing the Biotechnology minor take a core of required courses and approved elective courses focusing on biotechnology. The Biotechnology Minor Form is available from the Dean's Office or the Advising Center in the College of Science and Mathematics. Final approval of the minor is by one of the Minor Coordinators in the College of Science and Mathematics.

The minor is open to any major except Biochemistry, Microbiology, and Biological Science General Curriculum or with concentrations in Anatomy and Physiology, and Molecular and Cellular Biology.

Biological Sciences students preparing for the minor must take CHEM 216, CHEM 217, and CHEM 369 to fulfill the organic chemistry and biochemistry (if applicable) requirements of their major.

Students interested in more information should contact the Biotechnology Minor Coordinators in the Chemistry and Biochemistry Department or the Biological Sciences Department.

Minor Requirements (p. 362)

Environmental Studies Minor

Students who complete a minor in Environmental Studies will be able to:

- Analyze, explain, and evaluate environmental issues from both scientific/technical and social/political/economic/ethical perspectives.
- Integrate and synthesize knowledge from multiple disciplines.
- Explain and apply the methodologies and approaches that different disciplines bring to bear on complex problems.
- Work productively and effectively with students from other disciplines and with other points of view.
- Confront and grapple with real issues of contemporary significance.
- Gain employment or pursue further study that emphasizes interdisciplinary knowledge and skills.

More information about the Environmental Studies Minor, including Subject Area Electives appropriate for students in each of the colleges, can be obtained from the College of Science and Math Advising Center in Building 53, Room 211.

Actuarial Preparation Minor

Required Courses

BUS 214	Financial Accounting	4
BUS 342	Fundamentals of Corporate Finance	4
ECON 221	Microeconomics	4
ECON 222	Macroeconomics	4
STAT 305	Introduction to Probability and Simulation	4
or STAT 321	Probability and Statistics for Engineers and Scientists	

Approved Electives **8**

Students majoring in STAT or MATH must select from the following courses:

BUS 431	Security Analysis and Portfolio Management
BUS 439	Fixed Income Securities Market
BUS 442	Introduction to Futures and Options
BUS 444	Financial Engineering and Risk Management

Students majoring in BUS or ECON must select from the following courses:

STAT 324	Applied Regression Analysis
or STAT 334	Applied Linear Models
STAT 416	Statistical Analysis of Time Series
or ECON 406	Applied Forecasting
STAT 417	Survival Analysis Methods
STAT 425	Probability Theory
STAT 426	Estimation and Sampling Theory
STAT 434	Statistical Learning: Methods and Applications

Students in other majors must select one course from each list.

Total units **28**

Biotechnology Minor

Required Courses

BIO/CHEM 202	Orientation to Biotechnology	2
Select from the following:		4-5
BIO 161	Introduction to Cell and Molecular Biology	
BOT 121	General Botany	
MCRO 221	Microbiology	
MCRO 224	General Microbiology I	

Select from the following: **3-5**

BIO 303	Survey of Genetics
BIO 351	Principles of Genetics
CHEM 373	Molecular Biology

Select from the following: **5**

CHEM 314	Biochemistry: Fundamentals and Applications	
CHEM 369	Biochemical Principles	
Laboratory elective-	select from the following:	3-5
ASCI 403	Applied Biotechnology in Animal Science	
BIO/CHEM 475	Molecular Biology Laboratory	
CHEM 474	Protein Techniques Laboratory	

Approved Electives

Select from the following: **6-11**

Animal Biotechnology

ASCI 403	Applied Biotechnology in Animal Science
ASCI 406	Applied Animal Embryology and Assisted Reproduction
ASCI 407	Assisted Reproduction Technologies of Gametes and Embryos Laboratory
ASCI 440	Immunology and Diseases of Animals
DSCI 330	Artificial Insemination and Embryo Biotechnology

Bioinformatics

BIO/CHEM 441	Bioinformatics Applications
CSC 448	Bioinformatics Algorithms

Cell and Molecular Biology/Microbial Biotechnology

BIO 426	Immunology
BIO 452	Cell Biology
BIO/CHEM 475	Molecular Biology Laboratory
BIO 476	Gene Expression Laboratory
CHEM 474	Protein Techniques Laboratory
CHEM 428	Nutritional Biochemistry
MCRO 225	General Microbiology II
MCRO 320	Emerging Infectious Diseases
MCRO 402	General Virology
MCRO 433	Microbial Biotechnology

Engineering-related Biotechnology

BRAE 448	Bioconversion
ENGR 581	Biochemical Engineering
ENVE 443	Bioremediation Engineering

Ethics

PHIL 339	Biomedical Ethics
or PHIL 341	Professional Ethics

Pharmaceutical Biotechnology

CHEM 377	Chemistry of Drugs and Poisons
CHEM 477	Biochemical Pharmacology

Plant Biotechnology

BOT 323	Plant Pathology
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Total units **28**

Environmental Studies Minor

Select one course from each subject area. Electives must be approved in advance by an advisor for the minor.

Biology and ecology

Select from the following: 4

BIO 114	Plant Diversity and Ecology
BIO 227	Wildlife Conservation Biology
BIO 327	Wildlife Ecology
BIO 363	Principles of Conservation Biology
BIO 446	Ecosystem Ecology
BOT 326	Plant Ecology
MSCI 301	Biological Oceanography
NR 306	Natural Resource Ecology and Habitat Management

Earth science

Select from the following: 3-4

ERSC 144	Introduction to Earth Science
GEOL 102	Introduction to Geology
GEOG 250	Physical Geography
GEOG 414	Global and Regional Climatology
PHYS 313	Introduction to Atmospheric Physics
PSC 103	The Physical Environment: Earth
PSC 201	Physical Oceanography
SS 120	Introductory Soil Science

Energy and pollution

Select from the following: 3-4

BRAE 348	Energy for a Sustainable Society
CHEM 341	Environmental Chemistry: Water Pollution
ENVE 324	Introduction to Air Pollution
ENVE 331	Fundamentals of Environmental Engineering
PHYS 310	Physics of Energy
PSC 320	Energy, Society and the Environment

Social, political, economic, and ethical issues

Select from the following: 3-4

COMS 390	Environmental Communication
CRP 404	Environmental Law
ECON 345	Environmental and Natural Resource Economics
ECON 431	Environmental Economics
ECON 432	Economics of Energy and Resources
ECON 435	Economics of Land and Water
GEOG 308	Global Geography
GEOG 325	Climate and Humanity
GEOG 408	Geography of International Development
ISLA 303	Values and Technology
MSCI 428	Marine Conservation and Policy
NR 308	Fire and Society
PHIL 340	Environmental Ethics
POLS 325	Global Political Issues
POLS 332	World Food Systems
PSC 391	Appropriate Technology for the World's People: Development

PSC 392 Appropriate Technology for the World's People: Design

RPTA 302	Environmental and Wilderness Education
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Environmental planning, management, and sustainability

Select from the following: 3-4

AG 315	Principles of Organic Crop Production
AG/ISLA/UNIV 330	Cal Poly Land: Nature, Technology, and Society
AG 360	Holistic Management
ASCI 239	Principles of Rangeland Management
CRP 336	Introduction to Environmental Planning
EDES 406	Sustainable Environments
ERSC/GEOG 333	Human Impact on the Earth
MSCI 439	Fisheries Science and Resource Management
NR 142	Environmental Management
RPTA 313	Sustainability in the Experience Industry

Approved Elective

Choose one additional 300-400 level course from the above lists. 4

Capstone Course 4

AG/EDES/ENGR/ GEOG/ISLA/ SCM/UNIV 350 or SCM 360	The Global Environment Selected Environmental Issues of California's Central Coast
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Total units 24-28

Biological Sciences

Fisher Science Hall (33), Room 281

Phone: 805.756.2788

Email: biosci@calpoly.edu

<https://bio.calpoly.edu> (<https://bio.calpoly.edu/>)

Department Chair: Ken Hillers

Academic Programs

Program name	Program type
Biological Sciences	BS, MS
Biology	Minor
Cross Disciplinary Studies Minor in Bioinformatics	Minor
Marine Sciences	BS
Microbiology	BS, Minor

The Biological Sciences Department offers undergraduate programs leading to Bachelor of Science degrees in Biological Sciences, Marine Sciences and Microbiology, and minors in Biology, Bioinformatics, and Microbiology. The graduate program leads to a Master of Science degree in Biology. In addition, courses are offered to satisfy life science requirements of academic majors across campus. The Biological Sciences Department is committed to serving the needs of a student population with diverse backgrounds and goals.

The Biological Sciences Department teaches courses with the following prefixes: BIO (Biology), BOT (Botany), MCRO (Microbiology), and MSCI (Marine Science).

The Biological Sciences Department encourages learning by doing in the classroom and through research, in the laboratory and the field. Most courses are accompanied by labs where students gain hands-on experience with biology. Cal Poly's geographical setting on the Central Coast of California offers unique opportunities for studying terrestrial, aquatic, and marine ecosystems. The Department offers a wide range of potential research experiences for our majors. Our faculty maintain active research laboratories where students can participate in the scientific process from start to finish, including presenting and publishing their work. Special opportunities are available through the Center for Applications in Biotechnology (CAB), which is developing biological tools to address environmental concerns through collaborative interdisciplinary research and education; the Center for Coastal Marine Science (CCMS), which promotes and facilitates basic and applied studies of coastal marine systems; and the Undergraduate Biotechnology Laboratory (UBL), which provides undergraduates with hands-on biotechnology experience. Additional resources for research and teaching include a 3000-ft pier at nearby Avila Bay, and natural history collections consisting of tens of thousands of insects, plants, birds, mammals, reptiles, amphibians, and fish.

Successful graduates enter careers in basic and applied research, public health, biotechnology, teaching, wildlife and natural areas conservation, consulting, and government agencies. Graduates are also well prepared to enter graduate or professional schools for advanced study of medicine, dentistry, veterinary science and other health sciences, as well as biodiversity, botany, climate change biology, conservation, ecology, evolution, genetics, genomics, marine sciences, microbiology, molecular biology, physiology, and zoology. The department offers courses required for pre-professional training in medicine and paramedical fields.

The department supports the concept of international education and encourages students to investigate opportunities for overseas study. For further information, see Cal Poly International Center (<https://international.calpoly.edu/>).

Undergraduate Programs BS Biological Sciences

The degree offers students a broad education in biology from molecules to ecosystems, with an emphasis on hands-on training in the laboratory and the field. Biology majors can gain preprofessional preparation in the biomedical fields, coursework toward a teaching credential, progress toward professional certification, and/or preparation for graduate training in a field of interest. In addition to the core coursework for the biology major, students may choose a concentration in order to gain a deep, focused understanding of a specific subfield within biology, or may follow the general curriculum in biology for broader exposure to a variety of topics. Students are encouraged to consult with a faculty advisor and the College of Science and Mathematics Advising Center to help them learn about their chosen degree program, concentration choices, career options, study skills, and departmental opportunities. Students interested in teaching may choose any concentration and should contact the single subject credential advisor for information about teaching opportunities and recommended coursework. Students may not double major in Biological Sciences and Microbiology. Students may not double major in Biological Sciences and Marine Science.

Concentrations

Anatomy and Physiology

Students in this concentration study biological sciences with an emphasis on the structure and function of humans and other animals. This concentration is ideal for students preparing for careers in the health professions.

Ecology, Evolution, Biodiversity, and Conservation

This concentration will prepare students to study the ecology and evolution of the earth's biodiversity and to participate in its conservation. The concentration will provide students with the skills necessary to participate in the conservation of wildlife, plants, and other wild species and their habitats. Professions in this arena include basic and applied research with state and federal resource management agencies, non-governmental organizations (N.G.O.s), and private consulting firms. These professions require a solid foundation in the identification of organisms, the principles of ecology and evolution, and the tools, policies and social context of conservation. This area of concentration is recommended for students seeking professional certification by off-campus entities such as The Wildlife Society and the Ecological Society of America; students interested in such certification programs should consult with their faculty advisor for specific programmatic guidance.

Molecular and Cellular Biology

Designed for students who are interested in how genes and their products work to create and maintain cells, tissues and organisms. This concentration augments the diverse biological sciences curriculum with laboratory courses in nucleic acid and protein techniques, along with cell biology, biochemistry, and electives such as bioinformatics, microbial biotechnology, immunology, developmental biology and virology. This concentration is ideal for students interested in biotechnology or biomedical research, and is also an excellent option for students planning future studies in the health professions.

General Curriculum in Biology

General Curriculum in Biology is not a concentration but can be used to fulfill the unit requirements of a concentration. The General Curriculum provides the greatest flexibility allowing students to take coursework across all areas of biology. This breadth of knowledge across the biological sciences may be especially beneficial for students considering teaching biology at the secondary level. Students who do not declare a concentration will default to the General Curriculum.

BS Marine Sciences

The degree is an integrative program designed to prepare students for advanced training or professional employment in public or private agencies concerned with marine-related issues. While this degree is based in Biological Sciences, the program includes faculty from other disciplines including chemistry, physics, mathematics, engineering, and computer science. The degree instills students with critical thinking and analytical skills in areas such as marine organism physiology, conservation, fisheries, oceanographic sampling and data networks. Through the use of experience-based learning including faculty-led research projects, students will develop essential knowledge as well as a solid foundation in community-oriented education in the interdisciplinary field of marine sciences. Students may not double major in Biological Science and Marine Science.

BS Microbiology

Microbiology is the study of bacteria, viruses, fungi, and protists. Microorganisms are ubiquitous in the environment as important contributors to nutrient cycling, and many have symbiotic relationships with other organisms. Species of medical importance impact human and animal health as pathogens associated with infectious diseases. Additionally, microorganisms are critical research tools in fields such as molecular biology and genetics, and are used for large-scale production of many foods, pharmaceuticals, and industrial chemicals. Cal Poly is one of the few public universities in California offering a laboratory-intensive Bachelor of Science degree in Microbiology.

In the junior and senior years, in addition to genetics, cell biology, and microbial physiology, majors can take specialized courses in medical microbiology, immunology, microbial ecology, virology, and molecular biology laboratory techniques. Students also choose elective courses related to student interests and career goals in close consultation with their faculty advisors. Such goals may include graduate school or professional studies with further training through Clinical Laboratory Scientist (CLS) or Public Health Microbiologist certification programs. Graduates may also pursue post-baccalaureate employment in applied areas such as industrial microbiology, food and dairy microbiology, biotechnology, public health, epidemiology, or medical laboratory technology. Students may not double major in Biological Science and Microbiology.

Biology Minor

The purpose of the minor is to help students from other disciplines acquire increased factual and conceptual knowledge in biology, an increased understanding of scientific methods and techniques used to study biology, and an increased ability to analyze biological topics in the news or in various jobs. Biological issues are important throughout modern life and particularly relevant in many careers, including

those in health-related businesses, agriculture, several engineering disciplines, city planning, teaching K-12 students, journalism, political science, psychology, and statistics. Students in more closely related majors such as biochemistry or kinesiology may also be interested in strengthening their biology background. In addition, an enhanced biology background helps students become better educated citizens regarding a variety of controversial issues in modern society (e.g., genetically-modified organisms in agriculture, human cloning, genetic discrimination, the pressures of population growth). The minor is open to any major except Biological Sciences, Marine Science, Microbiology, and Liberal Studies with a concentration in Biology.

Biotechnology Minor

For information regarding the Biotechnology Minor, please see College of Science and Mathematics (p. 360) section.

Cross Disciplinary Studies Minor in Bioinformatics

Through an inter-college collaboration, the Biology, Chemistry, Computer Science and Software Engineering, and Statistics Departments offer a Cross-Disciplinary Studies Minor (CDSM) in Bioinformatics. Bioinformatics lies at the intersection of computational sciences and biology. The CDSM in Bioinformatics creates a strong foundation in molecular biology as well as the design and applications of software and databases commonly used by computational biologists. The student will gain an understanding of how bioinformatic data are generated, organized, and used to gain insights into molecular life science.

The CDSM in Bioinformatics will provide the opportunity for biology, biochemistry, computer science and statistics students to identify solutions to biological questions using bioinformatics, to write and implement software on a bioinformatics project, to apply statistical analyses associated with bioinformatics, and to learn algorithms that can be useful for software development in the bioinformatics/computational biology field.

A student may not be awarded both the Cross Disciplinary Studies Minor in Bioinformatics and the Biotechnology minor.

Target majors: Biology, Biochemistry, Statistics, Computer Science and Software Engineering

Microbiology Minor

This minor is designed to give students, from majors in which microbiology may be an important component, increased exposure to factual information, concepts, and skills and to provide those students a more complete understanding of the roles of microorganisms as they pertain to their major. Students in the allied health and related fields may expand their breadth of knowledge in microbial diseases, transmission and prevention, and immunologic responses. Students in applied fields of study such as Food and Dairy Sciences and various aspects of agriculture can gain additional information in pertinent topics such as the presence and role of microorganisms in water and wastewater treatment, in recycling of nutrients and soil fertility, in food processing, spoilage, and production, and in disease transmission. The minor is open to any major except Biological Sciences.

Graduate Programs

Master of Science Degree in Biological Sciences

General Characteristics

This degree offers a strong background in the biological sciences. The program is designed to offer sufficient depth to strengthen the student's academic understanding and improve competence for:

1. many types of biological work that require advanced training beyond the bachelor's degree;
2. careers in industry and/or civil service;
3. teaching biological sciences at the elementary, secondary, and community college levels;
4. independent research in the field of specialization;
5. continued graduate work at other institutions.

Prerequisites

Admission to this program requires a minimum grade point average of 3.0 in the last 90 quarter units attempted and two letters of recommendation from persons knowing your academic potential.

Information pertaining to specific departmental requirements for admission, classified, or conditionally classified may be obtained from the Director of the Graduate and Research Committee (Graduate Coordinator) of the Biological Sciences Department.

Program of Study

The formal program of study for the degree must include 45 units of committee-approved graduate work, at least 30 units of which must be at the 500 level. Coursework must include 32 units taken within the Biological Sciences Department at Cal Poly. A grade point average of 3.0 or better is required from the combination of all courses included in the Formal Study Plan. A maximum of 12 units of BIO 590 Seminar in Biology, and a maximum of 3 units of BIO 500 Individual Study may be used as credit towards the degree. The culminating experience is a written and publicly presented independent and novel body of research, and nine units of BIO 599 Thesis.

MS Biological Sciences, Specialization in Regenerative Medicine

Characteristics. Prepares students for careers in regenerative medicine and related fields. Specifically, our graduates are prepared for immediate employment in regenerative medicine, biotechnology or medical technology companies, or as research specialists/laboratory managers at universities and research institutes. Program graduates are also well-prepared to matriculate into biological sciences doctoral programs or graduate programs in the health professions.

Culminating Experience. Students who obtain a degree in the Master of Science in Biological Sciences with a specialization in Regenerative Medicine are not required to complete a "thesis" through BIO 599. In place of the thesis as a culminating experience, students complete a Project during a 9-month internship at a company or academic research laboratory (BIO 593). The Project Report and Project Presentation are evaluated by the student's Cal Poly and Internship Mentors; in addition, the Presentation is evaluated by the Program Director.

BS Biological Sciences

Program Learning Objectives

1. Explain fundamental concepts of biology in the following areas: diversity & evolution; structure and function at multiple hierarchical levels; information flow; energy and matter transformations; interactions among and between organisms and the environment.
2. Demonstrate proficiency in the appropriate lab and field techniques in their area of specialization in biology.
3. Locate and critically evaluate the scientific literature.
4. Apply the process of science to design, conduct, analyze and interpret experiments in biology.
5. Integrate statistics, math, physical sciences and technology to answer biological questions.
6. Communicate biological principles and research findings effectively to diverse audiences.
7. Relate ethical, social justice or global perspectives to the study and practice of biology.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

BIO 150	Diversity and History of Life	4
BIO 161	Introduction to Cell and Molecular Biology (B2 & B3) ¹	4
BIO 162	Introduction to Organismal Form and Function	4
BIO 263	Introductory Ecology and Evolution	4
BIO 351	Principles of Genetics	5
BIO 413	Evolutionary Medicine	4
or BIO 414	Evolution	
BIO 461	Senior Project - Research Proposal	2
or BIO 462	Senior Project Research Experience	

Ecology³

Select from the following:		4
BIO 327	Wildlife Ecology	
BIO 363	Principles of Conservation Biology	
BIO 442	Behavioral Ecology	
BOT 326	Plant Ecology	
MCRO 436	Microbial Ecology	
MSCI 300	Marine Ecology	

Physiology^{2,3}

Select from the following:		4
BIO 361	Principles of Animal Physiology	

BIO 434	Environmental Physiology	
BIO 435	Plant Physiology	
Concentration or General Curriculum in Biology³		
(See list of Concentrations and General Curriculum in Biology below)		43
SUPPORT COURSES		
CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ¹	4
CHEM 128	General Chemistry for Agriculture and Life Science II	4
CHEM 129	General Chemistry for Agriculture and Life Science III	4
CHEM 216 or CHEM 312	Organic Chemistry I ⁴ Organic Chemistry: Fundamentals and Applications	5
MATH 161	Calculus for the Life Sciences I (B4) ¹	4
MATH 162	Calculus for the Life Sciences II (GE Electives) ¹	4
PHYS 121	College Physics I	4
PHYS 122	College Physics II	4
PHYS 123	College Physics III	4
STAT 218	Applied Statistics for the Life Sciences	4
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		56
FREE ELECTIVES		
Free Electives ⁵		5
Total units		180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Students planning to take Anatomy and Physiology courses should take BIO 361 to fulfill this requirement.
- ³ Courses taken to meet a Major or Support requirement cannot be double-counted in a concentration or in the General Curriculum.
- ⁴ Students in the Molecular and Cellular Biology concentration should take CHEM 216 to fulfill this requirement.
- ⁵ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Curriculum in Biology or Concentrations (Select one)

- General Curriculum in Biology (p. 371)
- Anatomy and Physiology (p. 367)
- Ecology, Evolution, Biodiversity, and Conservation (p. 369)
- Molecular and Cellular Biology (p. 370)

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written

Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Major) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		56

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Anatomy and Physiology Concentration

BIO 452	Cell Biology	4
CHEM 369 or CHEM 314	Biochemical Principles Biochemistry: Fundamentals and Applications	5

Biodiversity Courses ^{1,2}

Select from the following: 4

BIO 321	Mammalogy
BIO 322	Ichthyology
BIO 323	Ornithology
BIO 324	Herpetology
BIO 329	Vertebrate Field Zoology
BIO 335	General Entomology
BIO 336	Invertebrate Zoology
BIO 415	Biogeography
BOT 313	Taxonomy of Vascular Plants
MCRO 224	General Microbiology I ³
MSCI 324	Marine Mammals, Birds and Reptiles
MSCI 437	Marine Botany
PLSC/BOT 323	Plant Pathology

Core Anatomy and Physiology Courses ^{1,2}

Select from the following: 16

BIO 406	Advanced Anatomy and Physiology: Neuroscience
BIO 407	Advanced Anatomy and Physiology: Endocrinology
or ASCI 405	Domestic Livestock Endocrinology
BIO 408	Advanced Anatomy and Physiology: Cardiorespiratory and Renal
BIO 409	Advanced Anatomy and Physiology: Muscle and Locomotion
BIO 410	Functional Histology
BIO 426	Immunology

Department Electives ^{1,2}

Select from the following: 3

BIO 321	Mammalogy
BIO 322	Ichthyology
BIO 323	Ornithology
BIO 324	Herpetology
BIO 329	Vertebrate Field Zoology
BIO 335	General Entomology
BIO 336	Invertebrate Zoology
BIO 405	Developmental Biology
BIO 406	Advanced Anatomy and Physiology: Neuroscience
BIO 407	Advanced Anatomy and Physiology: Endocrinology
or ASCI 405	Domestic Livestock Endocrinology
BIO 408	Advanced Anatomy and Physiology: Cardiorespiratory and Renal
BIO 409	Advanced Anatomy and Physiology: Muscle and Locomotion
BIO 410	Functional Histology
BIO 411	Advanced Human Gross Anatomy
BIO 415	Biogeography
BIO 426	Immunology
BIO 428	Hematology
BIO 429	Parasitology

BIO 434	Environmental Physiology
BIO 435	Plant Physiology
BIO 470	Selected Advanced Topics (for "Gastrointestinal Physiology & Microbiology" topic only)
BIO/CHEM 475	Molecular Biology Laboratory
MCRO 224	General Microbiology I ³
MCRO 225	General Microbiology II
MCRO 320	Emerging Infectious Diseases
MCRO 342	Public Health Microbiology
MCRO 402	General Virology
MCRO 423	Medical Microbiology
MCRO 424	Microbial Physiology

Approved Electives ¹

At least 4 units must be upper-division

Select from the following: 11

ANT 401	Culture and Health
ASCI 351	Reproductive Physiology
ASCI 406	Applied Animal Embryology and Assisted Reproduction
ASCI 407	Assisted Reproduction Technologies of Gametes and Embryos Laboratory
ASCI 438	Systemic Animal Physiology
BIO 231	Human Anatomy and Physiology I ⁴
or BIO 232	Human Anatomy and Physiology II
BIO 300	Research Experience for Undergraduates ⁵
BIO 321	Mammalogy
BIO 322	Ichthyology
BIO 323	Ornithology
BIO 324	Herpetology
BIO 329	Vertebrate Field Zoology
BIO 335	General Entomology
BIO 336	Invertebrate Zoology
BIO 400	Special Problems for Advanced Undergraduates ⁵
BIO 405	Developmental Biology
BIO 406	Advanced Anatomy and Physiology: Neuroscience
BIO 407	Advanced Anatomy and Physiology: Endocrinology
or ASCI 405	Domestic Livestock Endocrinology
BIO 408	Advanced Anatomy and Physiology: Cardiorespiratory and Renal
BIO 409	Advanced Anatomy and Physiology: Muscle and Locomotion
BIO 410	Functional Histology
BIO 411	Advanced Human Gross Anatomy
BIO 415	Biogeography
BIO 426	Immunology
BIO 428	Hematology
BIO 429	Parasitology
BIO 434	Environmental Physiology
BIO 435	Plant Physiology

BIO 461	Senior Project - Research Proposal ⁶
BIO 462	Senior Project Research Experience ⁶
BIO 463	Honors Research
BIO 470	Selected Advanced Topics (for "Gastrointestinal Physiology & Microbiology" topic only)
BIO/CHEM 475	Molecular Biology Laboratory
BOT 313	Taxonomy of Vascular Plants
CHEM 217	Organic Chemistry II
CHEM 218	Organic Chemistry III
CHEM 220	Organic Chemistry Laboratory For Life Sciences II
CHEM 223	Organic Chemistry Laboratory for Life Sciences III
CHEM 372	Metabolism
CHEM 418	Neurochemistry
CHEM 428	Nutritional Biochemistry
COMS 418	Health Communication
CSC 101	Fundamentals of Computer Science
DATA 301	Introduction to Data Science
ENGR 322/ SCM 302	The Learn By Doing Lab Teaching Practicum ⁷
FSN 310	Maternal and Child Nutrition
KINE 406	Neuroanatomy
KINE 445	Electrocardiography
KINE 446	Echocardiography
MCRO 225	General Microbiology II
MCRO 320	Emerging Infectious Diseases
MCRO 342	Public Health Microbiology
MCRO 402	General Virology
MCRO 423	Medical Microbiology
MCRO 424	Microbial Physiology
MSCI 324	Marine Mammals, Birds and Reptiles
MSCI 437	Marine Botany
PHIL 323	Ethics, Science and Technology
or PHIL 339	Biomedical Ethics
or PHIL 341	Professional Ethics
PLSC/BOT 323	Plant Pathology
PSY 320	Health Psychology
PSY 340	Biopsychology
STAT 313	Applied Experimental Design and Regression Models
WGQS/ES 350	Gender, Race, Culture, Science & Technology
Total units	43

¹ Consultation with advisor is recommended prior to selecting electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals. Choose electives carefully to ensure that you meet the required 60 units of 300-400 level courses.

² Excess units will be applied to Approved Electives.

³ Recommended for students interested in health sciences careers.

⁴ Only one of the following courses may count toward Approved Electives: BIO 231, BIO 232.

⁵ Maximum of 6 units may be applied toward Approved Electives: BIO 200, BIO 300, BIO 400, BIO 450, BIO 485, BIO 495, MSCI 401.

⁶ If BIO 461 or BIO 462 is used to meet the senior project requirement, it cannot be double-counted as an Approved Elective.

⁷ Maximum of 2 units may be applied toward Approved Electives from ENGR 322 /SCM 302.

Ecology, Evolution, Biodiversity, and Conservation Concentration

BIO 363	Principles of Conservation Biology	4
LA/NR 218	Introduction to Geographic Information Systems (GIS) ¹	3
or GEOG 218	Applications in GIS	

Biodiversity Courses^{1,2}

Select three from the following:		12
BIO 321	Mammalogy	
BIO 322	Ichthyology	
BIO 323	Ornithology	
BIO 324	Herpetology	
BIO 335	General Entomology	
BIO 336	Invertebrate Zoology	
BOT 313	Taxonomy of Vascular Plants	
BOT 433	Field Botany: California Plant Diversity	
MCRO 224	General Microbiology I	
MSCI 437	Marine Botany	

Ecology and Evolution Courses¹

Select one from the following:		4
BIO 415	Biogeography	
BIO 442	Behavioral Ecology	
BIO 444	Population Ecology	
BIO 445	Community Ecology	
BIO 446	Ecosystem Ecology	
BIO 447	Spatial Ecology	
BOT 326	Plant Ecology	
MCRO 436	Microbial Ecology	
MSCI 300	Marine Ecology	

Conservation Courses^{1,2}

Select one from the following:		4
BIO 427	Wildlife Management	
MSCI 428	Marine Conservation and Policy	
MSCI 439	Fisheries Science and Resource Management	
NR 416	Environmental Impact Analysis and Management	

Approved Electives:^{3,4}

Select from the following:		16
At least 8 units must be upper-division.		
ASCI 239	Principles of Rangeland Management	
BIO 300	Research Experience for Undergraduates ⁵	
BIO 321	Mammalogy	

BIO 322	Ichthyology
BIO 323	Ornithology
BIO 324	Herpetology
BIO 327	Wildlife Ecology
BIO 329	Vertebrate Field Zoology
BIO 330	Extended Field Biology Activity
BIO 335	General Entomology
BIO 336	Invertebrate Zoology
BIO 400	Special Problems for Advanced Undergraduates ⁵
BIO 415	Biogeography
BIO 427	Wildlife Management
BIO 429	Parasitology
BIO 434	Environmental Physiology
BIO 435	Plant Physiology
BIO 442	Behavioral Ecology
BIO 444	Population Ecology
BIO 445	Community Ecology
BIO 446	Ecosystem Ecology
BIO 450	Undergraduate Laboratory Assistantship ⁵
BIO 461	Senior Project - Research Proposal ⁶
BIO 462	Senior Project Research Experience ⁶
BIO 463	Honors Research
BOT 311	Plants, People and Civilization
BOT 323	Plant Pathology
BOT 326	Plant Ecology
GEOG 441	Advanced Applications in Geospatial Technologies
MCRO 224	General Microbiology I
MCRO 436	Microbial Ecology
MSCI 300	Marine Ecology
MSCI 324	Marine Mammals, Birds and Reptiles
MSCI 428	Marine Conservation and Policy
MSCI 437	Marine Botany
MSCI 439	Fisheries Science and Resource Management
NR 141	Introduction to Forest Ecosystem Management
NR 142	Environmental Management
NR 314	Environmental Life-Cycle Analysis
NR 404	Environmental Law
NR 416	Environmental Impact Analysis and Management
NR 418	Applied GIS
NR 425	Applied Resource Analysis and Assessment
NR 445	Systems Thinking in Environmental Management
SCM 302/ ENGR 322	The Learn By Doing Lab Teaching Practicum ⁷
STAT 313	Applied Experimental Design and Regression Models
STAT 324	Applied Regression Analysis

or STAT 334	Applied Linear Models
STAT 330	Statistical Computing with SAS
STAT 331	Statistical Computing with R
STAT 416	Statistical Analysis of Time Series
STAT 419	Applied Multivariate Statistics
STAT 421	Survey Sampling and Methodology

Total units **43**

- ¹ Excess units will be applied to subsequent concentration electives.
- ² Students seeking certification (e.g. as an Associate Wildlife Biologist from the Wildlife Society) should see their faculty advisor for guidance.
- ³ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ⁴ If a course is taken to meet a Major or Support requirement, it cannot be double-counted in the concentration.
- ⁵ Maximum of 6 units may be applied toward Approved Electives: BIO 200, BIO 300, BIO 400, BIO 450, BIO 485, BIO 495, MSCI 401.
- ⁶ If BIO 461 or BIO 462 is used to meet the senior project requirement, it cannot be double-counted as an Approved Elective.
- ⁷ Maximum of 2 units may be applied toward Approved Electives from SCM 302/ENGR 322.

Molecular and Cellular Biology Concentration

BIO 452	Cell Biology	4
BIO/CHEM 475	Molecular Biology Laboratory	3
CHEM 217	Organic Chemistry II	3
CHEM 220	Organic Chemistry Laboratory For Life Sciences II	1
CHEM 369	Biochemical Principles	5
MCRO 224	General Microbiology I	5

Advanced Cell and Molecular Applications^{1,2}

Select from the following:		10
ASCI 403	Applied Biotechnology in Animal Science	
BIO 405	Developmental Biology	
BIO 426	Immunology	
BIO 428	Hematology	
BIO/CHEM 441	Bioinformatics Applications	
BIO/CHEM 476	Gene Expression Laboratory	
CHEM 372	Metabolism	
CHEM 418	Neurochemistry	
CHEM 474	Protein Techniques Laboratory	
MCRO 402	General Virology	
MCRO 433	Microbial Biotechnology	

Approved Electives^{1,3,4,5}

Select from any 300-400 level BIO/BOT/MCRO/MSCI courses (including Advanced Cell and Molecular Applications from the list above) or select from the following:

At least 5 units must be upper-division

ASCI 403	Applied Biotechnology in Animal Science
ASCI 406	Applied Animal Embryology and Assisted Reproduction
ASCI 407	Assisted Reproduction Technologies of Gametes and Embryos Laboratory
BIO/CHEM 202	Orientation to Biotechnology
CHEM 218	Organic Chemistry III
CHEM 223	Organic Chemistry Laboratory for Life Sciences III
CHEM 331	Quantitative Analysis
CHEM 372	Metabolism
CHEM 377	Chemistry of Drugs and Poisons
CHEM 418	Neurochemistry
CHEM 428	Nutritional Biochemistry
CHEM 474	Protein Techniques Laboratory
CSC 101	Fundamentals of Computer Science
DATA 301	Introduction to Data Science
ENGR 322/ SCM 302	The Learn By Doing Lab Teaching Practicum ⁶
ES/WGQS 350	Gender, Race, Culture, Science & Technology
PHIL 323 or PHIL 339 or PHIL 341	Ethics, Science and Technology Biomedical Ethics Professional Ethics
STAT 313	Applied Experimental Design and Regression Models

Total units 43

- ¹ Consultation with advisor is recommended prior to selecting electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ² Excess units will be applied to Approved Electives.
- ³ Consult with your faculty advisor for approval to use other relevant upper-division coursework in other departments.
- ⁴ If a course is taken to meet a Major or Support requirement, it cannot be double-counted in the concentration.
- ⁵ Maximum of 6 units may be applied toward Approved Electives: BIO 200, BIO 300, BIO 400, BIO 450, BIO 485, BIO 495, MSCI 401.
- ⁶ Maximum of 2 units may be applied toward Approved Electives from ENGR 322/SCM 302.

General Curriculum in Biology

The General Curriculum in Biology is followed by default if no concentration is declared.

Biodiversity Courses^{1,2}

Select from the following: 4

BIO 321	Mammalogy
BIO 322	Ichthyology
BIO 323	Ornithology
BIO 324	Herpetology
BIO 329	Vertebrate Field Zoology
BIO 335	General Entomology
BIO 336	Invertebrate Zoology

BIO 429	Parasitology	
BOT 313	Taxonomy of Vascular Plants	
MCRO 224	General Microbiology I ³	
MCRO 402	General Virology	
MSCI 324	Marine Mammals, Birds and Reptiles	
400-level Electives^{1,4}		
Select from any 400 level BIO/BOT/MCRO/MSCI course, except BIO 400, BIO 450, BIO 461, BIO 462, BIO 463.		12
300-400 level Electives^{1,2}		
Select from any 300-400 level BIO/BOT/MCRO/MSCI course, except BIO 300, BIO 330, BIO 400, BIO 450, BIO 461, BIO 462, BIO 463, and courses which are "not open for major credit in Biological Sciences."		8
Approved Electives^{1,5,6,7}		
At least 12 units must be upper-division.		
At least 4 units must be BIO/BOT/MCRO/MSCI course(s)		
Select from the following:		19
Any BIO/BOT/MCRO/MSCI course except those which are "not open for major credit in Biological Sciences" ^{7,8,9}		
AG/EDES/ENGR/ ISLA/SCM/UNIV 350	The Global Environment	
ANT 401	Culture and Health	
ASCI 239	Principles of Rangeland Management	
ASCI 351	Reproductive Physiology	
ASCI 403	Applied Biotechnology in Animal Science	
ASCI 405 or BIO 407	Domestic Livestock Endocrinology Advanced Anatomy and Physiology: Endocrinology	
ASCI 406	Applied Animal Embryology and Assisted Reproduction	
ASCI 438	Systemic Animal Physiology	
CHEM 217	Organic Chemistry II	
CHEM 218	Organic Chemistry III	
CHEM 220	Organic Chemistry Laboratory For Life Sciences II	
CHEM 223	Organic Chemistry Laboratory for Life Sciences III	
CHEM 314 or CHEM 369	Biochemistry: Fundamentals and Applications Biochemical Principles	
CHEM 331	Quantitative Analysis	
CHEM 341	Environmental Chemistry: Water Pollution	
CHEM 372	Metabolism	
CHEM 377	Chemistry of Drugs and Poisons	
CHEM 418	Neurochemistry	
CHEM 428	Nutritional Biochemistry	
CHEM 474	Protein Techniques Laboratory	
COMS 418	Health Communication	
CSC 101	Fundamentals of Computer Science	
DATA 301	Introduction to Data Science	

ENGR 322/ SCM 302	The Learn By Doing Lab Teaching Practicum ¹⁰
ERSC/GEOG 250	Physical Geography
ES/WGQS 350	Gender, Race, Culture, Science & Technology
FSN 310	Maternal and Child Nutrition
GEOG 441	Advanced Applications in Geospatial Technologies
KINE 406	Neuroanatomy
KINE 445	Electrocardiography
KINE 446	Echocardiography
LA/NR 218	Introduction to Geographic Information Systems (GIS)
or GEOG 218	Applications in GIS
NR 141	Introduction to Forest Ecosystem Management
NR 142	Environmental Management
NR 404	Environmental Law
NR 416	Environmental Impact Analysis and Management
NR 418	Applied GIS
NR 425	Applied Resource Analysis and Assessment
PHIL 323	Ethics, Science and Technology
or PHIL 339	Biomedical Ethics
or PHIL 341	Professional Ethics
PSC 201	Physical Oceanography
PSY 320	Health Psychology
PSY 340	Biopsychology
SS 120	Introductory Soil Science
SS 321	Soil Morphology
SS 322	Soil Plant Relationships
SS 422	Soil Ecology
STAT 313	Applied Experimental Design and Regression Models
STAT 324	Applied Regression Analysis
or STAT 334	Applied Linear Models
STAT 330	Statistical Computing with SAS
STAT 416	Statistical Analysis of Time Series
STAT 419	Applied Multivariate Statistics
STAT 421	Survey Sampling and Methodology
Total units	43

¹ Consultation with advisor is recommended prior to selecting electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

² Excess units will be applied to Approved Electives.

³ Recommended for students interested in health science careers.

⁴ Excess units will be applied to 300-400 level Electives.

⁵ If a course is taken to meet a Major or Support requirement, it cannot be double-counted in the concentration.

⁶ Taking a General Education (GE) course that double-counts as an elective may cause an upper-division unit shortage. Use care to ensure that you have taken enough 300-400 level courses to meet the required 60 units of upper-division courses.

⁷ If BIO 461 or BIO 462 is used to meet the senior project requirement, it cannot be double-counted as an elective.

⁸ Maximum of 6 units may be applied toward Approved Electives: BIO 200, BIO 300, BIO 400, BIO 450, BIO 485, BIO 495, MSCI 401.

⁹ Only one of the following courses may count toward Approved Electives: BIO 231, BIO 232.

¹⁰ Maximum of 2 units may be applied toward Approved Electives from ENGR 322/SCM 302.

BS Marine Sciences

Program Learning Objectives

Graduates of the BS Marine Sciences program will be able to:

1. Integrate and synthesize information from the various marine disciplines.
2. Recognize and value the diversity of marine life and ecosystems.
3. Apply the scientific method, by formulating hypotheses, making predictions, and assessing, analyzing, synthesizing, and interpreting data.
4. Communicate marine scientific principles and research findings effectively diverse audiences.
5. Demonstrate proficiency in lab and field techniques relevant to marine sciences.
6. Locate and utilize bibliographic resources and demonstrate the ability to evaluate scientific literature.
7. Relate ethical, social justice or global perspectives to the study and practice of marine science.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

BIO 150	Diversity and History of Life	4
BIO 161	Introduction to Cell and Molecular Biology (B2 & B3) ¹	4
BIO 162	Introduction to Organismal Form and Function	4
BIO 263	Introductory Ecology and Evolution	4
BIO 461	Senior Project - Research Proposal ²	2
or BIO 462	Senior Project Research Experience	
CHEM 302	Marine Chemistry	3
MSCI 100	Orientation to Marine Sciences	1
MSCI 300	Marine Ecology	4
MSCI 301	Biological Oceanography	3
MSCI 403	Ocean Sampling Techniques	4
PSC 201	Physical Oceanography	4

Marine Resources Conservation and Policy

Select from the following:³ 4

BIO 363	Principles of Conservation Biology
MSCI 428	Marine Conservation and Policy
MSCI 438	Aquaculture
MSCI 439	Fisheries Science and Resource Management

Marine Biodiversity

Select from the following:³ 4

BIO 322	Ichthyology
BIO 336	Invertebrate Zoology
MCRO 436	Microbial Ecology
MSCI 324	Marine Mammals, Birds and Reptiles
MSCI 437	Marine Botany

Communicating Science

Select from the following (excess units will be applied to Electives):³ 1

COMS 390	Environmental Communication
COMS 395	Science Communication
ENGR 322/ SCM 302	The Learn By Doing Lab Teaching Practicum
MSCI 401	Marine Science Outreach
MSCI 440	Communicating Ocean Sciences to Informal Audiences

Electives

Select additional courses from Marine Resources Conservation and Policy, Marine Biodiversity, or Communicating Science (above) or select from the following:³ 25

At least 18 units must be upper-division. Select courses carefully to ensure that you have taken enough 300-400 level courses to meet the required 60 units of upper-division courses for the degree.

AG/EDES/ENGR/ GEOG/ISLA/ SCM/UNIV 350	The Global Environment
ASCI 290	Animal Production and Management Enterprise
ASCI 490	Advanced Animal Production and Management Enterprise
BIO 200	Special Problems for Undergraduates ⁴
BIO 300	Research Experience for Undergraduates ⁴
BIO 327	Wildlife Ecology
BIO 330	Extended Field Biology Activity ⁴
BIO 351	Principles of Genetics
BIO 361	Principles of Animal Physiology
BIO 400	Special Problems for Advanced Undergraduates ⁴
BIO 413	Evolutionary Medicine
BIO 414	Evolution
BIO 415	Biogeography
BIO 434	Environmental Physiology
BIO 442	Behavioral Ecology

BIO 444	Population Ecology
BIO 445	Community Ecology
BIO 446	Ecosystem Ecology
BIO 450	Undergraduate Laboratory Assistantship ⁴
BIO 452	Cell Biology
BIO 461	Senior Project - Research Proposal ²
BIO 462	Senior Project Research Experience ²
BIO 463	Honors Research
BIO 470	Selected Advanced Topics
BIO 471	Selected Advanced Laboratory
BIO 472	Current Topics in Biological Research
BIO/CHEM 475	Molecular Biology Laboratory
BRAE 333	Aquacultural Engineering
CHEM 201	Undergraduate Research
CHEM 217	Organic Chemistry II
CHEM 218	Organic Chemistry III
CHEM 220	Organic Chemistry Laboratory For Life Sciences II
or CHEM 221	Organic Chemistry Laboratory II
CHEM 223	Organic Chemistry Laboratory for Life Sciences III
or CHEM 324	Organic Chemistry Laboratory III
CHEM 314	Biochemistry: Fundamentals and Applications
CHEM 331	Quantitative Analysis
CHEM 341	Environmental Chemistry: Water Pollution
CHEM 369	Biochemical Principles
CHEM 372	Metabolism
CHEM 400	Special Problems for Advanced Undergraduates ⁴
CHEM 401	Advanced Undergraduate Research
COMS 390	Environmental Communication ⁵
COMS 395	Science Communication ⁵
CPE/CSC 101	Fundamentals of Computer Science
CRP/NR 404	Environmental Law
CSC/CPE 202	Data Structures
CSC/CPE 203	Project-Based Object-Oriented Programming and Design
CSC 231	Programming for Engineering Students
CSC 232	Computer Programming for Scientists and Engineers
DATA 301	Introduction to Data Science
EE 201	Electric Circuit Theory
EE 321	Electronics
ENGR 322/ SCM 302	The Learn By Doing Lab Teaching Practicum ^{5,6}
ENGR 400	Special Problems for Advanced Undergraduates ⁴
ENVE 331	Fundamentals of Environmental Engineering
ENVE 400	Special Problems

ENVE 434	Water Chemistry and Water Quality Measurements	
GEOL 200	Special Problems for Undergraduates	
GEOL 241	Physical Geology Laboratory	
GEOL 330	Principles of Stratigraphy	
GEOL 400	Special Problems for Advanced Undergraduates	
MATH 143	Calculus III	
MATH 241	Calculus IV	
MATH 244	Linear Analysis I	
MCRO 224	General Microbiology I	
MCRO 436	Microbial Ecology	
MSCI 401	Marine Science Outreach ⁴	
MSCI 410	Scientific Diving	
MSCI 440	Communicating Ocean Sciences to Informal Audiences ⁵	
NR 218	Introduction to Geographic Information Systems (GIS)	
NR/LA 317	The World of Spatial Data and Geographic Information Technology	
NR 321	Water Resources Technology and Society	
PHYS 200	Special Problems for Undergraduates	
PHYS 314	Ocean Dynamics	
PHYS 400	Special Problems for Advanced Undergraduates ⁴	
PHYS 461	Senior Project I	
PHYS 462	Senior Project II	
STAT 323	Design and Analysis of Experiments I	
STAT 324	Applied Regression Analysis	
or STAT 334	Applied Linear Models	
STAT 330	Statistical Computing with SAS	
STAT 331	Statistical Computing with R	
STAT 416	Statistical Analysis of Time Series	
SUPPORT		
CHEM 127	General Chemistry for Agriculture and Life Science I (B1) ¹	4
CHEM 128	General Chemistry for Agriculture and Life Science II	4
CHEM 129	General Chemistry for Agriculture and Life Science III	4
CHEM 216	Organic Chemistry I ⁷	5
or CHEM 312	Organic Chemistry: Fundamentals and Applications	
GEOL 102	Introduction to Geology	4
MATH 141	Calculus I (B4) ^{1,8}	4
or MATH 161	Calculus for the Life Sciences I	
MATH 142	Calculus II (GE Electives) ^{1,8}	4
or MATH 162	Calculus for the Life Sciences II	
PHYS 121	College Physics I ⁹	4
or PHYS 141	General Physics I	
PHYS 122	College Physics II ⁹	4
or PHYS 142	General Physics II	
PHYS 123	College Physics III ⁹	4
or PHYS 143	General Physics III	

STAT 218	Applied Statistics for the Life Sciences	4
STAT 313	Applied Experimental Design and Regression Models (Upper-Division B) ¹	4

GENERAL EDUCATION (GE)	
(See GE program requirements below.)	52
FREE ELECTIVES	
Free Electives ^{7,10}	8
Total units	180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² If BIO 461 or BIO 462 is used to meet the senior project requirement, it cannot be double-counted as an Elective.
- ³ If a course is taken to meet a Major or Support requirement, it cannot be double-counted as an Elective.
- ⁴ Maximum of 6 units may be applied toward Electives: BIO 200, BIO 300, BIO 330, BIO 400, BIO 450, BIO 485, BIO 495, CHEM 400, ENGR 400, MSCI 401, PHYS 400.
- ⁵ No more than 3 units from COMS 390, COMS 395, ENGR 322/SCM 302, MSCI 440.
- ⁶ Maximum of 2 units may be applied toward Electives from ENGR 322/SCM 302.
- ⁷ If CHEM 216 is taken, then some Free Electives may need to be 300-400 level to ensure completion of the required minimum of 60 units of upper-division.
- ⁸ Students emphasizing in Chemistry, Physics or Engineering should take MATH 141 and MATH 142 instead of MATH 161 and MATH 162. GE Area B4 will be met with any of the following: MATH 161, MATH 162, MATH 141, MATH 142.
- ⁹ Students emphasizing in Physics should take PHYS 141, PHYS 142 and PHYS 143 instead of PHYS 121, PHYS 122 and PHYS 123. GE Area B1 will be met with any of the following: PHYS 121, PHYS 122, PHYS 141 or PHYS 142.
- ¹⁰ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	

B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Major) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		52

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

BS Microbiology

Program Learning Objectives

1. Explain fundamental concepts and principles in microbiology and general biology (atom to ecosystem).
2. Demonstrate proficiency in common lab and field techniques for microbiology.
3. Locate, critically evaluate, and integrate scientific literature findings into the practice of microbiology.
4. Assess and analyze experimental data with objectivity.
5. Integrate statistics, math, physical sciences and technology to answer microbiological questions.
6. Communicate microbiology principles and research findings effectively to diverse audiences.
7. Relate ethical, social justice or global perspectives to the study and practice of microbiology.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support, or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

BIO 150	Diversity and History of Life	4
BIO 161	Introduction to Cell and Molecular Biology (B2 & B3) ¹	4
BIO 263	Introductory Ecology and Evolution	4
BIO 351	Principles of Genetics	5
BIO 452	Cell Biology	4
MCRO 224	General Microbiology I	5
MCRO 225	General Microbiology II	5
MCRO 424	Microbial Physiology	5
BIO 461	Senior Project - Research Proposal	2
or BIO 462	Senior Project Research Experience	

Select three courses from the following:

11-13

BIO 426	Immunology	
BIO 475	Molecular Biology Laboratory	
MCRO 402	General Virology	
MCRO 423	Medical Microbiology	
MCRO 436	Microbial Ecology	

Electives

Select from the following:^{2,3,4}

19-21

Biotechnology

ASCI 403	Applied Biotechnology in Animal Science	
BIO 202	Orientation to Biotechnology	
BIO 475	Molecular Biology Laboratory	
BIO/CHEM 476	Gene Expression Laboratory	
BRAE 448	Bioconversion	
CHEM 372	Metabolism	
CHEM 474	Protein Techniques Laboratory	
MCRO 433	Microbial Biotechnology	

Food Microbiology

DSCI 402	Quality Assurance and Control of Dairy Products	
DSCI 444	Dairy Microbiology	
FSN 230	Elements of Food Processing	
FSN 275	Elements of Food Safety	
FSN 335	Food Quality Assurance	
FSN 340	Fermented Foods	
FSN 364	Food Chemistry	
FSN 368	Food Analysis	
FSN 374	Food Laws and Regulations	

MCRO/WVIT 301	Wine Microbiology	BIO 462	Senior Project Research Experience ⁵
MCRO 421	Food Microbiology	BIO 463	Honors Research
Medical and Public Health Microbiology		BOT/PLSC 323	Plant Pathology
ASCI 321	Zoonoses and Veterinary Public Health Concerns	CHEM 218 & CHEM 223	Organic Chemistry III and Organic Chemistry Laboratory for Life Sciences III
BIO 406	Advanced Anatomy and Physiology: Neuroscience	CHEM 331	Quantitative Analysis
BIO 407	Advanced Anatomy and Physiology: Endocrinology	CHEM 341	Environmental Chemistry: Water Pollution
BIO 408	Advanced Anatomy and Physiology: Cardiorespiratory and Renal	CHEM 418	Neurochemistry
BIO 409	Advanced Anatomy and Physiology: Muscle and Locomotion	ENVE 434	Water Chemistry and Water Quality Measurements
BIO 410	Functional Histology	MATH 162	Calculus for the Life Sciences II
BIO 426	Immunology	MCRO 100	Introduction to Microbiology Research
BIO 428	Hematology	PLSC 313	Agricultural Entomology
BIO 429	Parasitology	PLSC 441	Biological Control for Pest Management
CHEM 349	Chemical and Biological Warfare	SUPPORT COURSES	
CHEM 377	Chemistry of Drugs and Poisons	CHEM 127	General Chemistry III for Agriculture and Life Science I (B1 & B3) ¹
CHEM 477	Biochemical Pharmacology	CHEM 128	General Chemistry for Agriculture and Life Science II
KINE 301	Functional Anatomy	CHEM 129	General Chemistry for Agriculture and Life Science III
MCRO 320	Emerging Infectious Diseases	CHEM 216	Organic Chemistry I ⁴
MCRO 342	Public Health Microbiology	CHEM 217 & CHEM 220	Organic Chemistry II and Organic Chemistry Laboratory For Life Sciences II ⁴
MCRO 423	Medical Microbiology	CHEM 314	Biochemistry: Fundamentals and Applications (Upper-Division B) ^{1,6}
Microbial Diversity, Ecology and Evolution		or CHEM 369	Biochemical Principles
BIO 413	Evolutionary Medicine	MATH 161	Calculus for the Life Sciences I (B4) ^{1,4}
BIO 414	Evolution	PHYS 121	College Physics I
MCRO 402	General Virology	PHYS 122	College Physics II
MCRO 436	Microbial Ecology	PHYS 123	College Physics III
SS 422	Soil Ecology	STAT 218	Applied Statistics for the Life Sciences (GE Electives) ¹
Bioinformatics and Data Analysis		GENERAL EDUCATION (GE)	
BIO 441	Bioinformatics Applications	(See list of GE program requirements below.)	
DATA 301	Introduction to Data Science	52	
STAT 313	Applied Experimental Design and Regression Models	FREE ELECTIVES	
STAT 419	Applied Multivariate Statistics	Free Electives ⁷	
STAT 421	Survey Sampling and Methodology	10-14	
Other Electives for Microbiology Majors		Up to 6 units of free electives may need to be at the 300-400 level to ensure completion of the required minimum of 60 units of upper-division courses. Consult college advisor for additional information.	
ASCI 203	Animal Parasitology	Total units	
ASCI 440	Immunology and Diseases of Animals	180	
ASCI 438	Systemic Animal Physiology		
BIO 162	Introduction to Organismal Form and Function		
BIO 300	Research Experience for Undergraduates ³		
BIO 335	General Entomology		
BIO 336	Invertebrate Zoology		
BIO 361	Principles of Animal Physiology		
BIO 400	Special Problems for Advanced Undergraduates ³		
BIO 434	Environmental Physiology		
BIO 450	Undergraduate Laboratory Assistantship ³		

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Consultation with an advisor is recommended before selecting Electives; bear in mind that selections may impact pursuit of post-baccalaureate studies and/or goals. At least 14-16 units must be upper-division (300-400 level) to ensure completion of the required minimum of 60 units of upper-division courses.

- ³ Maximum of 6 units may be applied toward Approved Electives: BIO 200, BIO 300, BIO 400, BIO 450, BIO 485, BIO 495, MSCI 401
- ⁴ Students planning to attend graduate or professional schools are strongly advised to meet with their advisors to ensure that they meet necessary prerequisites for entry into these programs. Additional courses in math and chemistry may be necessary.
- ⁵ If BIO 462 is used to meet the senior project requirement, it cannot also be counted as an Elective.
- ⁶ CHEM 369 suggested for students who plan to pursue graduate school or a health professions career.
- ⁷ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Major) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4

Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		52

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Biology Minor

Note: Up to 5 units in the minor may be taken credit/no-credit.

Introductory courses¹		
Select three courses from the following:		12-14
BIO 111	General Biology	
or BIO 161	Introduction to Cell and Molecular Biology	
BIO 114	Plant Diversity and Ecology	
or BOT 121	General Botany	
BIO 123	Biology of Sex	
BIO 150	Diversity and History of Life	
BIO 162	Introduction to Organismal Form and Function	
or BIO 211	Biology of Plants and Animals	
BIO 227	Wildlife Conservation Biology	
BIO 231	Human Anatomy and Physiology I	
BIO 232	Human Anatomy and Physiology II	
BIO 263	Introductory Ecology and Evolution	
MCRO 221	Microbiology	
or MCRO 224	General Microbiology I	
Upper-division electives (300-400 level)^{1, 2}		
Select at least 4 courses from the following:		16
BIO, BOT, MCRO, MSCI or ZOO, with the exception of BIO 450, BIO 485, BIO 495 and MSCI 401.		
A maximum of 1 unit of BIO 400 may be used in the minor.		
Total units		28-30

¹ Check prerequisites. Upper-division courses designed for Biological Sciences majors usually require some combination of BIO 150, BIO 161, BIO 162 and BIO 263 as prerequisites.

² Suggested combinations of courses in particular areas of biology are available in the department. Specific combinations of courses may not be allowed if the courses overlap too much in content. Students must obtain prior approval from one of the Biology Minor advisors.

Cross Disciplinary Studies Minor in Bioinformatics

Biology/Biochemistry

BIO 161	Introduction to Cell and Molecular Biology	4
BIO 302	Human Genetics ¹	3-5
or BIO 303	Survey of Genetics	
or BIO 351	Principles of Genetics	
or CHEM 373	Molecular Biology	

Depth in Biology/Biochemistry

Select 6-10 units from the following: ^{1,2} 6-10

BIO 305	Biology of Cancer	
BIO 308	Genetic Engineering Technology	
BIO 327	Wildlife Ecology	
BIO 361	Principles of Animal Physiology	
BIO 413	Evolutionary Medicine	
BIO 414	Evolution	
BIO 415	Biogeography	
BIO 442	Behavioral Ecology	
BIO 444	Population Ecology	
BIO 446	Ecosystem Ecology	
BIO 475	Molecular Biology Laboratory	
BIO 476	Gene Expression Laboratory	
BOT 311	Plants, People and Civilization	
BOT 326	Plant Ecology	
CHEM 202	Orientation to Biotechnology	
CHEM 314	Biochemistry: Fundamentals and Applications	
CHEM 369	Biochemical Principles	
MCRO 320	Emerging Infectious Diseases	
MCRO 342	Public Health Microbiology	
MCRO 421	Food Microbiology	
MCRO 433	Microbial Biotechnology	
MSCI 330	Technologies for Ocean Discovery	

Computer Science

CSC 101	Fundamentals of Computer Science	4
CSC 202	Data Structures	4
CSC 203	Project-Based Object-Oriented Programming and Design	4

Statistics

STAT 302	Statistics II ¹	4
or STAT 312	Statistical Methods for Engineers	
or STAT 313	Applied Experimental Design and Regression Models	

Bioinformatics

BIO/CHEM 441	Bioinformatics Applications ¹	4
or CSC 448	Bioinformatics Algorithms	
DATA 301	Introduction to Data Science	4
DATA 441	Bioinformatics Capstone I	2
DATA 442	Bioinformatics Capstone II	2

Total units 41-47

¹ Courses in this minor may have additional prerequisites that will not count towards the minor.

² Please check prerequisites. Your ability to select specific elective courses may vary depending upon the curriculum requirements for your major.

Microbiology Minor

Required Courses

MCRO 221	Microbiology	4-5
or MCRO 224	General Microbiology I	
MCRO 225	General Microbiology II	5
Select from the following:		4-5
MCRO 402	General Virology	
MCRO 423	Medical Microbiology	
MCRO 424	Microbial Physiology	

Approved Electives

Select from the following:		11-13
BIO 426	Immunology	
BIO 428	Hematology	
BIO 429	Parasitology	
DSCI 444	Dairy Microbiology	
MCRO 301	Wine Microbiology	
MCRO 320	Emerging Infectious Diseases	
MCRO 342	Public Health Microbiology	
MCRO 402	General Virology	
MCRO 421	Food Microbiology	
MCRO 423	Medical Microbiology	
MCRO 424	Microbial Physiology	
MCRO 433	Microbial Biotechnology	
MCRO 436	Microbial Ecology	
SS 422	Soil Ecology	

Total units 26

MS Biological Sciences

Program Learning Objectives

1. Demonstrate a thorough understanding and competency in a subdiscipline of specialization within the biological sciences.
2. Communicate scientific ideas effectively in both oral and written formats.
3. Demonstrate an ability to think critically and evaluate, design, conduct, and quantitatively analyze or assess research in a biological discipline.
4. Demonstrate the skills and knowledge needed for employment or advanced graduate or professional study in discipline related areas.

Required Courses

Select from the following:		8
BIO 501	Molecular & Cellular Biology	
BIO 502	Biology of Organisms	
BIO 503	Population Biology	
BIO 560	Graduate Professional Seminar	2
BIO 561	Proposal Writing for Biological Research	3

BIO 590	Seminar in Biology	3
BIO 591	Biology Colloquium	2
BIO 599	Thesis	9
Select from the following:		4
STAT 419	Applied Multivariate Statistics	
STAT 513	Applied Experimental Design and Regression Models	
STAT 523	Design and Analysis of Experiments I	
STAT 524	Applied Regression Analysis	
Electives		
Additional units at the 400 or 500 level. ¹		14
Total units		45

¹ Electives must include 5 units taken within the Biological Sciences Department at Cal Poly in order to meet the program requirement of 32 units.

All 45 units must be acceptable for graduate credit and in accordance with Graduate Guidelines of the Biological Sciences Department. Coursework must include 32 units taken within the Biological Sciences Department at Cal Poly. For further information, students should communicate with the Chair of the Biological Sciences Department or with the Director of the Graduate and Research Committee.

MS Biological Sciences, Specialization in Regenerative Medicine

Program Learning Objectives

1. Perform fundamental laboratory skills involved in regenerative medicine research & development.
2. Discuss and critically evaluate biomedical primary literature.
3. Effectively communicate technical topics to both peer and lay audiences.
4. Explain the process of biotechnology development & commercialization.
5. Describe how research & development efforts are motivated by and impact physician & patient experiences.
6. Design and execute independent research projects.

Required Courses

BIO 501	Molecular & Cellular Biology	4
BIO 509	Communicating Biology to General Audiences	1
BIO 534	Principles of Stem Cell Biology	2
BIO/ASCI/BMED 583	Research Experience for Regenerative Medicine Students	2
BIO/ASCI/BMED 593	Regenerative Medicine Internship ¹	9
BMED 510	Principles of Tissue Engineering	4
BMED 515	Introduction to Biomedical Imaging	4
BMED 560	Cell Transplantation and Biotherapeutics	2
BMED 561	Cell Transplantation and Biotherapeutics Laboratory	2

STAT 513	Applied Experimental Design and Regression Models	4
or STAT 523	Design and Analysis of Experiments I	
or STAT 524	Applied Regression Analysis	

Seminars ²		
Select from the following:		6
ASCI 581	Graduate Seminar in Animal Science	
BIO 574	Teaching Strategies for College Biology Laboratories	
BIO 590	Seminar in Biology	
BIO 591	Biology Colloquium	
BMED 563	Biomedical Engineering Graduate Seminar	

Approved Electives		
Select from the following:		5
ASCI 406	Applied Animal Embryology and Assisted Reproduction	
ASCI 407	Assisted Reproduction Technologies of Gametes and Embryos Laboratory	
BIO 405	Developmental Biology	
BIO 406	Advanced Anatomy and Physiology: Neuroscience	
BIO 410	Functional Histology	
BIO 426	Immunology	
BIO 441	Bioinformatics Applications	
BIO 475	Molecular Biology Laboratory ³	
BIO 476	Gene Expression Laboratory	
BIO 500	Individual Study	
BIO 502	Biology of Organisms	
BIO 524	Developmental Biology Seminar	
CHEM 418	Neurochemistry	
CHEM 474	Protein Techniques Laboratory	

Total units		45
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- ¹ Students will complete their internship at one of our partner institutions. An updated list of our current partners can be found on our program website: regenmed.calpoly.edu (<https://regenmed.calpoly.edu>).
- ² Take at least one offering of ASCI 581, BIO 590, and BMED 563; the remaining units up to 6 may be from any combination of seminar courses, chosen in consultation with a faculty advisor.
- ³ Strongly recommended if not already taken an equivalent course.

Chemistry & Biochemistry

Baker Center for Sciences and Mathematics Bldg. (180), Room 206
Phone: 805.756.2693
<https://chemistry.calpoly.edu>

Department Chair: Seth Bush

Academic Programs

Program name	Program type
Biochemistry	BS
Chemistry	BS
Cross Disciplinary Studies Minor in Bioinformatics	Minor
Polymers and Coatings Science	MS

The Chemistry and Biochemistry Department has two roles in the university: to provide professional education for students who are majors in chemistry and biochemistry and who plan careers in the natural sciences and related fields, and to provide instruction in the fundamentals of chemistry to students with majors in fields related to chemistry, especially in the life sciences, agriculture, and engineering.

The department offers a flexible chemical education degree option for students interested in a career in pre-college science education. Interested students should contact the single subject teaching credential advisor early in their academic career for more information.

Career opportunities for chemists are increasing. There are openings in traditional areas such as environmental analysis, the health professions, industrial research and production, pharmacology, toxicology, product quality control, and teaching at the secondary or university level. Newer opportunities lie in related areas such as library science, market research, patent law, and safety engineering

Undergraduate Programs

BS Biochemistry

The Chemistry and Biochemistry Department provides curricula leading to the Bachelor of Science in Biochemistry and the Bachelor of Science in Biochemistry with a concentration in Polymers and Coatings.

The baccalaureate curriculum in biochemistry includes required courses in general chemistry, analytical chemistry, inorganic chemistry, organic chemistry, biochemistry and physical chemistry. Advanced undergraduates choose electives from courses that cover a broad range of specialized topics, such as environmental chemistry, nutritional biochemistry, advanced organic and physical chemistry, pharmacology, and polymer chemistry. The curriculum emphasizes laboratory work, especially current techniques and the use of instrumentation in all fields of chemistry. The program provides opportunities for independent research under faculty guidance, including a requirement for a senior project. A senior project may consist of pure or applied research in biochemistry, or it may involve interdisciplinary work with another field such as art, biology, agriculture, civil or environmental engineering, psychology, or soil science. Under the department's cooperative education program, bachelor's degree candidates may work full-time in industry or government for one or two quarters, for pay and academic credit.

There are a number of career opportunities in the fields of biotechnology and polymers and coatings. Students completing a degree in biochemistry or a concentration in polymers and coatings are prepared

for direct entry into these careers, as well as for postgraduate education in a professional specialty.

Concentration

Polymers and Coatings Concentration

Students may select the Polymers and Coatings concentration instead of advanced approved biochemistry electives in Major Courses. The concentration includes the required courses in the biochemistry curriculum and electives in the area of polymers, coatings, surface chemistry and materials engineering. The concentration gives students the background and practical experience to move into a rewarding career in a wide range of fields including paints and coatings, resins, plastics, adhesives and sealants.

BS Chemistry

The Chemistry and Biochemistry Department provides curricula leading to the Bachelor of Science in Chemistry and the Bachelor of Science in Chemistry with a certified concentration in Polymers and Coatings. Both the BS in Chemistry and the concentration in Polymers and Coatings are certified by the American Chemical Society. An option in Chemical Education designed for aspiring teachers in secondary schools is also available.

The baccalaureate curriculum in chemistry includes required courses in general chemistry, analytical chemistry, inorganic chemistry, organic chemistry, biochemistry and physical chemistry. Advanced undergraduates choose electives from courses that cover a broad range of specialized topics, such as environmental chemistry, nutritional biochemistry, advanced organic and physical chemistry, pharmacology, and polymer chemistry. The curriculum emphasizes laboratory work, especially current techniques and the use of instrumentation in all fields of chemistry. The program provides opportunities for independent research under faculty guidance, including a requirement for a senior project. A senior project may consist of pure or applied research in chemistry, or it may involve interdisciplinary work with another field such as art, biology, agriculture, civil or environmental engineering, psychology, or soil science. Under the department's cooperative education program, bachelor's degree candidates may work full-time in industry or government for one or two quarters, for pay and academic credit.

Career opportunities for chemists lie in traditional areas such as environmental analysis, the health professions, industrial research and production, pharmacology, toxicology, product quality control, and teaching at the secondary or university level. Newer opportunities lie in related areas such as library science, market research, patent law, and safety engineering.

Concentration

Polymers and Coatings Concentration

Students may select the Polymers and Coatings concentration instead of advanced approved biochemistry electives in Major Courses. The concentration includes the required courses in the biochemistry curriculum and electives in the area of polymers, coatings, surface chemistry and materials engineering. The concentration gives students the background and practical experience to move into a rewarding career in a wide range of fields including paints and coatings, resins, plastics, adhesives and sealants.

Biotechnology Minor

For information regarding the Biotechnology minor, see the College of Science and Mathematics (p. 360) section of the catalog.

Cross Disciplinary Studies Minor in Bioinformatics

For information regarding the Cross Disciplinary Studies Minor in Bioinformatics, see the Biological Sciences (p. 364) section of the catalog.

Graduate Program Master of Science Degree in Polymers and Coatings Science General Characteristics

The MS degree in Polymers and Coatings Science offers a unique, focused program closely tied to industry. Students gain academic preparation in polymers and coatings science through lecture and laboratory courses, then undertake a rigorous industrial internship or thesis research. Through the internship or thesis research students specialize and develop advanced skills related to their internship work or research. The program is designed to prepare students for challenging careers in the polymers and coatings industry. The program also provides excellent background for doctoral studies in areas related to polymer and coatings science. This program is unique in California and relies on the close relationship between the department and the polymers and coatings industry for its success.

Prerequisites

Students entering the program must have a bachelor's degree from an accredited institution with a minimum grade point average of 2.5 in the last 90 quarter units attempted. Applicants with majors in chemistry, biochemistry, materials engineering, chemical engineering or related fields generally meet the prerequisites for courses in the program. Applicants with degrees in other areas may need to take supplemental courses in organic and physical chemistry and can be admitted conditionally. For information concerning additional departmental requirements, the student should contact the Graduate Advisor in the Chemistry and Biochemistry Department.

Advancement to candidacy requires completion of 12 units of an approved study plan with a minimum grade point average of 3.0.

Blended BS + MS Polymers and Coatings Science Program

A blended program provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

A blended program is available for MS Polymers and Coatings Science.

Eligibility

Majors that are eligible for the blended program are:

- BS Chemistry
- BS Materials Engineering

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Chemistry and Biochemistry department for any additional eligibility criteria.

Program of Study

Students may begin taking the required graduate courses in either their junior or senior year depending on their preparation. Students may not pursue both the Concentration in Polymers and Coatings and the MS in Polymers and Coatings Science. Students pursuing the concentration take the 400-level polymers and coatings courses while those pursuing the MS degree take the 500-level polymers and coatings courses. Students cannot receive credit for both 400 and 500-level courses in the same topic.

Students in the blended program are eligible to begin the Industrial Internship or Thesis Research upon completion of the required graduate-level chemistry courses.

BS Biochemistry Program Learning Objectives

1. Understand and apply the fundamental concepts of chemistry in the following areas: calculation and estimation, structure, and properties of atoms, ions and molecules, chemical bonding and chemical reactivity.
2. Use techniques and modern tools to conduct, design, analyze, and interpret experiments in chemistry and biochemistry.
3. Communicate effectively with the scientific community.
4. Apply concepts of math, physical and biological sciences to chemical problems.
5. Integrate the concepts, skills and attitudes from a general education with his/her major program to understand and explain the impact of chemistry, science and technology on issues in global, economic, environmental, and societal contexts.

Degree Requirements and Curriculum

In addition to the program requirements on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ¹	4
CHEM 125	General Chemistry for Physical Science and Engineering II	4

CHEM 126	General Chemistry for Physical Science and Engineering III	4
CHEM 203	Undergraduate Seminar I	1
CHEM 216	Organic Chemistry I	5
CHEM 217	Organic Chemistry II	3
CHEM 218	Organic Chemistry III	3
CHEM 221	Organic Chemistry Laboratory II	2
CHEM 303	Undergraduate Seminar II	1
CHEM 324	Organic Chemistry Laboratory III	2
CHEM 331	Quantitative Analysis ²	5
CHEM 351	Physical Chemistry I	3
CHEM 352	Physical Chemistry II	3
CHEM 353	Physical Chemistry III	3
CHEM 356	Physical Chemistry Laboratory (GWR)	2
CHEM 369	Biochemical Principles (Upper-Division B) ¹	5
CHEM 372	Metabolism	4
CHEM 373	Molecular Biology	3
CHEM 403	Undergraduate Seminar III: Senior Project	1
CHEM/BIO 475	Molecular Biology Laboratory	3
Select from the following:		3
BIO 476	Gene Expression Laboratory	
CHEM 474	Protein Techniques Laboratory	
Select from the following:		12/18
Polymers and Coatings Concentration (18 units)		
Approved Advanced Biochemistry Electives (12 units) ³		
One course must be a lecture, and at least two courses must be from List A.		
List A:		
CHEM 302	Marine Chemistry	
CHEM 341	Environmental Chemistry: Water Pollution	
CHEM 357	Physical Chemistry III Lab	
CHEM 377	Chemistry of Drugs and Poisons	
CHEM 401	Advanced Undergraduate Research ⁴	
CHEM 405	Advanced Physical Chemistry	
CHEM 414	Advanced Organic Chemistry - Mechanisms	
CHEM 420	Advanced Organic Chemistry - Synthesis	
CHEM 428	Nutritional Biochemistry	
CHEM 432	Physical Biochemistry	
CHEM 439	Instrumental Analysis	
CHEM 441	Bioinformatics Applications	
CHEM 444	Polymers & Coatings I	
CHEM 445	Polymers & Coatings II	
CHEM/MATE 446	Surface Chemistry of Materials	
CHEM 447	Polymers and Coatings Laboratory I	
CHEM 448	Polymers and Coatings Laboratory II	
CHEM 449	Polymers and Coatings Internship	
CHEM 450	Polymers and Coatings III	
CHEM 451	Polymers and Coatings Laboratory III	

CHEM 454	Functional Polymeric Materials	
CHEM 458	Advanced Organic Chemistry: Spectroscopy	
CHEM 463	Honors Research	
CHEM 465	College Teaching Practicum	
CHEM 466	Learning Assistant Seminar	
CHEM 470	Selected Advanced Topics	
CHEM 474	Protein Techniques Laboratory	
CHEM 477	Biochemical Pharmacology	
CHEM 481	Inorganic Chemistry	
CHEM 484	Inorganic Chemistry Laboratory	
CHEM 485	Cooperative Education Experience ⁵	
CHEM 495	Cooperative Education Experience ⁵	
SCM 302/ ENGR 322	The Learn By Doing Lab Teaching Practicum	

List B

BIO/CHEM 308	Genetic Engineering Technology	
or CHEM 349	Chemical and Biological Warfare	
or ENVE 324	Introduction to Air Pollution	
or SCM 360	Selected Environmental Issues of California's Central Coast	
BIO 351	Principles of Genetics	
BIO 361	Principles of Animal Physiology	
BIO 405	Developmental Biology	
BIO 406	Advanced Anatomy and Physiology: Neuroscience	
BIO 407	Advanced Anatomy and Physiology: Endocrinology	
BIO 408	Advanced Anatomy and Physiology: Cardiorespiratory and Renal	
BIO 409	Advanced Anatomy and Physiology: Muscle and Locomotion	
BIO 410	Functional Histology	
BIO 426	Immunology	
BIO 452	Cell Biology	
MCRO 402	General Virology	
MCRO 423	Medical Microbiology	
MCRO 424	Microbial Physiology	
STAT 312	Statistical Methods for Engineers	

SUPPORT COURSES

BIO 161	Introduction to Cell and Molecular Biology (B2 & B3) ¹	4
BIO 452	Cell Biology	3-5
or CHEM 432	Physical Biochemistry	
or MCRO 224	General Microbiology I	
MATH 141	Calculus I (B4) ¹	4
MATH 142	Calculus II (GE Electives) ¹	4
MATH 143	Calculus III	4
PHYS 141	General Physics I	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4

GENERAL EDUCATION (GE)

(See GE program requirements below.)

52

FREE ELECTIVES	
Free Electives ⁶	13-21
Total units	180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Students should take CHEM 331 as soon as possible after completing CHEM 126.
- ³ Consultation with advisor is recommended prior to selecting Approved Advanced Biochemistry Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ⁴ No more than 6 units may apply to Approved Advanced Biochemistry Electives.
- ⁵ No more than 2 units may apply toward Approved Advanced Biochemistry Electives.
- ⁶ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentration

Students may select the following concentration instead of Approved Advanced Biochemistry Electives in Major Courses:

- Polymers and Coatings (p. 383)

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Major) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4

C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		52

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Polymers and Coatings Concentration - BS Biochemistry

CHEM 444	Polymers & Coatings I	3
CHEM 445	Polymers & Coatings II	3
CHEM 446	Surface Chemistry of Materials	3
CHEM 447	Polymers and Coatings Laboratory I	2
CHEM 448	Polymers and Coatings Laboratory II	2
CHEM 450	Polymers and Coatings III	3
Select from the following:		2
CHEM 449	Polymers and Coatings Internship	
CHEM 451	Polymers and Coatings Laboratory III	
Total units		18

BS Chemistry

Program Learning Objectives

- Understand and apply the fundamental concepts of chemistry in the following areas: calculation and estimation, structure and properties of atoms, ions and molecules, chemical bonding and chemical reactivity.
- Use techniques and modern tools to conduct, design, analyze, and interpret experiments in chemistry and biochemistry.
- Communicate effectively with the scientific community.
- Apply concepts of math, physical and biological sciences to chemical problems.
- Integrate the concepts, skills and attitudes from a general education with his/her major program to understand and explain the impact

of chemistry, science and technology on issues in global, economic, environmental, and societal contexts.

Degree Requirements and Curriculum

In addition to the program requirements on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ¹	4
CHEM 125	General Chemistry for Physical Science and Engineering II	4
CHEM 126	General Chemistry for Physical Science and Engineering III	4
CHEM 203	Undergraduate Seminar I	1
CHEM 216	Organic Chemistry I	5
CHEM 217	Organic Chemistry II	3
CHEM 218	Organic Chemistry III	3
CHEM 221	Organic Chemistry Laboratory II	2
CHEM 303	Undergraduate Seminar II	1
CHEM 324	Organic Chemistry Laboratory III	2
CHEM 331	Quantitative Analysis ²	5
CHEM 351	Physical Chemistry I	3
CHEM 352	Physical Chemistry II	3
CHEM 353	Physical Chemistry III	3
CHEM 356	Physical Chemistry Laboratory (GWR)	2
CHEM 357	Physical Chemistry III Lab	1
CHEM 369	Biochemical Principles (Upper-Division B) ¹	5
CHEM 403	Undergraduate Seminar III: Senior Project	1
CHEM 439	Instrumental Analysis	5
CHEM 481	Inorganic Chemistry	3
CHEM 484	Inorganic Chemistry Laboratory	2
Select from the following:		15/18

Polymers and Coatings Concentration (18 units)

Approved Advanced Chemistry Electives (15 units) ³

BIO/CHEM 308	Genetic Engineering Technology	
or CHEM 349	Chemical and Biological Warfare	
or ENVE 324	Introduction to Air Pollution	
or SCM 360	Selected Environmental Issues of California's Central Coast	
BIO/CHEM 441	Bioinformatics Applications	
BIO/CHEM 475	Molecular Biology Laboratory	
CHEM 302	Marine Chemistry	

CHEM 341	Environmental Chemistry: Water Pollution	
CHEM 372	Metabolism	
CHEM 373	Molecular Biology	
CHEM 377	Chemistry of Drugs and Poisons	
CHEM 401	Advanced Undergraduate Research ⁴	
CHEM 405	Advanced Physical Chemistry	
CHEM 414	Advanced Organic Chemistry - Mechanisms	
CHEM 420	Advanced Organic Chemistry - Synthesis	
CHEM 428	Nutritional Biochemistry	
CHEM 432	Physical Biochemistry	
CHEM 444	Polymers & Coatings I	
CHEM 445	Polymers & Coatings II	
CHEM/MATE 446	Surface Chemistry of Materials	
CHEM 447	Polymers and Coatings Laboratory I	
CHEM 448	Polymers and Coatings Laboratory II	
CHEM 449	Polymers and Coatings Internship	
CHEM 450	Polymers and Coatings III	
CHEM 451	Polymers and Coatings Laboratory III	
CHEM 454	Functional Polymeric Materials	
CHEM 458	Advanced Organic Chemistry: Spectroscopy	
CHEM 463	Honors Research	
CHEM 465	College Teaching Practicum	
CHEM 466	Learning Assistant Seminar	
CHEM 470	Selected Advanced Topics	
CHEM 474	Protein Techniques Laboratory	
CHEM 477	Biochemical Pharmacology	
CHEM 485	Cooperative Education Experience ⁵	
CHEM 495	Cooperative Education Experience ⁵	
SCM 302/ ENGR 322	The Learn By Doing Lab Teaching Practicum	

SUPPORT COURSES

BIO 161	Introduction to Cell and Molecular Biology (B2 & B3) ¹	4
MATH 141	Calculus I (B4) ¹	4
MATH 142	Calculus II (GE Electives) ¹	4
MATH 143	Calculus III	4
MATH 241	Calculus IV	4
Select from the following:		3-4
CSC 232	Computer Programming for Scientists and Engineers	
CSC 234	C and Unix	
MATH 206	Linear Algebra I	
MATH 244	Linear Analysis I	
STAT 218	Applied Statistics for the Life Sciences	
STAT 312	Statistical Methods for Engineers	
PHYS 141	General Physics I	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4

Physics elective (200-level and above)	3
GENERAL EDUCATION (GE)	
(See GE program requirements below.)	52
FREE ELECTIVES	
Free Electives	9-13
Total units	180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Students should take CHEM 331 as soon as possible after completing CHEM 126.
- ³ Consultation with advisor is recommended prior to selecting Approved Advanced Chemistry Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ⁴ No more than 6 units may apply to Approved Advanced Chemistry Electives.
- ⁵ No more than 2 units may apply to Approved Advanced Chemistry Electives.
- ⁶ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the the degree.

Concentration

Students may select the following concentration instead of Advanced Approved Chemistry Electives in Major Courses:

- [Polymers and Coatings \(p. 385\)](#)

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Major) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	

Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		52

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Polymers and Coatings Concentration - BS Chemistry

CHEM 444	Polymers & Coatings I	3
CHEM 445	Polymers & Coatings II	3
CHEM 446	Surface Chemistry of Materials	3
CHEM 447	Polymers and Coatings Laboratory I	2
CHEM 448	Polymers and Coatings Laboratory II	2
CHEM 450	Polymers and Coatings III	3
Select from the following:		2
CHEM 449	Polymers and Coatings Internship	
CHEM 451	Polymers and Coatings Laboratory III	
Total units		18

MS Polymers and Coatings Science Program Learning Objectives

1. Integrate knowledge of the diverse range of chemistry sub-disciplines as well as non-chemistry disciplines such as fluid flow, mechanics, and science of appearance, and apply it in their profession.
2. Use traditional and nontraditional thinking to define a problem, identify potential alternatives, gather appropriate knowledge and information to formulate and articulate a solution.

3. Think critically and be able to evaluate, design, and conduct research in the polymers and coatings field.

4. Effectively communicate as professionals in both individual and team-based environments.

5. Join polymer and coating related industries or advanced graduate programs and be immediately productive. Demonstrate dedication, loyalty and passion toward the chosen professional career.

Required Courses

CHEM 544	Polymer Physical Chemistry and Analysis	3
CHEM 545	Polymer Synthesis and Mechanisms	3
CHEM 547	Polymer Characterization and Analysis Laboratory	2
CHEM 548	Polymer Synthesis Laboratory	2
CHEM 550	Coatings Formulation Principles	3
CHEM 551	Coatings Formulation Laboratory	2
CHEM 590	Graduate Seminar in Polymers and Coatings (1, 1, 1)	3
Select from the following:		9
CHEM 598	Graduate Project (3, 3, 3)	
CHEM 599	Graduate Thesis (3, 3, 3)	

Approved Electives

18 units of advisor-approved electives (at least 3 units must be from 500 level). See department for list. 18

Total units 45

A complete project report or thesis must be submitted to the graduate committee. Guidelines on how to prepare report or thesis are available from the graduate coordinator.

Kinesiology and Public Health

Kinesiology Bldg. (43A), Room 458

Phone: 805.756.2545

Email: kinesiology@calpoly.edu, publichealth@calpoly.edu

<https://kinesiology.calpoly.edu>

<https://healthresearch.calpoly.edu>

Department Chair: Kris Jankovitz

Academic Programs

Program name	Program type
Exercise and Sport Studies	Minor
Kinesiology	BS
Public Health	BS

The Department of Kinesiology and Public Health offers undergraduate programs leading to the BS in Kinesiology, the BS in Public Health and the minor in Exercise and Sport Studies. The department also contributes to the education of all students by providing general education courses in health and wellbeing, sport sociology, psychology of injury, and elective courses in first aid/CRP/AED; physical activity, sport and fitness; and support courses for students intending to pursue careers in K-8 teaching. The programs are designed to meet the mission of preparing students to promote physical activity and health for all and to make an impact in the fields of exercise science, disease prevention and treatment, physical activity and sport, and public health.

The Department of Kinesiology and Public Health is home to the Center for Health Research. Initiated in 2007, the Center for Health Research is a university-wide, multidisciplinary, research center that provides students with unique opportunities to engage in research, community outreach and programs to improve health outcomes.

The Kinesiology and Recreation Center building complex provides laboratory, research and office space for the Department of Kinesiology and Public Health and provides access to quality physical activity and sport facilities for students, faculty and staff.

Undergraduate Programs

BS Kinesiology

The BS in Kinesiology provides training in the multiple sub-disciplines of kinesiology (biomechanics, exercise physiology, health promotion, motor behavior, and sport and exercise psychology/ sociology). The program offers a broad based curriculum incorporating the scientific and clinical knowledge of exercise science, health promotion, and sport science that is applicable to preventive and clinical exercise science, commercial fitness, sport instruction and educational settings. In addition to the core coursework for the kinesiology major, students choose a concentration to gain a deep and focused understanding of a specific subfield in kinesiology. The program provides students with the knowledge, skills and abilities they need to move into a variety of entry level positions in exercise and sport sciences, health promotion, or to pursue graduate education in kinesiology, or allied health professions. For students who are considering graduate programs in medicine or allied health professions (e.g., nursing, occupational therapy physical therapy, physician assistant, etc.) additional coursework beyond the bachelor's degree will be required.

Concentrations

Exercise Science

Exercise science professionals lead and demonstrate safe and effective methods of exercise to clients in a variety of settings. Students who complete the Exercise Science Concentration will be prepared to work in a wide range of enterprises that include clinical exercise physiology, cardiac rehabilitation, and commercial fitness facilities or pursue graduate education in Kinesiology or Exercise Science. Completion of this concentration could also prepare students for certification exams for Certified Health and Fitness Specialist (ACSM), Clinical Exercise Specialist (ACSM), Certified Strength and Conditioning Specialist (NSCA) and Exercise Physiologist-Certified (ASEP). For students who are considering graduate programs in allied health professions (e.g., nursing, physical therapy, physician assistant, etc.) additional coursework will be required.

Health Promotion

Students who complete the Health Promotion Concentration will be prepared for a variety of health promotion related careers in various public/private settings, college/university settings, non-profit health promotion agencies and to pursue graduate study in Health Promotion/Health Education/Public Health. Possible job titles include Health Promotion Program Coordinator, Physical Activity and Public Health Specialist, Fitness and Wellness Coordinator, Personal Trainer, Health & Fitness Specialist. For students considering graduate programs in allied health professions (e.g., nursing, physical therapy, physician assistant, etc.), additional coursework will be required.

Sport Science

Students who complete the BS in Kinesiology with the sport science concentration will be prepared for entry level leadership positions in competitive sport settings which include coaching at the youth, club/ interscholastic, college/university and international levels. They would also be prepared for advanced study in master's degree programs with an emphasis in coaching, or for employment as a personal trainer or group exercise instructor. Course content and learning experiences are focused on fundamentals of athletic and sport performance, psychological and sociological benefits of participating in sport and athletics and skill development in leadership and mentoring. Students who complete this concentration will also be well prepared to take the American College of Sports Medicine (ACSM) Certified Personal Trainer Exam and the ACSM Certified Group Instructor Exam. They will also be prepared to complete a wide variety of American Sport Education Program (ASEP) certification courses, request inclusion in the National Registry of Coaches (coordinated by ASEP) and pursue coaching certification from sport specific governing bodies (e.g., USA Track and Field, USA Swimming, USA Soccer, etc.).

BS Public Health

The BS in Public Health prepares students for professional positions in public health agencies, community-based organizations, health care, tribal health, international organizations, and/or for graduate study in public health or allied health professions. The curriculum aligns with the standards approved by the Association of Schools and Programs of Public Health and by the National Commission for Health Education Credentialing (NCHEC). Graduates of the program are eligible to take the national Certified Health Education Specialist (CHES) examination administered by NCHEC. Our program helps students to understand health at the individual, community, and population levels emphasizing critical thinking, problem solving and teamwork through hands-on

application, and project-based learning. Students have opportunities to participate in community outreach activities, internships, and undergraduate research. In addition to the core coursework for the public health major, students choose a concentration to gain a deep and focused understanding in a specific area of public health. For students who are considering graduate programs in medicine or allied health professions (e.g., nursing, occupational therapy, physical therapy, physician assistant, etc.) additional coursework beyond the bachelor's degree will be required.

Concentrations

Community and Public Health

Students who complete the Community and Public Health Concentration will be prepared for careers in local, state and federal public health departments; non-profit health agencies and coalitions; health insurance providers, hospital, clinical and research settings; and to pursue graduate study for the masters in public health and the MS in Health Care Administration, Community Health, Environmental Health, Health Education or Health Promotion. This concentration provides a foundation in concepts that are complementary for students who are planning to pursue graduate study in the allied health professions or medicine.

Culture and Society in Health

Students who complete the Culture and Society in Health Concentration will be prepared with a strong foundation in the social determinants of health. Graduates are prepared for careers in a variety of settings such as local, state and federal public health agencies, non-profit health agencies, hospital, clinical and research settings, and to pursue graduate study for the master's in public health. This concentration provides a foundation in concepts that are complementary for students who are planning to pursue graduate study in the allied health professions or medicine.

Physical Activity in Public Health

Students who complete the Physical Activity in Public Health Concentration will be prepared to work with organizations engaged in planning to promote physical activity and improve health outcomes. Graduates are prepared for careers in local, state, and federal public health agencies, non-profit health agencies and coalitions, local government agencies, corporate and commercial fitness settings. Students who pursue this concentration will also qualify for the ACSM/NPAS Physical Activity in Public Health Specialist (PAPHS) certification (ACSM.org). In addition, it prepares students to pursue graduate study for the master's in public health, the MS in Kinesiology, Health Promotion, or Health Education.

Worksite and University Health Promotion

Students who complete the Worksite and University Health Promotion Concentration are prepared for careers as health promotion/wellness specialists in various public/private worksites, college/university settings, non-profit health agencies, health insurance providers, and to pursue graduate study for the master's in public health, the MS in Community Health, Health Promotion, Health Education, or Occupational Health.

Exercise and Sport Studies Minor

Students who complete the minor in exercise and sport studies will be prepared for entry-level positions in coaching at the youth, club/ interscholastic or college/university levels. They will also be prepared to take the California Subject Examination (CSET) for physical education to enter a single subject credential program to teach physical education.

Students who complete this minor could also explore other career options related to exercise, physical activity, and sports and will be

better prepared to apply for graduate programs in sport psychology and potentially become a Certified Mental Performance Consultant (CMPC) through the Association for Applied Sport Psychology (AASP).

Students interested in the minor should check course descriptions to ensure they have met prerequisites. In particular, KINE 366 Applied Sport Psychology requires PSY 201, PSY 202 or KINE 266.

BS Kinesiology

Program Learning Objectives

1. Describe the relationship between physical activity participation, quality of life, acute and chronic disease prevention, diagnosis and treatment.
2. Evaluate the underlying scientific foundations of physical activity including human movement, physiology and metabolism.
3. Apply principles of quantitative and qualitative research to the study and practice of physical activity.
4. Explain the sociocultural dimensions of physical activity including diversity and inclusion in physical activity and health.
5. Apply principles of exercise prescription and the national physical activity guidelines to develop effective physical activity programs.
6. Demonstrate proficiency in critical thinking through written and oral communication.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: Up to 4 units of credit/no credit grading may be selected for courses in Major, Support, or Concentration.

MAJOR COURSES

KINE 180	Orientation to Kinesiology	2
HLTH 250	Healthy Living (E) ¹	4
or HLTH 255	Personal Health: A Multicultural Approach	
or HLTH 260	Women's Health Issues	
KINE 266	Sport and Exercise Psychology	4
KINE 301	Functional Anatomy	3
KINE 303	Physiology of Exercise	4
KINE 304	Pathophysiology and Exercise	3
KINE 307	Adapted Physical Activity	4
KINE 312	Motor Learning and Control	4
KINE 319	Introduction to Research Methods in Kinesiology	4
KINE 349	Exercise Testing and Prescription for Healthy Populations	4
KINE 401	Managing Exercise, Health, and Sport Programs	3

KINE 403	Biomechanics	4
KINE 412	Physical Activity and Public Health	3
KINE 451	Nutrition for Fitness and Sport	4
KINE 459	Personal and Group Fitness Instruction	3
KINE 460	Experiential Senior Project	1
or KINE 461	Senior Project Report	
or KINE 462	Research Honors Senior Project	
or KINE 463	Exercise Science and Health Promotion Fieldwork	
Approved Electives²		
Select from the following:		8
BIO 162	Introduction to Organismal Form and Function	
BIO 253	Health Professions Shadowing	
BIO 305	Biology of Cancer	
CHEM 129	General Chemistry for Agriculture and Life Science III	
CHEM 217 & CHEM 220	Organic Chemistry II and Organic Chemistry Laboratory For Life Sciences II	
CHEM 314	Biochemistry: Fundamentals and Applications	
COMS 211	Interpersonal Communication	
COMS 213	Organizational Communication	
COMS 301	Business and Professional Communication	
COMS 316	Intercultural Communication	
FSN 310	Maternal and Child Nutrition	
FSN 315	Nutrition in Aging	
FSN 415	Nutrition Education and Communications	
FSN 416	Community Nutrition	
HLTH 297	Medical Terminology	
HLTH 305	Drugs in Society	
HLTH 320	Media and Technology in Health Promotion	
IME 320	Human Factors and Technology	
KINE 181	Responding to Emergencies: Comprehensive First Aid, CPR, AED	
KINE 201	Introductory Undergraduate Research ³	
KINE 308	Motor Development	
KINE 323	Sport and Gender	
KINE 400	Special Problems for Advanced Undergraduates ³	
KINE 406	Neuroanatomy	
KINE 409	Interdisciplinary Study in Biomechanics	
KINE 446	Echocardiography	
PHYS 122	College Physics II	
PHYS 123	College Physics III	
PSY 201	General Psychology	
or PSY 202	General Psychology	
PSY 252	Social Psychology	

PSY 256	Developmental Psychology	
PSY 302	Behavior in Organizations	
PSY 310	Psychology of Death	
PSY 318	Psychology of Aging	
PSY 320	Health Psychology	
PSY 340	Biopsychology	
PSY 350	Teamwork	
RPTA 160	Introduction to Sport Management	
RPTA 255	Leadership and Diverse Groups	
RPTA 275	Facilitation and Teambuilding	
RPTA 450	Resource and Grant Development	

Select one concentration⁴ 18

SUPPORT COURSES		
BIO 161	Introduction to Cell and Molecular Biology (B2 & B3) ¹	4
BIO 231	Human Anatomy and Physiology I	5
BIO 232	Human Anatomy and Physiology II	5
CHEM 127	General Chemistry for Agriculture and Life Science I (B1) ¹	4
CHEM 128	General Chemistry for Agriculture and Life Science II	4
CHEM 312	Organic Chemistry: Fundamentals and Applications	5
or CHEM 216	Organic Chemistry I	
MATH 119	Precalculus Trigonometry (B4) ¹	4
or MATH 141	Calculus I	
PHYS 121	College Physics I	4
STAT 218	Applied Statistics for the Life Sciences (GE Electives) ¹	4

GENERAL EDUCATION (GE)
(See GE program requirements below.) 52

FREE ELECTIVES
Free Electives⁵ 9

Total units 180

- Required in Major or Support; also satisfies General Education (GE) requirement.
- If a course is taken to meet a Concentration requirement, it cannot be double-counted as an Approved Elective.
- Maximum of 4 units may be applied toward Approved Electives from: KINE 201, KINE 400.
- Students may have to complete additional coursework to satisfy admission requirements for graduate or professional degree programs in the allied health professions. Students interested in these programs should consult their academic advisor or visit the College of Science and Mathematics Advising Office for more information.
- If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentrations

Students may select one of the following concentrations.

- Exercise Science (p. 390)
- Health Promotion (p. 390)
- Sport Science (p. 391)

General Education (GE) Requirements

- 72 units required, 20 of which are specified in Major and/or Support.
- If any of the remaining 52 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English ²	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Major) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4

GE Electives in Areas B, C, and D

Select courses from two different areas; may be lower-division or upper-division courses.

GE Electives (4 units in Support plus 4 units in GE) ¹	4
Total units	52

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² It is recommended that students pursuing the Sport Science concentration take PHIL 230 or PHIL 231 to fulfill GE Area C2.

Exercise Science Concentration

KINE 408	Exercise and Health Gerontology	3
KINE 445	Electrocardiography	4
KINE 454	Exercise Metabolism	4
KINE 449	Exercise Prescription for Diseased and Special Populations	3
Select from the following: ¹		4
BMED/KINE/ME 409	Interdisciplinary Study in Biomechanics	
HLTH 405	Stress, Health and Chronic Illness	
HLTH 453	Obesity Prevention and Treatment	
KINE 406	Neuroanatomy	
KINE 446	Echocardiography	
PHIL 339	Biomedical Ethics	
PSY 318	Psychology of Aging	
PSY 320	Health Psychology	
PSY 330	Behavioral Effects of Psychoactive Drugs	
PSY 405	Abnormal Psychology	

Total units	18
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¹ Students seeking admission to graduate or professional degree programs in the allied health professions may need additional coursework to meet admission requirements. Please consult an advisor for assistance.

Health Promotion Concentration

HLTH 265	Introduction to Community and Public Health	3
HLTH 298	Introduction to Epidemiology	4
HLTH 334	Health Behavior Theory	3
Select from the following:		8
HLTH 305	Drugs in Society	
HLTH 320	Media and Technology in Health Promotion	
HLTH 405	Stress, Health and Chronic Illness	
HLTH 410	Global Health	
HLTH 434	Health Promotion Program Planning	
HLTH 450	Worksite and University Health Promotion Programs	
HLTH 453	Obesity Prevention and Treatment	

Total units	18
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Sport Science Concentration

KINE 278	Introduction to Perspectives in Physical Activity	4
KINE 308	Motor Development	3
KINE 324	Sports, Media and American Popular Culture	4
KINE 366	Applied Sport Psychology	3
RPTA 260	Community Relations and Sports-Based Youth Development	4
Total units		18

BS Public Health

Program Learning Objectives

1. Describe the history, philosophy, and core functions of public health in the U.S. and globally.
2. Analyze factors that affect human health and contribute to health disparities including socio-economic, behavioral, biological, environmental, and systemic factors.
3. Develop, implement, and evaluate public health programs that improve population health outcomes and promote health equity.
4. Apply epidemiological and public health research methods to assess community health needs, assets, and outcomes.
5. Communicate public health information in oral, written, and visual forms through a variety of media.
6. Describe the legal, ethical, structural, and economic dimensions of health care and policy, and the role of different governmental entities in public health.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: Up to 4 units of credit/no credit grading may be selected for courses in Major, Support, or Concentration.

MAJOR COURSES

HLTH 101	Orientation to Public Health	1
HLTH 255	Personal Health: A Multicultural Approach (E) (USCP) ¹	4
or HLTH 260	Women's Health Issues	
HLTH 265	Introduction to Community and Public Health	3
HLTH 298	Introduction to Epidemiology	4
HLTH 305	Drugs in Society	4
HLTH 310	Injury Prevention	3
HLTH 318	Applied Epidemiology	4
HLTH 320	Media and Technology in Health Promotion	4
HLTH 334	Health Behavior Theory	3

HLTH 402	Research Methods in Public Health Settings	4
HLTH 405	Stress, Health and Chronic Illness	4
HLTH 410	Global Health	4
HLTH 434	Health Promotion Program Planning	4
HLTH 435	Health Promotion Program Implementation and Evaluation	4
HLTH 453	Obesity Prevention and Treatment	4
HLTH 460	Experiential Senior Project	1
or HLTH 461	Senior Project Report	
or HLTH 462	Research Senior Project	
or HLTH 463	Public Health Internship	

Approved Electives^{2, 3, 4}

Select from the following: 12

At least 4 units must be at the 300-400 level

Culture and Health

ANT 201	Cultural Anthropology
ANT 250	Biological Anthropology
ANT 360	Human Cultural Adaptations
ANT 425	Meaning, Gender, and Identity in Anthropological Theory
ISLA 303/ HNRS 304	Values and Technology
ISLA/HNRS 320	Topics and Issues in Values, Media and Culture
WGQS 301	Contemporary Issues in Women's and Gender Studies

Life and Physical Science

BIO 123	Biology of Sex
BIO 162	Introduction to Organismal Form and Function
BIO 302 or BIO 303	Human Genetics Survey of Genetics
BIO 305	Biology of Cancer
CHEM 128	General Chemistry for Agriculture and Life Science II
CHEM 129	General Chemistry for Agriculture and Life Science III
CHEM 216	Organic Chemistry I
CHEM 217	Organic Chemistry II
CHEM 218	Organic Chemistry III
CHEM 312	Organic Chemistry: Fundamentals and Applications
CHEM 314	Biochemistry: Fundamentals and Applications
MCRO 225	General Microbiology II
MCRO 320	Emerging Infectious Diseases
MCRO 342	Public Health Microbiology
MCRO 421	Food Microbiology
PHYS 121	College Physics I
PHYS 122	College Physics II

Health Communication

COMS 211	Interpersonal Communication
COMS 213	Organizational Communication

COMS 301	Business and Professional Communication	PSY 344	Behavioral Genetics	
COMS 316	Intercultural Communication	PSY 372	Multicultural Psychology	
COMS 418	Health Communication	PSY 405	Abnormal Psychology	
JOUR 219	Multicultural Society and the Mass Media	SOC 326	Sociology of the Life Cycle	
JOUR 312	Public Relations	Spanish		
JOUR 412	Public Relations and Crisis Management	SPAN 101	Elementary Spanish I	
Built Environment and Health		or SPAN 111	Elementary Hispanic Language and Culture	
CRP 212	Introduction to Urban Planning	SPAN 102	Elementary Spanish II	
CRP 214	Land Use and Transportation Studies	SPAN 103	Elementary Spanish III	
CRP 215	Planning for and with Multiple Publics	SPAN 104	Intensive Elementary Spanish	
CRP 325	Reflections on Biking, Walking and the City	SPAN 201	Intermediate Spanish I	
CRP 426	Planning Healthy Communities	SPAN 202	Intermediate Spanish II	
NR 218	Introduction to Geographic Information Systems (GIS)	SPAN 203	Intermediate Spanish III	
Health and Nutrition		Statistics		
FSN 310	Maternal and Child Nutrition	STAT 323	Design and Analysis of Experiments I	
FSN 315	Nutrition in Aging	STAT 324	Applied Regression Analysis	
HLTH 297	Medical Terminology	STAT 330	Statistical Computing with SAS	
HLTH 450	Worksite and University Health Promotion Programs	STAT 331	Statistical Computing with R	
Health, Exercise and Fitness		Select one concentration 19-20		
HLTH 201	Introductory Undergraduate Research ⁵	SUPPORT COURSES		
HLTH 400	Special Problems for Advanced Undergraduates ⁵	ANT 201	Cultural Anthropology (D2) ¹	4
KINE 303	Physiology of Exercise	or SOC 110	Comparative Societies	
KINE 304	Pathophysiology and Exercise	BIO 161	Introduction to Cell and Molecular Biology (B2 & B3) ¹	4
KINE 349	Exercise Testing and Prescription for Healthy Populations	BIO 231	Human Anatomy and Physiology I	5
KINE 408	Exercise and Health Gerontology	BIO 232	Human Anatomy and Physiology II	5
Public Policy and Health		CHEM 127	General Chemistry for Agriculture and Life Science I (B1 & B3) ¹	4
POLS 310	The Politics of Race, Class, Gender and Sexuality	FSN 202	Introduction to Human Nutrition	4
POLS 332	World Food Systems	MCRO 221	Microbiology (GE Electives) ¹	4-5
POLS 351	Public Policy and Administration	or MCRO 224	General Microbiology I	
POLS 451	Technology and Public Policy	PSY 201	General Psychology	4
POLS 459	The Politics of Poverty	or PSY 202	General Psychology	
RPTA 450	Resource and Grant Development	STAT 218	Applied Statistics for the Life Sciences (B4) ¹	4
Behavioral Health		STAT 313	Applied Experimental Design and Regression Models (Upper-Division B) ^{1, 6}	4
PSY 252	Social Psychology	GENERAL EDUCATION (GE)		
PSY 256	Developmental Psychology	(See GE program requirements below.) 44		
PSY 302	Behavior in Organizations	FREE ELECTIVES		
PSY 310	Psychology of Death	Free Electives ⁷ 6-8		
PSY 311	Environmental Psychology	Total units 180		
PSY 318	Psychology of Aging	¹ Required in Major or Support; also satisfies General Education (GE) requirement.		
PSY 320	Health Psychology	² Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.		
PSY 330	Behavioral Effects of Psychoactive Drugs	³ Approved Electives have been organized by area of interest to guide students in their selections. Any course listed can be used as an Approved Elective; courses not listed can serve as an Approved Elective but require faculty advisor approval.		
PSY 340	Biopsychology			

- ⁴ If a course is taken to satisfy a Major, Support, or Concentration requirement, it cannot be double-counted as an Approved Elective.
- ⁵ Maximum of 4 units may be applied toward Approved Electives from: HLTH 201, HLTH 400.
- ⁶ Students need to complete MATH 118 to meet a course prerequisite for STAT 313.
- ⁷ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Concentrations

Students may select one of the following concentrations.

- Community and Public Health (p. 393)
- Culture and Society in Health (p. 393)
- Physical Activity in Public Health (p. 394)
- Worksite and University Health Promotion (p. 394)

General Education (GE) Requirements

- 72 units required, 28 of which are specified in Major and/or Support.
- If any of the remaining 44 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Support) ¹	0
B2	Life Science (4 units in Support) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Support) ¹	0
Upper-Division B (4 units in Support) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English ²	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	

D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D (4 units in Support) ¹	0
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Major) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Support plus 4 units in GE) ¹		4
Total units		44

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² It is recommended that students pursuing the Physical Activity in Public Health concentration take PHIL 230 or PHIL 231 to fulfill GE Area C2.

Community and Public Health Concentration

FSN 310	Maternal and Child Nutrition	4
or FSN 315	Nutrition in Aging	
JOUR 312	Public Relations	4
or POLS 351	Public Policy and Administration	
MCRO 320	Emerging Infectious Diseases	3
MCRO 342	Public Health Microbiology	4
Select from the following:		4
CRP 212	Introduction to Urban Planning	
CRP 214	Land Use and Transportation Studies	
CRP 215	Planning for and with Multiple Publics	
CRP 325	Reflections on Biking, Walking and the City	
CRP 426	Planning Healthy Communities	
GEOG 218	Applications in GIS	
Total units		19

Culture and Society in Health Concentration

COMS 316	Intercultural Communication	4
or COMS 418	Health Communication	
PSY 252	Social Psychology	4
or PSY 310	Psychology of Death	
or PSY 372	Multicultural Psychology	
PHIL 339	Biomedical Ethics	4
Select from the following:		8
ANT 250	Biological Anthropology	
ANT 401	Culture and Health	

ANT 402	Nutritional Anthropology	
ES/WGQS 350	Gender, Race, Culture, Science & Technology	
POLS 310	The Politics of Race, Class, Gender and Sexuality	
POLS/WGQS 457	U.S. Reproductive Politics	
POLS 459	The Politics of Poverty	
PSY 344	Behavioral Genetics	
PSY 360	Applied Social Psychology	
Total units		20

Physical Activity in Public Health Concentration

KINE 240	Introductory Principles of Exercise Science and Sport	4
KINE 278	Introduction to Perspectives in Physical Activity	4
KINE 412	Physical Activity and Public Health	3
Select from the following:		8
CRP 212	Introduction to Urban Planning	
CRP 214	Land Use and Transportation Studies	
CRP 215	Planning for and with Multiple Publics	
CRP 325	Reflections on Biking, Walking and the City	
CRP 426	Planning Healthy Communities	
GEOG 218	Applications in GIS	
KINE 303	Physiology of Exercise	
KINE 349	Exercise Testing and Prescription for Healthy Populations	
RPTA 112	Introduction to Parks and Outdoor Recreation	
Total units		19

Worksite and University Health Promotion Concentration

COMS 301	Business and Professional Communication	4
or JOUR 312	Public Relations	
HLTH 450	Worksite and University Health Promotion Programs	4
KINE 401	Managing Exercise, Health, and Sport Programs	3
PSY 330	Behavioral Effects of Psychoactive Drugs	4
or PSY 340	Biopsychology	
PSY 302	Behavior in Organizations	4
or PSY 350	Teamwork	
or PSY 352	Conflict Resolution: Violent and Nonviolent	
Total units		19

Exercise and Sport Studies Minor

Required Courses

KINE 240	Introductory Principles of Exercise Science and Sport	4
KINE 278	Introduction to Perspectives in Physical Activity	4
KINE 308	Motor Development	3
KINE 324	Sports, Media and American Popular Culture	4
KINE 366	Applied Sport Psychology	3
KINE 401	Managing Exercise, Health, and Sport Programs	3

Approved Electives ¹

Select from the following:		8
At least 4 units must be at the 300-400 level.		
HLTH 250	Healthy Living	
or HLTH 255	Personal Health: A Multicultural Approach	
or HLTH 260	Women's Health Issues	
or HLTH 443	Health Education for Teachers	
KINE 307	Adapted Physical Activity	
KINE 312	Motor Learning and Control	
KINE 323	Sport and Gender	
PSY 350	Teamwork	
RPTA 260	Community Relations and Sports-Based Youth Development	
RPTA 323	Sport Marketing and the Fan Experience	
Total units		29

¹ Some courses may require additional prerequisites.

Liberal Studies, an Undergraduate Teacher Preparation Program

Faculty Offices East (Bldg. 25), Room 125B

Phone: 805.756.2935

<https://liberalstudies.calpoly.edu> (<https://liberalstudies.calpoly.edu/>)

Department Director: Lola Berber-Jimenez

Academic Program

Program name	Program type
Liberal Studies	BS

Liberal Studies is Cal Poly's pre-credential teacher preparation program. The mission of Liberal Studies is to ensure that students are prepared to teach competently and professionally each of the seven domains in the state-mandated curriculum (K-8). These include language arts, mathematics, science, history/social sciences, visual and performing arts, health/physical education, and human development. Liberal Studies provides the educational experience and preparation best suited for the prospective elementary teacher. Upon completion of this undergraduate degree, students are eligible to enter a multiple subject credential program.

Faculty from the following disciplines help to offer the required curriculum in the major: Biological Sciences, English, Ethnic Studies, History, Kinesiology and Public Health, Mathematics, Music, Philosophy, Political Science, Physics, Psychology and Child Development, Social Sciences, Statistics, Theatre, and Education.

Undergraduate Program BS Liberal Studies

The BS Liberal Studies degree directly addresses California's need to produce more and better-trained elementary school teachers. LS graduates will be especially well prepared in the "high-need" teaching areas of science, mathematics, and reading. Students have the opportunity to earn a BS in four years including education classes that are pre-requisites to entering Cal Poly's multiple subject credential program.

A depth of study is required to earn a BS at Cal Poly. Liberal Studies majors select one of the following concentrations or listed minors that count towards a concentration. Students may also choose an individualized course of study with prior approval from the department chair.

Liberal Studies students may take any minor at Cal Poly; however, only the minors listed below will count towards a concentration.

Concentrations

- English
- Environmental Education
- History/Social Sciences
- Human Development
- Mathematics
- Science
- Teaching English to Speakers of Other Languages

Minors that can be taken in place of a concentration

- Ethnic Studies
- Music
- Spanish

Students in the Liberal Studies major will complete pre-requisite courses for the Cal Poly Multiple Subject teaching credential program. A Multiple Subject teaching credential requires one additional year. Application to credential programs is done during the last two quarters of the BS Liberal Studies degree. For more information about Cal Poly's Multiple Subject teaching credential program: <https://soe.calpoly.edu/content/multiple-subject> (<https://soe.calpoly.edu/content/multiple-subject/>)

BS Liberal Studies

Program Learning Objectives

Upon graduating, Liberal Studies students will:

1. Examine the importance of the physical, social and cognitive development of children and their application to learning.
2. Demonstrate subject matter competency in the following domains: Reading, Language and Literacy, History and Social Science, Mathematics, Science, Visual and Performing Arts, Physical Education and Human Development.
3. Examine and reflect on how knowledge is developed and organized through best teaching and learning practices specific to each domain, with a focus on metacognition.
4. Demonstrate effective oral, written and interpersonal communication skills in a variety of contexts including the use of appropriate technology.
5. Integrate the content of one discipline into another through the development of projects across subject matter areas.
6. Synthesize information and integrate experiences that promote personal and professional growth in the field of education.
7. Demonstrate engagement as an agent for change in diversity and inclusion using principles of social justice, equity and ethical practice.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: Up to 4 units of credit/no credit grading may be selected for courses in Major, Support, or Concentration.

MAJOR COURSES

LS 201	Orientation to Liberal Studies	1
LS 211	Visual Arts in the Elementary Classroom	4
LS 214	Constitutional Issues in the History of U.S. and California Education	4

LS 230	Field Experience in the Elementary Classroom I	2
LS 250	Field Experience in the Elementary Classroom II	2
LS/ENGL 255	Children's Literature in a Diverse Society (Lower-Division C Elective) ¹	4
LS 301	Liberal Studies Career Preparation	1
LS 310	Storytelling: Modern Applications of Traditional Narrative	4
LS 370	Performing Arts in the Elementary Classroom	4
LS 411	Advanced History/Social Sciences Integration for the K-8 Classroom	4
or LS 412	Advanced Arts Integration for the K-8 Classroom	
or LS 413	Advanced Science/Engineering Integration for the K-8 Classroom	
LS 461	Senior Project Seminar	4
or LS 462	Senior Project Research	
ASTR 101	Introduction to the Solar System (B1) ¹	4
BIO 111	General Biology (B2 & B3) ¹	4
BIO 211	Biology of Plants and Animals	4
ENGL 391	Topics in Applied Linguistics	4
GEOG 308	Global Geography (Upper-Division D) ¹	4
HIST 201	United States History to 1865 (D1) ¹	4
HIST 208	Survey of California History (USCP)	4
HIST 210	World History to 1800 (D2) ^{1,2}	4
KINE 310	Concepts and Applications in Elementary Physical Education	3
HLTH 443	Health Education for Teachers	4
MATH 227	Mathematics for Elementary Teaching I (B4) ¹	4
MATH 328	Mathematics for Elementary Teaching II	4
MATH 329	Mathematics for Elementary Teaching III	4
MATH 330	Algebraic Thinking with Technology	4
PHIL 230	Philosophical Classics: Knowledge and Reality (C2)	4
or PHIL 231	Philosophical Classics: Ethics and Political Philosophy	
PSC 101	Matter and Energy (GE Electives) ¹	4
PSC 102	Atoms and Molecules	4
PSC 103	The Physical Environment: Earth	4
PSY 201	General Psychology (E) ¹	4
or PSY 202	General Psychology	
STAT 130	Introduction to Statistical Reasoning ³	4
or STAT 217	Introduction to Statistical Concepts and Methods	

Concentration, approved minor, or individualized course of study 18-22

SUPPORT COURSES

CD/EDUC 207	Children's Learning and Development in Educational Settings	4
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EDUC 427	Theories, Methods, and Assessment of First and Second Language Acquisition in Schools ⁴	4
EDUC 428	Foundations of K-8 Literacy Teaching and Learning in Schools with Diverse Populations ⁴	4

GENERAL EDUCATION

(See GE program requirements below.) 32

FREE ELECTIVES

Free Electives⁵ 1-5

Total units 180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Students in the History/Social Sciences concentration, may substitute with HIST 221.

³ Students considering a Child Development or Psychology minor should consider taking STAT 217.

⁴ Prerequisite for Multiple Subject Credential program at Cal Poly. For a credential program elsewhere, check the prerequisites for that institution.

⁵ If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

Students may select one of the following concentrations or listed minors to count toward a concentration.

Concentrations

- Human Development
- English
- Environmental Education
- History/Social Sciences
- Mathematics
- Science
- Teaching English to Speakers of Other Languages

Individualized Course of Study

With department chair approval, students may select one of the minors listed below or pursue a course of study which meets their individual needs and interests; this must be initiated early and all courses must be pre-approved. The individualized course of study consists of 18-20 units with at least one course at the 300-400 level. Courses are selected by the student in consultation with an advising faculty member. The list of courses is a contract between the student and the department.

Minors that can be taken to create an Individualized Course of Study

- Ethnic Studies
- Music
- Spanish

When selecting one of these minors to create an ICS, students should be advised the concentration will appear on their official transcript as Individualized Course of Study. The minor must be declared separately

with the minor department in order for it to appear on the official transcript.

General Education (GE) Requirements

- 72 units required, 40 of which are specified in Major and/or Support.
- If any of the remaining 32 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Major) ¹	0
B2	Life Science (4 units in Major) ¹	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B		4
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English (4 units in Major) ¹	0
Lower-Division C Elective - Select a course from either C1 or C2 (4 units in Major)		0
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement) (4 units in Major) ¹	0
D2	Lower-Division D (4 units in Major plus 4 units in GE) ¹	0
Upper-Division D (4 units in Major) ¹		0
Area E	Lifelong Learning and Self-Development	
Lower-Division E (4 units in Major) ¹		0
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		

GE Electives (4 units in Major plus 4 units in GE) ¹	4
Total units	32

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² Recommended courses to satisfy GE Area C1: MU 101, DANC 221, or TH 210 for individuals planning to pursue a teaching credential.

Courses Needed for Multiple Subject Credential

EDUC 402	Learning to Teach K-8 Health and Physical Education with Diverse Populations	3
EDUC 429	Learning to Teach K-8 Literacy in Schools with Diverse Populations	4
EDUC 431	Learning to Teach K-8 Social Studies with Diverse Populations	4
EDUC 435	Learning to Teach K-8 Mathematics with Diverse Populations	4
EDUC 436	Learning to Teach K-8 Science with Diverse Populations	4
EDUC 438	Multiple Subject Clinical Practice I	4
EDUC 439	Multiple Subject Clinical Practice Seminar I	3
EDUC 440	Educating Individuals with Exceptional Needs	4
EDUC 450	Teaching Performance Assessment Seminar	1
EDUC 454	Multiple Subject Clinical Practice II	6
EDUC 455	Multiple Subject Clinical Practice Seminar II	3
EDUC 456	Multiple Subject Clinical Practice III	12
EDUC 457	Multiple Subject Clinical Practice Seminar III	3
Total units		55

English Concentration in BS Liberal Studies

The English language as a discipline is structured around concepts of rhetoric and grammar as they are used to express creative thought orally and in writing. Knowledge in these areas is generated by a study of current and historical rules of rhetoric, grammar and of current and historical works of literature. The term "creative thought" includes poetry, theater, narration and exposition in both oral and written form.

This concentration is aligned to a supplemental authorization in English that can be added to your future credential. See a concentration advisor for more information.

ENGL 311	Advanced Rhetorical Inquiry and Composing	4
or ENGL 312	Translingual Rhetorical Inquiry and Writing	
ENGL 361	Reading Instruction for the Teaching of Young Adult Literature	5
ENGL 368	Theory and Practice of Peer-to-Peer Writing Instruction	4 - 5

or ENGL 424	Teaching English in Secondary Schools	
Select from the following:		8
British Literature		
ENGL 330	British Literature: Beginnings to 1485	
ENGL 331	British Literature: 1485-1660	
ENGL 332	British Literature: 1660-1798	
ENGL 333	British Literature: 1798-1832	
ENGL 334	British Literature: 1832-1914	
ENGL 335	British Literature: 1914-Present	
ENGL 339	Introduction to Shakespeare	
American Literature		
ENGL 340	American Literature: Beginnings-1865	
ENGL 341	American Literature: 1865-1914	
ENGL 342	American Literature: 1914-1956	
ENGL 343	American Literature: 1956-Present	
ENGL 345	Women Writers of the Twentieth and Twenty-First Centuries (USCP)	
ENGL 346	Ethnic American Literature (USCP)	
ENGL 347	African American Literature (USCP)	
Modern English		
ENGL 350	The Modern Novel	
ENGL 351	Modern Poetry	
ENGL 352	Modern Drama	
Total units		21-22

Environmental Education Concentration

Environmental Education connects students to nature through a variety of experiences and helps to link social, political, and economic factors to help citizens make well-informed decisions about the environment and climate change. Courses in this concentration are interdisciplinary and structured to support the development of environmental literacy, address interrelated issues, and the impacts to society and the world at large.

Cultural Geography

Select from the following:		4
BOT 311	Plants, People and Civilization	
ES/NR 360	Ethnicity and the Land	
GEOG 150	Human Geography	
GEOG 370	Geography of Latin America	
GEOG 380	Geography of the Caribbean	

Ecological and Environment Foundations

Select from the following:		4
BIO 114	Plant Diversity and Ecology	
BIO 227	Wildlife Conservation Biology	
BOT 326	Plant Ecology	
ERSC/GEOG 250	Physical Geography	
NR 306	Natural Resource Ecology and Habitat Management	
NR 310	Global Climate Change	
PSC 201	Physical Oceanography	

Education and Communication

Select from the following:		2-4
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COMS 390	Environmental Communication	
LS 380	Education Apprenticeship ¹	
MSCI 440	Communicating Ocean Sciences to Informal Audiences	
NR/RPTA 328	Environmental Leadership and Community Engagement	
Social, Political, Economic and Ethical Issues		
Select from the following:		4
ERSC/GEOG 325	Climate and Humanity	
GEOG 350	The Global Environment	
HIST 311	Comparative World Environmental History & Sustainability Since 1492	
NR 323	Human Dimensions in Natural Resources Management	
PHIL 340	Environmental Ethics	
PSC 320	Energy, Society and the Environment	
Capstone		
Select from the following:		4
LS 413	Advanced Science/Engineering Integration for the K-8 Classroom ²	
SCM 360	Selected Environmental Issues of California's Central Coast	
Total units		18-20

¹ No more than 4 units from LS 380.

² Students need to take LS 411 or LS 412 to meet other major requirements.

History/Social Sciences Concentration

The discipline of Social Sciences is based on individual human beings as they interact with other human beings singly and with groups. Knowledge is acquired and generated by the study of anthropology, history, sociology and certain aspects of geography as they relate to the human condition.

This concentration is aligned to a supplemental authorization in Social Sciences that can be added to your future credential. See a concentration advisor for more information.

HIST 322	Modern America	4
Select from the following World History courses:		4
HIST 221	World History, Beginnings to 1000 CE ¹	
HIST 222	World History, 1000-1800	
HIST 223	World History, 1800 - Present	
Select from the following U.S. Government courses:		4
POLS 112	American and California Government	
POLS 315	The American Presidency	
POLS 319	United States Congress	
POLS 348	Early American Political Thought	
POLS 349	Contemporary American Political Thought	
Select from the following World Civilization or World Culture courses:		4
HIST 307	European Thought 1800-2000	

HIST 310	East Asian Culture and Civilization
HIST 313	Modern Middle East
HIST 316	Modern East Asia
HIST 319	Modern South and Southeast Asia
HIST 334	Modern Europe, 1789-1914
HIST 335	Modern Europe, 1914-Present
HIST 338	Modern Latin America
HIST 341	Modern Central America
Select from the following Social Systems courses: 4	
ES 381	The Social Construction of Whiteness
LS 350	Identity and Equity in American Schools ²
SOC 309	The World System and Its Problems
SOC 315	Global Race and Ethnic Relations

Total units 20

- ¹ If course is taken to meet a Major or Support requirement, it may not be double-counted in the concentration.
- ² This course may not count towards an Introductory Subject Matter Authorization in History/Social Sciences.

Human Development Concentration

The Human Development concentration provides students with a broad foundation covering a range of issues. Courses focus on psychological, sociological, and emotional development across the lifespan of humans. It also complements professional training and enhances personal development and interpersonal effectiveness. This concentration provides knowledge and skills that can be applied to real world settings such as families, schools, and work places.

Select from the following:¹ 20

Choose at least one course in each of the designated areas below. One course must be upper-division.

Human Development and Growth²

CD 256	Developmental Psychology
CD 304	Infant and Toddler Development
CD 305	Early and Middle Childhood Development
CD 306	Adolescence
PSY 318	Psychology of Aging
PSY 324	Psychology of Gender
PSY 340	Biopsychology

Applications to Education and Advocacy³

CD 350	Developmental Issues in Education
CD 351	Learning in Out-of-School Time
CD 356	Behavioral Disorders in Childhood
CD 460	Child Abuse and Neglect
PSY 320	Health Psychology
PSY 325	Introduction to Positive Psychology
PSY 350	Teamwork
PSY 357	Cognition
SPED 420	Understanding Special Education

Social Context and Relationships

CD 417	Interpersonal Relationships in Childhood and Adolescence
CD 424	Children's Development in Diverse Cultures
LS 350	Identity and Equity in American Schools
PSY 254	Family Psychology
PSY 305	Personality
PSY 340	Biopsychology
PSY 475	The Social Psychology of Prejudice

Total units 20

- ¹ Additional courses are required if pursuing a minor in Child Development or Psychology. If you plan to pursue a minor, meet with an advisor early in your degree.
- ² If pursuing a career in Early Childhood Education (ECE), students may transfer 16 units of ECE credit from a community college. These students must also take an upper-division course in the areas of "Human Development and Growth" or "Applications to Education and Advocacy."
- ³ If pursuing a career in Special Education, students must take SPED 420.

Mathematics Concentration

Mathematics as a discipline is structured around conceptual categories of numbers and quantity, algebra, functions, modeling, geometry and probability and statistics. Knowledge in this area is unified through context, coherence, and tasks that develop mathematical "habits of mind." Courses in this concentration are structured for higher mathematics practices and content to support college and career pathways.

This concentration is aligned to a supplemental authorization in Mathematics that can be added to your future credential. See a concentration advisor for more information.

MATH 141	Calculus I	4
MATH 142	Calculus II	4
MATH 143	Calculus III	4
MATH 248	Methods of Proof in Mathematics	4

Select from the following: 4

LS 305	Project Based Learning in STEM Education
MATH 300	Technology in Mathematics Education
MATH 334	Combinatorial Math
MATH 335	Graph Theory
MATH 341	Theory of Numbers
MATH 419	Introduction to the History of Mathematics
MATH 442	Euclidean Geometry
STAT 410	Statistics Education: Pedagogy, Content, Technology, and Assessment

Total units 20

Science Concentration

The discipline of science is based on laws governing the world around us. Knowledge in this area is generated by development of concepts in matter, motion, and energy in living systems and Earth and space while emphasizing evidence to support claims for its knowledge. This concentration expands on ideas of the branches of science with engagement in the practices to build proficiency and further develop appreciation of the strengths and limitations of science in the real world.

This concentration is aligned to a supplemental authorization in Science that can be added to your future credential. See a concentration advisor for more information.

Students must take at least one 4-unit course at the 300-400 level in the concentration; three courses in the same discipline are recommended.

Chemistry Requirement

Select from the following: 4

CHEM 110	World of Chemistry
CHEM 124	General Chemistry for Physical Science and Engineering I
CHEM 127	General Chemistry for Agriculture and Life Science I

Physics Requirement

Select from the following: 4

PHYS 111	Contemporary Physics for Nonscientists
PHYS 121	College Physics I
PHYS 141	General Physics I
PSC 320	Energy, Society and the Environment

Approved Concentration Electives¹

Select from the following: 12

ASTR 102	Introduction to Stars and Galaxies
ASTR 324	Longitude, Navigation, and Timekeeping
BIO 114	Plant Diversity and Ecology
BIO 231	Human Anatomy and Physiology I
BIO 232	Human Anatomy and Physiology II
BIO 302	Human Genetics
BIO 305	Biology of Cancer
BIO/CHEM 308	Genetic Engineering Technology
BOT 121	General Botany
BOT 311	Plants, People and Civilization
BOT 326	Plant Ecology
CHEM 125	General Chemistry for Physical Science and Engineering II
CHEM 126	General Chemistry for Physical Science and Engineering III
CHEM 128	General Chemistry for Agriculture and Life Science II
CHEM 129	General Chemistry for Agriculture and Life Science III
CHEM 312	Organic Chemistry: Fundamentals and Applications
CHEM 314	Biochemistry: Fundamentals and Applications

CHEM 349	Chemical and Biological Warfare
CHEM 377	Chemistry of Drugs and Poisons
ERSC 223	Rocks and Minerals
GEOL 102	Introduction to Geology
GEOL 203	The Geologic Record: Fossils and the History of Life
GEOL 206	Geologic Excursions
GEOL 305	Seismology and Earth Structure
LS 305	Project Based Learning in STEM Education ²
MCRO 221	Microbiology
MCRO 342	Public Health Microbiology
MCRO 421	Food Microbiology
MSCI 111	Survey of Marine Biology
MSCI 330	Technologies for Ocean Discovery
MSCI 440	Communicating Ocean Sciences to Informal Audiences
NR 306	Natural Resource Ecology and Habitat Management
PHYS 122	College Physics II
PHYS 123	College Physics III
PHYS 142	General Physics II
PHYS 143	General Physics III
PHYS 330	Teaching Physics
PSC 201	Physical Oceanography
SCM 302/ ENGR 322/ HNRS 302	The Learn By Doing Lab Teaching Practicum ²
SCM 360	Selected Environmental Issues of California's Central Coast
SCM 368	Theory and Practice of STEM Tutoring ³

Total units 20

¹ Courses in BIO/BOT/MCR/MSCI may count towards a minor in Biology. Please consult a minor advisor for more information.

² A maximum of 4 units total from LS 305 and SCM 302/ENGR 322/HNRS 302 may be used in the concentration.

³ This course may not count towards an Introductory Subject Matter Authorization in Science.

Teaching English to Speakers of Other Languages Concentration

The knowledge and ability to effectively teach a second language is dependent on Linguistics, the scientific study of a language. Coursework in this concentration covers theoretical, methodological and pedagogical issues in second language teaching and learning. A variety of concepts within both theoretical and applied linguistics are developed. Additional coursework is required for the certification and students are encouraged to begin taking courses early in their Junior year. Meet with the Teaching English to Speakers of Other Languages (TESOL) program advisor for more information.

COMS 316	Intercultural Communication	4
ENGL 290	Introduction to Linguistics ¹	4

or ENGL 390	The Linguistic Structure of Modern English	
ENGL 497	Theories of Language Learning and Teaching	4
ENGL 498	Approaches to Teaching English to Speakers of Other Languages	4
ENGL 499	Practicum in Teaching English to Speakers of Other Languages	2
Total units		18

¹ Both ENGL 290 and ENGL 390 are required for the TESOL certification.

Mathematics

Faculty Offices East Bldg. (25), Room 208

Phone: 805.756.2206

<https://math.calpoly.edu> (<https://math.calpoly.edu/>)

Department Chair: Benjamin Richert

Academic Programs

Program name	Program type
Mathematics	BS, MS, Minor

The Mathematics Department offers a comprehensive undergraduate program of courses leading to a Bachelor of Science degree in mathematics. It also offers a program of courses for students who wish to minor in mathematics, as well as graduate courses for programs of study leading to a Master of Science degree. The mix of pure and applied mathematics in these courses increases both the usefulness of and the demand for graduates with a degree in mathematics. In addition, the Mathematics Department offers courses that serve all departments in the university.

The rich variety of courses in the Mathematics Department provides students with the opportunity to experience those fields and the techniques of mathematics that are most useful in the physical sciences, engineering, statistics and business. Examples include mathematical modeling, mathematical biology, data science, operations research, fluid dynamics, numerical analysis, financial mathematics and sustainability.

For mathematics placement (MAPE) information visit the Academic Standards and Policies (p. 43) section.

Undergraduate Programs

BS Mathematics

The undergraduate program for math majors contains a central core of courses. These courses give a solid basis for advanced work that is tailored to fit the needs and objectives of each individual student. Advanced coursework is chosen in close consultation with faculty advisors.

Concentrations

The General Curriculum in Mathematics is not a concentration, and is the default curriculum required for students who do not declare a concentration. The general curriculum and all of the concentrations provide a strong mathematical foundation for the student contemplating the pursuit of a graduate degree in mathematics.

Applied Mathematics

Provides a curriculum with an emphasis on applications to the physical sciences and engineering. This concentration benefits students who are interested in the use of mathematics in areas such as engineering, data science, physics, aeronautics, finance, actuarial science, biology, medicine, and the geosciences. Potential career paths include pursuit of advanced degrees in any of the above fields or in applied mathematics, as well as industry jobs in a broad range of areas in which physical processes are modeled or analyzed using the tools of mathematics.

Mathematics Teaching

Students wishing to prepare for a career teaching mathematics in middle or senior high school should choose the concentration in teaching. The courses in the concentration, coupled with the other required courses

in the major, fulfill the prerequisites for the California Commission on Teacher Credentialing.

Pure Mathematics

A broad and rigorous curriculum designed both for students who will pursue an advanced degree in mathematics as well as those who choose careers requiring significant mathematical training. Graduates of the program are well prepared to enter graduate programs in mathematics and capable of bringing a broad range of mathematical skills and expertise to a wide range of professional careers.

Mathematics Minor

Students may earn a minor in mathematics by completing a coordinated program of study. The program consists of a core of required courses, followed by four advanced courses coordinated with a student's career objectives. Interested students should contact the Mathematics Department for individual advisement.

Graduate Programs

Master of Science Degree in Mathematics

General Characteristics

The Master of Science program in mathematics prepares students to enter careers in industry, teaching at the community college level, or to prepare for entering a PhD program in pure or applied mathematics.

Prerequisites

General CSU minimum qualifications for students entering a master's degree program include a bachelor's degree from an accredited institution with a minimum grade point average of 2.5 in the last 90 quarter units attempted.

Generally, the Mathematics Department at Cal Poly expects incoming master's degree students to have a grade point average of 3.0 or higher, and preferably a major in mathematics. Applicants without a major in mathematics are still welcome to apply, but must have substantial exposure to upper-level mathematics courses. Such applicants may be subject to acceptance conditional upon completion of remaining standard undergraduate mathematics curricula.

Program of Study

The Master's program requires 45 units of coursework. Students take eleven specified 500 level courses, with an additional four units of electives at the 400 or 500 level. Two of these courses have prerequisite qualifying exams, each offered three times a year. The culminating experience is either a written and publicly presented thesis on a significant topic at the 500 level, or an oral exam in three of five subjects: applied analysis, discrete mathematics, topology, algebra, or measure theory.

Specialization in Applied Mathematics

This program prepares students to enter careers in industry or to enter a PhD program in applied mathematics. Students take ten specified 400 and 500 level courses, with an additional eight units at the 400 or 500 level. Students can take electives that fit their specific needs or career objectives, and the culminating experience is either a written and publicly presented thesis on a significant mathematical topic at the 500

level, or oral exams in three of five subjects: applied analysis, discrete mathematics, topology, algebra, or measure theory.

Degree Requirements and Curriculum (p. 408)

Blended BS+MS Mathematics

A blended program provides an accelerated route to a graduate degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status. Students are required to complete all requirements for both degrees.

A blended program is available for MS Mathematics.

Eligibility

Students majoring in BS Mathematics are eligible for the blended program in MS Mathematics.

Participation in a blended program is based upon prior academic performance and other measures of professional promise. Refer to [Graduate Education \(p. _____\)](#) for more information and for the minimum criteria required to be eligible for a blended program at Cal Poly. Contact the Graduate Program Coordinator in the Mathematics department for any additional eligibility criteria.

BS Mathematics

Program Learning Objectives

1. Understand the nature of mathematical proof and be able to write clear and concise proofs.
2. Develop the ability to read, understand, and use basic definitions in linear and abstract algebra and real analysis, and be able to prove simple consequences of these definitions.
3. Be able to use standard mathematical techniques to solve elementary problems.
4. Be able to communicate effectively in oral and written form.
5. Be able to write simple computer programs to perform mathematical computations.
6. Gain experience exploring open-ended problems, learn to make conjectures, and gather evidence to support or refute these conjectures.
7. Develop the ability to read and to learn mathematics independently.
8. Learn about applications of mathematics in other fields and gain experience in mathematical modeling.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

MATH 141	Calculus I (B4) ¹	4
MATH 142	Calculus II (GE Electives) ¹	4
MATH 143	Calculus III	4
MATH 202	Orientation to Mathematics Major	1
MATH 206	Linear Algebra I	4
MATH 241	Calculus IV	4
MATH 242	Differential Equations I	4
MATH 248	Methods of Proof in Mathematics	4
MATH 306	Linear Algebra II	4
MATH 334	Combinatorial Math (Upper-Division B) ¹	4
MATH 412	Introduction to Analysis I	4
Select from the following: ²		4
MATH 459	Senior Project Seminar	
MATH 460	Senior Project Applied Seminar	
MATH 461 & MATH 462	Senior Project I and Senior Project II	
MATH 481	Abstract Algebra I	4
CSC/CPE 101	Fundamentals of Computer Science	4
PHYS 141	General Physics I	4
Select from the following: ¹		4
PHYS 142	General Physics II (B1 & B3)	
PHYS 143	General Physics III (B1 & B3)	
General Curriculum in BS Mathematics or Concentration ³		44/56/48/48
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		56
FREE ELECTIVES		
Free Electives ^{3,4}		19/7/15/15
Total units		180

- ¹ Required in Major or Support; also satisfies General Education (GE) requirement.
- ² MATH 460 is recommended for students in the Applied Mathematics concentration.
- ³ General Curriculum/Applied Mathematics concentration/ Mathematics Teaching concentration/Pure Mathematics concentration.
- ⁴ 60 units must come from upper-division courses at the 300-400 level for the General Curriculum in BS Mathematics.

General Curriculum in BS Mathematics or Concentrations (select one)

- General Curriculum (p. 404)
- Applied Mathematics (p. 405)
- Mathematics Teaching (p. 406)
- Pure Mathematics (p. 407)

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Major) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		56

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

General Curriculum in Mathematics

This is the default curriculum required for students who do not declare a concentration.

STAT 301	Statistics I	4
or STAT 305	Introduction to Probability and Simulation	
Tracks		
Choose three tracks from the following list, with at least one track chosen from the first four tracks listed. A track consists of two paired courses representing depth of study with a particular focus. ¹		24
MATH 413 & MATH 414	Introduction to Analysis II and Introduction to Analysis III	
MATH 482 & MATH 483	Abstract Algebra II and Abstract Algebra III	
or MATH 406	Linear Algebra III	
MATH 406 & MATH 413	Linear Algebra III and Introduction to Analysis II	
or MATH 440	Topology I	
MATH 482 & MATH 413	Abstract Algebra II and Introduction to Analysis II	
or MATH 440	Topology I	
MATH 304 & MATH 404	Vector Analysis and Introduction to Differential Geometry	
MATH 335 & MATH 435	Graph Theory and Discrete Mathematics with Applications I	
MATH 344 & MATH 416	Linear Analysis II and Differential Equations II	
or MATH 418	Partial Differential Equations	
MATH 341 & MATH 437	Theory of Numbers and Game Theory	
MATH 410 & MATH 411	Complex Analysis I and Complex Analysis II	
MATH 442 & MATH 443	Euclidean Geometry and Modern Geometries	
MATH 451 & MATH 452	Numerical Analysis I and Numerical Analysis II	
or MATH 453	Numerical Optimization	
Approved Electives		
Select from the following: ²		16
CSC/CPE 202	Data Structures	
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	
CSC 349	Design and Analysis of Algorithms	
CSC 365	Introduction to Database Systems	
MATH 304	Vector Analysis	
MATH 335	Graph Theory	
MATH 341	Theory of Numbers	
MATH 344	Linear Analysis II	
MATH 350	Mathematical Software	
MATH 404	Introduction to Differential Geometry	
MATH 406	Linear Algebra III	
MATH 410	Complex Analysis I	
MATH 411	Complex Analysis II	
MATH 413	Introduction to Analysis II	
MATH 414	Introduction to Analysis III	
MATH 416	Differential Equations II	

MATH 418	Partial Differential Equations	
MATH 419	Introduction to the History of Mathematics	
MATH 435	Discrete Mathematics with Applications I	
MATH 437	Game Theory	
MATH 440	Topology I	
MATH 442	Euclidean Geometry	
MATH 443	Modern Geometries	
MATH 451	Numerical Analysis I	
MATH 452	Numerical Analysis II	
MATH 453	Numerical Optimization	
MATH 459	Senior Project Seminar	
or MATH 460	Senior Project Applied Seminar	
MATH 461 & MATH 462	Senior Project I and Senior Project II	
MATH 470	Selected Advanced Topics	
MATH 475	Advanced Topics in Mathematics ³	
MATH 476	Advanced Topics in Applied Mathematics ³	
MATH 482	Abstract Algebra II	
MATH 483	Abstract Algebra III	
MATH 531	Discrete Mathematics with Applications II	
MATH 541	Topology II	
PHYS 142	General Physics II	
or PHYS 143	General Physics III	
PHYS 211	Modern Physics I	
PHYS 301	Thermal Physics I	
PHYS 305	Classical Mechanics I	
PHYS 323	Optics	
PHYS/CPE 345	Quantum Computing	
PHYS 405	Quantum Mechanics I	
PHYS 408	Electromagnetic Fields and Waves I	
STAT 301	Statistics I	
STAT 302	Statistics II	
STAT 305	Introduction to Probability and Simulation	
STAT 425	Probability Theory	
STAT 426	Estimation and Sampling Theory	
STAT 427	Mathematical Statistics	

Total units **44**

¹ A single course cannot be used to satisfy multiple tracks.
² Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
³ Maximum of 8 units combined between MATH 475 and MATH 476.

Applied Mathematics Concentration

MATH 304	Vector Analysis	4
MATH 344	Linear Analysis II	4
MATH 350	Mathematical Software	4

or CSC/CPE 202	Data Structures	
MATH 410	Complex Analysis I	4
MATH 413	Introduction to Analysis II	4
MATH 416	Differential Equations II	4
or MATH 418	Partial Differential Equations	
MATH 451	Numerical Analysis I	4
STAT 301	Statistics I	4
or STAT 305	Introduction to Probability and Simulation	

Tracks
 Select courses from one of the following tracks.^{1,2} **12**

Track A

MATH 335	Graph Theory	
MATH 341	Theory of Numbers	
MATH 406	Linear Algebra III	
MATH 411	Complex Analysis II	
MATH 414	Introduction to Analysis III	
MATH 416	Differential Equations II	
MATH 418	Partial Differential Equations	
MATH 435	Discrete Mathematics with Applications I	
MATH 437	Game Theory	
MATH 452	Numerical Analysis II	
MATH 453	Numerical Optimization	
MATH 460	Senior Project Applied Seminar	
MATH 461 & MATH 462	Senior Project I and Senior Project II	
MATH 476	Advanced Topics in Applied Mathematics	
MATH 482	Abstract Algebra II	
MATH 483	Abstract Algebra III	

Track B

DATA 301	Introduction to Data Science	
DATA 401 & DATA 403	Data Science Process and Ethics and Data Science Projects Laboratory ³	
MATH 335	Graph Theory	
or MATH 435	Discrete Mathematics with Applications I	
or MATH 453	Numerical Optimization	

Approved Electives **12**

Select three courses in one of the following categories, with at least one course at the 300-level or above.^{4,5}

Physics Category:

ASTR 301	Planetary Systems	
ASTR 302	Stars and Galaxies	
ASTR 326	Cosmology	
PHYS 142	General Physics II	
or PHYS 143	General Physics III	
PHYS 211	Modern Physics I	
PHYS 301	Thermal Physics I	
PHYS 305	Classical Mechanics I	
PHYS 306	Classical Mechanics II	
PHYS 313	Introduction to Atmospheric Physics	
PHYS 314	Ocean Dynamics	

PHYS 318	Special Theory of Relativity
PHYS 323	Optics
PHYS/CPE 345	Quantum Computing
PHYS 405	Quantum Mechanics I
PHYS 408	Electromagnetic Fields and Waves I
PHYS 425	Solid State Physics
PHYS 428	Nonlinear Dynamical Systems
Statistics Category:	
STAT 302	Statistics II
STAT 305	Introduction to Probability and Simulation
STAT 323	Design and Analysis of Experiments I
STAT 330	Statistical Computing with SAS
STAT 331	Statistical Computing with R
STAT 334	Applied Linear Models
STAT 416	Statistical Analysis of Time Series
STAT 417	Survival Analysis Methods
STAT 418	Categorical Data Analysis
STAT 419	Applied Multivariate Statistics
STAT 421	Survey Sampling and Methodology
STAT 423	Design and Analysis of Experiments II
STAT 425	Probability Theory
STAT 426	Estimation and Sampling Theory
STAT 427	Mathematical Statistics
Computer Science Category:	
CSC/CPE 202	Data Structures
CSC/CPE 203	Project-Based Object-Oriented Programming and Design
CSC 225	Introduction to Computer Organization
CPE 345	Quantum Computing
CSC 349	Design and Analysis of Algorithms
CSC/CPE 357	Systems Programming
CSC 365	Introduction to Database Systems
CSC 448	Bioinformatics Algorithms
Mechanical Engineering Category:	
ME 211	Engineering Statics
ME 212	Engineering Dynamics
ME 302	Thermodynamics I
ME 326	Intermediate Dynamics
ME 341	Fluid Mechanics I
Economics Category:	
ECON 311	Intermediate Microeconomics I
ECON 312	Intermediate Microeconomics II
ECON 313	Intermediate Macroeconomics
ECON 403	Industrial Organization
ECON 408	Mathematical Economics
ECON 409	Probability Models for Economic Decisions

Total units

56

- ² Students who select Track B should select Approved Electives from the Statistics Category that will fulfill prerequisites for courses in the Data Science minor.
- ³ DATA 401 and DATA 403 must be taken concurrently with DATA 402.
- ⁴ Consultation with advisor is recommended prior to selecting Approved Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
- ⁵ Other choices are also possible, and should be pre-approved in consultation with an academic advisor. Approved Electives are to be taken outside of the Mathematics department and should have significant applications to mathematics.

Mathematics Teaching Concentration

MATH 300	Technology in Mathematics Education	4
MATH 341	Theory of Numbers	4
MATH 419	Introduction to the History of Mathematics	4
MATH 423	Advanced Mathematics for Teaching	4
MATH 442	Euclidean Geometry	4
MATH 443	Modern Geometries	4
MATH 482	Abstract Algebra II	4
SCM 300	Early Field Experience ¹	4
STAT 301	Statistics I	4
STAT 302	Statistics II	4
or STAT 305	Introduction to Probability and Simulation	
Select from the following:		8
CSC/CPE 202	Data Structures	
MATH 304	Vector Analysis	
MATH 335	Graph Theory	
MATH 344	Linear Analysis II	
MATH 350	Mathematical Software	
MATH 406	Linear Algebra III	
MATH 410	Complex Analysis I	
MATH 413	Introduction to Analysis II	
MATH 416	Differential Equations II	
MATH 435	Discrete Mathematics with Applications I	
MATH 437	Game Theory	
MATH 440	Topology I	
MATH 451	Numerical Analysis I	
MATH 459	Senior Project Seminar	
or MATH 460	Senior Project Applied Seminar	
MATH 461 & MATH 462	Senior Project I and Senior Project II	
MATH 470	Selected Advanced Topics	
MATH 483	Abstract Algebra III	
PHYS 142	General Physics II	
or PHYS 143	General Physics III	
PHYS 305	Classical Mechanics I	
STAT 425	Probability Theory	

Total units

48

¹ Only students in the Applied Mathematics concentration who are pursuing a Data Science minor should select Track B.

¹ SCM 300 requires 45 hours of observations at local schools. Students should plan their schedules to have a four-hour block free during elementary school hours each week.

Pure Mathematics Concentration

MATH 410	Complex Analysis I	4
MATH 413	Introduction to Analysis II	4
MATH 440	Topology I	4
MATH 482	Abstract Algebra II	4
Select from the following:		12
MATH 406	Linear Algebra III	
MATH 411	Complex Analysis II	
MATH 414	Introduction to Analysis III	
MATH 435	Discrete Mathematics with Applications I	
MATH 483	Abstract Algebra III	
Select from the following:		4
MATH 350	Mathematical Software	
STAT 301	Statistics I	
STAT 305	Introduction to Probability and Simulation	
Select from the following:		16
MATH 304	Vector Analysis	
MATH 335	Graph Theory	
MATH 341	Theory of Numbers	
MATH 344	Linear Analysis II	
MATH 350	Mathematical Software	
MATH 404	Introduction to Differential Geometry	
MATH 406	Linear Algebra III	
MATH 411	Complex Analysis II	
MATH 414	Introduction to Analysis III	
MATH 416	Differential Equations II	
MATH 418	Partial Differential Equations	
MATH 435	Discrete Mathematics with Applications I	
MATH 437	Game Theory	
MATH 451	Numerical Analysis I	
MATH 452	Numerical Analysis II	
MATH 453	Numerical Optimization	
MATH 459	Senior Project Seminar	
or MATH 460	Senior Project Applied Seminar	
MATH 461 & MATH 462	Senior Project I and Senior Project II	
MATH 470	Selected Advanced Topics	
MATH 475	Advanced Topics in Mathematics	
MATH 483	Abstract Algebra III	
MATH 531	Discrete Mathematics with Applications II	
MATH 541	Topology II	
STAT 425	Probability Theory	

Total units 48

Mathematics Minor

Required Courses

MATH 143	Calculus III	4
MATH 206	Linear Algebra I	4
or MATH 244	Linear Analysis I	
MATH 248	Methods of Proof in Mathematics	4

Approved Electives

Select from the following (a maximum of two 300-level courses):

MATH 304	Vector Analysis	
MATH 306	Linear Algebra II	
MATH 334	Combinatorial Math	
MATH 335	Graph Theory	
MATH 341	Theory of Numbers	
MATH 344	Linear Analysis II	
MATH 404	Introduction to Differential Geometry	
MATH 406	Linear Algebra III	
MATH 410	Complex Analysis I	
MATH 411	Complex Analysis II	
MATH 412	Introduction to Analysis I	
MATH 413	Introduction to Analysis II	
MATH 414	Introduction to Analysis III	
MATH 416	Differential Equations II	
MATH 418	Partial Differential Equations	
MATH 435	Discrete Mathematics with Applications I	
MATH 437	Game Theory	
MATH 440	Topology I	
MATH 442	Euclidean Geometry	
MATH 443	Modern Geometries	
MATH 451	Numerical Analysis I	
MATH 452	Numerical Analysis II	
MATH 453	Numerical Optimization	
MATH 481	Abstract Algebra I	
MATH 482	Abstract Algebra II	
MATH 483	Abstract Algebra III	

Total units 28

MS Mathematics

Program Learning Objectives

1. Demonstrate a high level of overall mathematical knowledge in the traditional areas of advanced mathematics, such as algebra, analysis, topology, and discrete mathematics.
2. Apply mathematical knowledge in new settings.
3. Produce detailed, rigorous, and correct proofs.
4. Communicate effectively in oral and written forms.

Required Courses

MATH 505	Graduate Teaching Seminar	1
MATH 520	Applied Analysis I	4
MATH 521	Applied Analysis II	4

MATH 530	Discrete Mathematics with Applications I	4
MATH 531	Discrete Mathematics with Applications II	4
MATH 540	Topology I	4
MATH 541	Topology II	4
MATH 548	Transition to Graduate Mathematics	4
MATH 550	Real Analysis	4
MATH 560	Field Theory	4
MATH 561	Graduate Algebra	4
Electives		4

Select additional units at the 400 or 500 level as approved by the Graduate Committee.

Satisfactory completion of the comprehensive examinations.

Total units 45

MS Mathematics, Specialization in Applied Mathematics

Program Learning Objectives

1. Demonstrate a high level of overall mathematical knowledge in the traditional areas of advanced mathematics, such as algebra, analysis, topology, and discrete mathematics.
2. Apply mathematical knowledge in new settings.
3. Produce detailed, rigorous, and correct proofs.
4. Communicate effectively in oral and written forms.

Required Courses

MATH 476	Advanced Topics in Applied Mathematics	4
MATH 502	Numerical Methods in Applied Mathematics	4
MATH 505	Graduate Teaching Seminar	1
MATH 520	Applied Analysis I	4
MATH 521	Applied Analysis II	4
MATH 530	Discrete Mathematics with Applications I	4
MATH 531	Discrete Mathematics with Applications II	4
MATH 548	Transition to Graduate Mathematics ¹	4
MATH 550	Real Analysis	4
MATH 561	Graduate Algebra	4
Electives		8

Select additional units at the 400 or 500 level as approved by the Graduate Committee.

Satisfactory completion of the comprehensive examinations or thesis defense.

Total units 45

¹ Students that pass both the algebra and the real analysis qualifying exams before the fall of their first year of graduate school may choose to waive the requirement to take MATH 548. In that case, the number of electives would be 12 instead of 8.

Physics

Baker Center for Science and Mathematics Bldg. (180), Room 204
Phone: 805.756.2448; Fax: 805.756.2435
<http://physics.calpoly.edu/>
physics@calpoly.edu

Department Chair: Karl Saunders

Academic Programs

Program name	Program type
Physics	BA, BS, Minor
Astronomy	Minor
Geology	Minor

The department provides a solid grounding in fundamental physics through theoretical courses in Classical and Modern Physics, Quantum Mechanics, Electromagnetism, and Thermal Physics. These are supported by a comprehensive laboratory program in electronics and quantum physics. Required subjects are complemented by a wide range of elective courses including optics, particle and solid state physics, nonlinear dynamics, astronomy, and geophysics. Facilities include specialized laboratories in electrical measurements, optics, solid state physics, and nuclear and atomic physics. Majors are prepared to attend graduate school, work in technical fields, or pursue a teaching credential. Student activities include a chapter of the national Society of Physics Students and a chapter of the national physics honor society, Sigma Pi Sigma. All physics students are admitted under the BS Program. Beginning in the second quarter of enrollment students may elect to change to the BA program. Consult your academic advisor.

Undergraduate Programs

BA Physics

The BA in Physics provides the student with a solid foundation in physics. It is a more flexible major serving students with double majors, nontechnical minors, and students who intend to pursue pre-college teaching. The curriculum has fewer required courses than the BS, which allows students to choose from an extensive list of electives. Tailoring the curriculum to maximize student goals should be done in consultation with an academic advisor. Students considering a career in teaching should consult with their academic advisor early.

BS Physics

The BS in Physics is the appropriate choice for those students planning a career involving physics in industry or government laboratories, as well as those seeking a strong foundation in physics for graduate study.

Astronomy Minor

The Astronomy Minor provides students an opportunity to learn about and analyze astronomical phenomena and processes. A minor in astronomy provides a background for graduate-level studies in astronomy or work in related fields. Interested students should see an Astronomy Minor advisor.

Geology Minor

The Geology Minor is offered in conjunction with the Natural Resources Management and Environmental Sciences Department. It provides a background useful for careers in environmental consulting or geotechnical fields. Interested students should consult with a Geology Minor advisor. Students preparing for the geology minor should take SS 120 and CHEM 124 or CHEM 127, and have credit for MATH 119 or higher to fulfill the prerequisites for the required courses in the minor. Depending on chosen elective courses in the minor additional prerequisites may apply. This minor is not open to students in the Earth Sciences' Geology concentration. For more information about the Geology concentration, please see the Earth Sciences program in the Natural Resources Management and Environmental Sciences Department (p. 117).

Physics Minor

The Physics Minor provides students with the opportunity to build on their introductory physics courses with a coordinated set of electives based on interests and career objectives selected in consultation with a physics advisor.

Students may earn a minor in Physics by completing a course of study consisting of 24 units in physics and astronomy, of which 12 units must be upper division, and no more than 4 units may be from astronomy courses.

BA Physics

Program Learning Objectives

1. Demonstrate a good understanding of both the theoretical concepts and mathematical techniques of the major fields of physics: classical mechanics, electromagnetism, thermodynamics, and quantum physics.
2. Work safely with modern laboratory equipment to carry out measurements and analyze data.
3. Use computers to perform numerical computations, to simulate physical phenomena, and to collect and analyze data in the laboratory.
4. Communicate effectively, both orally and in writing.
5. Move successfully into graduate school or a career in teaching or industry.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major courses with a lab component may be selected as credit/no credit.¹

Note: Students intending to double major must consult the Physics department chair, preferably prior to sophomore year.

MAJOR COURSES

PHYS 141	General Physics I	4
PHYS 142	General Physics II (B1 & B3) ^{1,2}	4
PHYS 143	General Physics III ¹	4
PHYS 206	Electronics and Instrumentation ¹	4
or PHYS 202	Physics on the Computer	
PHYS 211	Modern Physics I	4
PHYS 212	Modern Physics II	4
PHYS 301	Thermal Physics I	4
PHYS 305	Classical Mechanics I (Upper-Division B) ²	4
PHYS 320	Methods of Theoretical Physics I	4
PHYS 405	Quantum Mechanics I	4
PHYS 408	Electromagnetic Fields and Waves I	4
PHYS 461	Senior Project I	2
MATH 141	Calculus I (B4) ²	4
MATH 142	Calculus II (GE Electives) ²	4
MATH 143	Calculus III	4
MATH 206	Linear Algebra I	4
MATH 241	Calculus IV	4
MATH 242	Differential Equations I	4

Approved Electives

Select from the following: 22

Laboratory ElectivesSelect one from the following: ^{1,3}

ASTR 444	Observational Astronomy	
PHYS 323	Optics	
PHYS 340	Quantum Physics Laboratory I	
PHYS 341	Quantum Physics Laboratory II	
PHYS 357	Advanced Instrumentation in Experimental Physics	
PHYS 422	Polymer Electronics Laboratory	
PHYS 423	Advanced Optics	
PHYS 426	Solid State Physics Laboratory	
PHYS 428	Nonlinear Dynamical Systems	

Technical ElectivesSelect 14 units from the following: ^{1,4,5}Any 300-400 level courses with PHYS, ASTR, or GEOL prefix. ⁶

OR one of the following:

HIST 350	The Scientific Revolution, c. 1500-1800	
PHIL 321	Philosophy of Science	
PHIL 323	Ethics, Science and Technology	
PHIL 421	Philosophy of Space, Time and Matter	

Breadth Electives

Select 7 units from any 300-400 level course or PHYS 100, PHYS 220.

GENERAL EDUCATION (GE)

(See GE program requirements below.) 56

FREE ELECTIVESFree Electives ^{7,8} 32**Total units** 180¹ Major courses with lab component may not be taken as CR/NC grading:

PHYS 142, PHYS 143, PHYS 206, PHYS 323, PHYS 340, PHYS 341, PHYS 342, PHYS 357, PHYS 422, PHYS 423, PHYS 426, PHYS 428, ASTR 444.

² Required in Major or Support; also satisfies General Education (GE) requirement.³ Units in excess of 1 unit will count towards Technical Elective units.⁴ Excess units will count towards Breadth Elective units.⁵ Total combined elective credit in PHYS 400, PHYS 404, ASTR 400, ASTR 404, GEOL 400, and GEOL 404 limited to 8 units, with a maximum of 2 units per quarter.⁶ PHYS 321 is recommended.⁷ CHEM 124 and CHEM 125 are recommended.⁸ At least 8 units must be upper-division (300-400 level).**General Education (GE) Requirements**

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A**English Language Communication and Critical Thinking**

A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4

Area B**Scientific Inquiry and Quantitative Reasoning**

B1	Physical Science (4 units in Major) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0

Upper-Division B (4 units in Major) ¹ 0**Area C****Arts and Humanities**

Lower-division courses in Area C must come from three different subject prefixes.

C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4

Lower-Division C Elective - Select a course from either C1 or C2 4

Upper-Division C 4

Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
	Upper-Division D	4
Area E	Lifelong Learning and Self-Development	
	Lower-Division E	4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		56

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

BS Physics

Program Learning Objectives

1. Demonstrate a good understanding of both the theoretical concepts and mathematical techniques of the major fields of physics: classical mechanics, electromagnetism, thermodynamics, and quantum physics.
2. Work safely with modern laboratory equipment to carry out measurements and analyze data.
3. Use computers to perform numerical computations, to simulate physical phenomena, and to collect and analyze data in the laboratory.
4. Communicate effectively, both orally and in writing.
5. Move successfully into graduate school or industry.

Degree Requirements and Curriculum

In addition to the program requirements on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major course with a lab component may be selected as credit/no credit.¹

Note: Students intending to double major must consult the physics department chair, preferably prior to sophomore year.

MAJOR COURSES

PHYS 141	General Physics I	4
PHYS 142	General Physics II (B1 & B3) ^{1,2}	4
PHYS 143	General Physics III ¹	4
PHYS 202	Physics on the Computer	4

PHYS 206	Electronics and Instrumentation ¹	4
PHYS 211	Modern Physics I	4
PHYS 212	Modern Physics II	4
PHYS 301	Thermal Physics I	4
PHYS 305	Classical Mechanics I (Upper-Division B) ²	4
PHYS 320	Methods of Theoretical Physics I	4
PHYS 321	Methods of Theoretical Physics II	4
PHYS 340	Quantum Physics Laboratory I ¹	2
PHYS 341	Quantum Physics Laboratory II ¹	2
PHYS 405	Quantum Mechanics I	4
PHYS 408	Electromagnetic Fields and Waves I	4
PHYS 461	Senior Project I	2
PHYS 462	Senior Project II	2
CHEM 124	General Chemistry for Physical Science and Engineering I	4
CHEM 125	General Chemistry for Physical Science and Engineering II	4
MATH 141	Calculus I (B4) ²	4
MATH 142	Calculus II (GE Electives) ²	4
MATH 143	Calculus III	4
MATH 206	Linear Algebra I	4
MATH 241	Calculus IV	4
MATH 242	Differential Equations I	4

Technical Electives

Select from the following: 20

Physics Electives^{1, 3, 4, 5, 6}

Select 11 units from the following:

Any 300-400 level PHYS course or ASTR 444;

And two courses must be labs selected from:

ASTR 444 Observational Astronomy

PHYS 323 Optics

PHYS 342 Quantum Physics Laboratory III

PHYS 357 Advanced Instrumentation in Experimental Physics

PHYS 422 Polymer Electronics Laboratory

PHYS 423 Advanced Optics

PHYS 426 Solid State Physics Laboratory

PHYS 428 Nonlinear Dynamical Systems

Breadth Electives^{1, 3, 4, 5}

Select 9 units from the following:

Any 300-400 level PHYS, ASTR, GEOL, MATH, STAT, DATA or CSC, or PHYS 100, PHYS 220, CSC 101, CSC 231, CSC 234, CSC 235 (excludes ASTR 324).

GENERAL EDUCATION (GE)

(See GE program requirements below.)

56

FREE ELECTIVES

Free Electives⁷

12

Total units

180

¹ Major courses with lab component may not be taken as CR/NC grading:
PHYS 142, PHYS 143, PHYS 206, PHYS 323, PHYS 340, PHYS 341, PHYS 342, PHYS 343, or ASTR 444.

² Required in Major or Support; also satisfies General Education (GE) requirement.

³ For students anticipating an industrial career PHYS 323, PHYS 357, PHYS 423, PHYS 425, PHYS 426, and PHYS 427 are suggested.

⁴ For students anticipating graduate work in physics, PHYS 306, PHYS 401, PHYS 406, PHYS 409, and MATH 410 are suggested. PHYS 357 is suggested for students who anticipate becoming experimental physicists.

⁵ Total combined elective credit in PHYS 400, PHYS 404, ASTR 400, ASTR 404, GEOL 400, and GEOL 404 limited to 8 units, with a maximum of 2 units per quarter.

⁶ Excess units will count towards Breadth Elective units.

⁷ At least 9 units must be upper-division (300-400 level).

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Major) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4

Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹		4
Total units		56

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Astronomy Minor

Lower-Division		
PHYS 142	General Physics II ¹	4
PHYS 143	General Physics III ¹	4
PHYS 211	Modern Physics I ¹	4
Upper-Division		12-13
Select the following four courses:		
ASTR 301	Planetary Systems ¹	
ASTR 302	Stars and Galaxies ¹	
ASTR 326	Cosmology	
ASTR 444	Observational Astronomy	
Or select three of the above ASTR courses and at least 3 units from the following electives:		
AERO 351	Introduction to Orbital Mechanics ¹	
ASTR 470	Selected Advanced Topics	
ASTR 471	Selected Advanced Laboratory	
GEOL 415	Structural Geology ¹	
PHYS 305	Classical Mechanics I ¹	
PHYS 313	Introduction to Atmospheric Physics ¹	
PHYS 318	Special Theory of Relativity	
PHYS 323	Optics ¹	
PHYS 410	Physics of Solid Earth ¹	
PHYS 418	Introduction to General Relativity	
Total units		24-25

¹ Requires additional prerequisites.

Geology Minor

Required Courses		
ERSC 223	Rocks and Minerals ¹	4
GEOL 201	Physical Geology ¹	3
GEOL 241	Physical Geology Laboratory ¹	1
GEOL 415	Structural Geology	4
Approved Electives		
Select from the following:		
ERSC 423	Geomorphology ¹	12
GEOL 305	Seismology and Earth Structure ¹	

GEOL 309	Igneous Petrology
GEOL 311	Metamorphic Petrology
GEOL 330	Principles of Stratigraphy
GEOL 400	Special Problems for Advanced Undergraduates ²
GEOL 404	Research Experience for Advanced Undergraduates ²
GEOL 416	Field-Geology Methods
GEOL 417	Geologic Mapping
GEOL 420	Applied Geophysics ¹

Total units **24**

¹ Course requires additional prerequisites.

² Total credit in GEOL 400 and GEOL 404 limited to 2 units.

Physics Minor

Required Courses

PHYS 143	General Physics III ¹	4
PHYS 211	Modern Physics I ¹	4

Physics/Astronomy Electives ^{2,3} **16**

Any upper division PHYS course (300-400 level)

ASTR 301	Planetary Systems ¹
ASTR 302	Stars and Galaxies ¹
ASTR 326	Cosmology ¹
ASTR 444	Observational Astronomy
PHYS 212	Modern Physics II
Must include at least one of the following courses:	
PHYS 301	Thermal Physics I
PHYS 305	Classical Mechanics I ¹
PHYS 323	Optics ¹
PHYS 405	Quantum Mechanics I ¹
PHYS 408	Electromagnetic Fields and Waves I ¹
PHYS 425	Solid State Physics ¹

Total units **24**

¹ Courses requires additional MATH and PHYS prerequisites.

² Total credit in PHYS 400 and PHYS 404 limited to 4 units.

³ Total credit in ASTR courses limited to 4 units.

School of Education

Education Bldg. (02), Room 120
805.756.2126
<https://soe.calpoly.edu>
soe@calpoly.edu

Director: J. Kevin Taylor

Academic Programs

Program name	Program type
Curriculum and Instruction	MA
Educational Leadership and Administration	MA
Equity in Education	Minor
Higher Education Counseling and Student Affairs	MS
Special Education	MS

Vision, Mission and Programs

Vision: The School of Education programs support the development of qualified, competent, and caring education professionals who prepare a diverse student population to become active and thoughtful participants in a democratic society.

Mission: The School of Education leads the campus in an all-university approach to preparing education professionals. These professionals create, assess and modify environments, practices, and policies to foster the achievement of each and every learner; they strive for equity in schools and society; and they are committed to inquiry and professional growth for themselves and the advancement of P-20 education.

School of Education faculty model leadership in their teaching, scholarship, and service through a grounded, reflective *learn-by-doing* approach and through sustained collaborations with their education partners: P-12 schools, families, community colleges, universities, and local, state, and national agencies.

Learning Outcomes: All candidates who complete a credential or master's degree in the School of Education will:

- *Be Qualified, Competent, and Caring Professional Educators*
- *Integrate Principles and Practices of Professional Fields to Support Student Learning*
- *Engage in Cross-Disciplinary and Collaborative Practices*
- *Demonstrate Authentic Assessment Practices Designed for Student Success, Individual Growth, and Program Improvement*
- *Effect Sustainable Communities in a Multicultural Environment*
- *Engage in Professional Practices*

Programs: The School offers a wide variety of courses and programs leading to careers in education. Common to all programs is a commitment to excellence, to partnerships and collaboration, and to preparation for future educational challenges. As the state's population grows, enrollments in grades P–12 increase and with them the demand for well-prepared teachers, and for specialists in administration, special education, and higher education.

To meet the need for excellence in the field, the School seeks talented, creative students who are committed to a long-term career in education and to the improvement of educational processes and institutions.

The School offers programs that lead to a preliminary Educational Specialist credential in Multiple Subject or Single Subject teaching, in Administrative Services or as an Education Specialist or Agriculture Specialist. Supplementary and subject matter authorizations are available in a variety of subject areas.

The School offers four master's degrees; see the Graduate (p. 415) section for more information.

Stressing the "learn by doing" philosophy, the School provides opportunities for extensive on-site observation, tutoring, and fieldwork in educational settings. Cal Poly maintains cooperative relations with surrounding school districts and area educational agencies. Within our service area, teacher candidates and master's students can learn in cross-cultural, city and rural settings.

Undergraduate Program Equity in Education Minor

The Equity in Education Minor is an interdisciplinary course of study that introduces students to how cognition, social-emotional development, culture, and policy impact teaching and learning. The minor is meant to be flexible and allow students from all majors to deepen their knowledge about teaching and learning and the role of education for advancing social justice and equity. The minor is especially valuable for students who are interested in careers in education, including K-12 public schooling, higher education/student affairs, non-profit organizations, and educational leadership. Interested students should consult with an Equity in Education Minor advisor. The Equity in Education Minor is not open to Liberal Studies majors. Students preparing for the minor should take PSY 201 or 202 to fulfill the prerequisites for the required courses in the minor.

Minor Requirements (p. 418)

Teacher Education

Education Bldg. (02), Room 120
805.756.2126

The following credential programs are accredited by the California Commission on Teacher Credentialing (CTC) to prepare candidates and recommend for these credentials.

Teaching Credential Programs

- Agriculture Specialist
- Multiple Subject
- Single Subject: Agriculture
- Single Subject: Biological Science
- Single Subject: Chemistry
- Single Subject: English
- Single Subject: Geosciences
- Single Subject: Mathematics
- Single Subject: Physics
- Single Subject: Social Science
- Single Subject: World Languages – French
- Single Subject: World Languages – Spanish
- Bilingual Authorization: Spanish
- Education Specialist: Mild/Moderate Disabilities (see Graduate section in School of Education)

Credential programs consist of coursework and field experiences, including the clinical practice known as student teaching, that are required to obtain a preliminary teaching credential in California. Coursework in credential programs in the state of California is required to fit within one year of full-time study. In some instances, candidates are able to take prerequisite courses and enter a credential program prior to the completion of their undergraduate degree.

Application deadlines are established for each specific program. Detailed information about application deadlines and other requirements is available on the School of Education website at <https://soe.calpoly.edu>.

Multiple Subject Teaching

A multiple subject teaching credential permits someone to teach all subjects in a self-contained classroom up to the 8th grade, and Cal Poly's Multiple Subject Teacher Preparation (MSTEP) Program prepares students to earn this credential. Entry to MSTEP requires completion of an undergraduate degree, subject matter coursework and prerequisite coursework, which can be taken either as part of an undergraduate degree or at the post-baccalaureate level. Some prerequisite courses have specific requirements for enrollment (e.g. senior or graduate standing); hence, early advising is critical and interested individuals are encouraged to contact the School of Education Credential Office for this purpose.

Multiple subject candidates must demonstrate subject matter competency by completing an approved subject matter waiver program in elementary education or provide evidence of passing the Multiple Subject California Subject Examinations for Teachers (CSET). Demonstration of subject matter competency must be completed before candidates begin the credential program. During the MSTEP Program candidates take courses in methods of teaching specific subjects, and they engage in clinical practice (student teaching) in elementary school classrooms and participate in seminar courses designed to bridge university- and school-based learning experiences. Special attention is paid to learning how to teach young students whose first language is not English, so a credential earned from the MSTEP Program is designated as English learner authorized. Detailed information about steps to apply to the MSTEP Program and state requirements for a Multiple Subject Teaching Credential can be found on the School of Education website at <https://soe.calpoly.edu>.

Single Subject Teaching

The Single Subject Teaching Credential is for candidates who wish to teach a specific content area at the secondary level. Single subject candidates must demonstrate subject matter competency by completing an approved subject matter course work program in that subject matter area or provide evidence of passing the appropriate California Subject Examinations for Teachers (CSET) specialty area test(s). Demonstration of subject matter competency must be completed before candidates begin the credential program.

Candidates for the Single Subject teaching credential in Agriculture or the Agricultural Specialist credential complete their preparation program through the Agricultural Education and Communication Department at Cal Poly and should communicate with the department credential advisor for further information or advisement (Dr. Ben Swan, at 805-756-2401 or bswan@calpoly.edu).

NOTE: Credential requirements are subject to change. Please check with program advisors for up-to-date information.

Admission Requirements

Details concerning specific requirements are available from the appropriate advisor, the advisement handbook, or at <https://soe.calpoly.edu>.

The requirements for admission to Cal Poly to pursue a Multiple Subject credential differ slightly from those for the Single Subject credential. All applicants must first apply for admission to graduate studies in Education at Cal Poly by completing an application at <https://calstate.edu/apply> (<https://calstate.edu/apply/>).

Preliminary Credential

California has a two-tiered credentialing system. Initial credentialing to be a teacher requires earning a *preliminary* credential. Cal Poly programs provide a route to this credential, and it allows a person to be hired as a classroom teacher in public schools in California. Contact the School of Education Credential Office for program-specific admission requirements, which include obtaining a Certificate of Clearance.

To make successful progress through a credential program, teacher candidates must maintain a B average in all professional education courses (MSTEP Program) or each a B or better in all professional education courses (Single Subject Program). Candidates must also complete additional application steps at specified transition points. Check with the pertinent credential program advisor, handbook, and/or website (see <https://soe.calpoly.edu>) to determine all requirements to be completed for a specific credential program. A teacher candidate must provide evidence of completion of all state- and program-mandated requirements and have that verified by the SOE Credential Office in order to be recommended for a preliminary credential.

Clear Credential

The second tier of teacher credentialing in California is the *clear* credential. California Senate Bill 2042 transferred the recommending of a clear teaching credential to school districts via Induction Programs. Graduates obtaining their preliminary credential from Cal Poly should consult the school district employing them for information about Induction Programs and obtaining a clear credential.

Supplementary and Subject Matter Authorizations

A basic teaching credential can be enhanced by adding supplementary and/or subject matter authorizations. These authorizations allow teachers to teach additional subjects without completing a full professional preparation program for that credential and we encourage candidates to consider whether it is possible to add these as part of completing their preliminary credential. To earn an authorization, students must complete a specific number of course credits in the new content area. See www.ctc.ca.gov (<http://www.ctc.ca.gov>) for specific information on these authorizations and consult with your credential advisor to plan your coursework in order to meet the necessary requirements for any additional authorizations desired.

Graduate Programs Credential Programs

Credential programs are accredited by the California Commission on Teacher Credentialing (CTC) to prepare candidates and recommend for these credentials.

Admission

Details concerning specific requirements are available from the appropriate advisor, the advisement handbook, or at <https://soe.calpoly.edu>.

Admission into programs leading to licensure and credentialing does not guarantee that students will obtain a license or credential. Licensure and credentialing requirements are set by agencies that are not controlled by or affiliated with the CSU and requirements can change at any time. For example, licensure or credentialing requirements can include evidence of the right to work in the United States (e.g., social security number or taxpayer identification number) or successfully passing a criminal background check. Students are responsible for determining whether they can meet licensure or credentialing requirements. The CSU will not refund tuition, fees, or any associated costs, to students who determine after admission that they cannot meet licensure or credentialing requirements.

Administrative Services

- Preliminary
- Administrative Intern

The Educational Leadership and Administration Program offers the California Preliminary Administrative Services Credential for eligible candidates who hold a valid CLEAR California teaching or service credential and who have completed five (5) years of full-time teaching/service with this credential. The Administrative Internship Program is an option for those who are requested by their employing district to concurrently serve in an administrative position while completing the requirements for the California Preliminary Administrative Services Credential.

California Preliminary Administrative Services

This program emphasizes a comprehensive knowledge of K-12 school administration including applied theory, administration and leadership, schools in contemporary society, and effective management related to educational outcomes. As a basis for credential recommendation, the preliminary program emphasizes applied theory with actual experience in fieldwork assignments and an evaluation of administrative competence.

The credential program requires 58 quarter units, all of which are applicable to the MA in Educational Leadership and Administration. The Preliminary Administrative Services Credential authorizes service in any administrative position at any grade level (K-12) in California.

Administrative Intern

This program supports districts that have an immediate need for an administrator and are without suitable candidates. Candidates earn the Preliminary Administrative Services Credential as they serve in an administrative capacity within a one year time frame.

Education Specialist (Mild/Moderate Disabilities)

- Preliminary

This credential authorizes the holder to teach in the following settings: special day classes, special schools, home/hospital settings, correctional facilities, nonpublic schools and agencies, and resource rooms. Education Specialist candidates must demonstrate subject matter competency by completing an approved subject matter waiver program in elementary education or provide evidence of passing the Multiple Subject

California Subject Examinations for Teachers (CSET). Demonstration of subject matter competency must be completed before candidates begin the credential program.

The program is designed to prepare candidates to work with pupils with mild/moderate disabilities, which include specific learning disabilities; mild to moderate intellectual disabilities; attention deficit and attention deficit and hyperactivity disorders; and serious emotional disturbances, and authorizes serving individuals in K-12, and in classes organized for adults through age 22.

A full-time candidate may complete the requirements in one calendar year. The Education Specialist program is heavily field based and requires 62 quarter units, most of which are applicable to the MS Special Education.

A Multiple or Single Subject teaching credential is *not* required for admission. However, some coursework taken for the Single Subject or Multiple Subject Credential program may meet prerequisite course requirements for the Education Specialist Credential program.

MA Curriculum and Instruction

General Characteristics

A Master of Arts in Curriculum and Instruction offers the opportunity for PreK-16 educators to advance their knowledge and practice in working with ambitious curricula and complex instructional approaches to foster students' development of deep understanding and multiple literacies for the 21st century.

Candidates in the program will be required to have at least two years of teaching experience or a teaching credential so that they have developed the skills necessary to lead instruction and can build more advanced knowledge and skills. This program will be offered in a classroom-based or hybrid format, with all core classes being offered online to enable the working educator to manage full-time employment and coursework. Similarly, all courses are designed with practical readings and activities to enhance relevance to working classroom teachers.

Admission

Admissions for the MA Curriculum & Instruction degree minimally requires the following:

- 2 years of PreK-16 classroom teaching experience/or a teaching credential
- 2.5 cumulative GPA
- 3 Letters of recommendation
- Bachelor's degree from a regionally accredited college/university

Program of Study

Completion of the program will place candidates in a position to take on curriculum design, instructional leadership roles, and/or lead professional development opportunities in their programs, schools, or districts. In addition, it will lay the groundwork for graduate study at the doctoral level.

In the program, candidates will be part of a cohort and have collaborative learning opportunities to deepen their understanding of effective, evidence-based teaching practice with the ambitious standards in K-16 education today.

Advising

Students must meet with their advisor on a regular basis to ensure a smooth progression toward the completion of the degree.

Formal Study Plan

The candidate is required to file a Formal Study Plan prior to the completion of 12 units in the program. This plan is completed in consultation with the program advisor and helps the candidate to schedule courses in a sequence that results in timely completion of the program. A Formal Study Plan is required prior to Advancement to Candidacy.

Advancement to Candidacy

- Advancement to master's degree candidacy requires:
- Completing at least 24 units of program-required courses in residence
- Meeting the university Graduation Writing Requirement
- Receiving formal recommendation of the graduate faculty
- Earning a GPA of 3.0 in all coursework included on the formal program of study, and in all coursework completed subsequent to admission to post-baccalaureate standing; and
- Meeting all conditions of admission.

Culminating Experience

The culminating project involves the design and conduct of research in a classroom in response to an authentic question about teaching practice. Teachers engage in elements of this type of activity on a daily basis as they try out ideas to support the learning of students. In this program, such activity will be in a more formal and systematic way as an action research project, with the result that each candidate will be contributing to our knowledge base about what works in classrooms to support desired student development. Students must receive a minimum score of 80 percent to pass the project. If a student fails to receive a passing mark, s/he will be permitted to rewrite and/or revise the project one additional time.

MA Educational Leadership and Administration

General Characteristics

The Master of Arts in in Educational Leadership and Administration Program (ELAP) allows students to complete their Master's degree in 16 weekends (Friday evenings and all day Saturdays) and one summer session during an 11-month period. It is possible for qualified students to also complete the requirements for the Preliminary Administrative Services Credential.

Admission

- Admission to ELAP minimally requires the following:
- 2.5 cumulative GPA
- 3 Letters of recommendation
- Bachelor's degree from a regionally accredited college/university
- Autobiographical statement
- An in-person interview or video testimonial

Program of Study

The MA in Educational Leadership and Administration is a rigorous, practical program designed for those seeking leadership positions in K-12 schools, school districts, and educationally related organizations.

Students are admitted once each year in the fall, and they progress through the program as a cohort. The program emphasizes applied theories of educational leadership, mastery of practical skills required for effective school administration and competence in research methods necessary for understanding and assessing learning organizations.

Advising

The candidate must meet with their advisor on a regular basis. Continued consultation with the advisor assists a smooth progression toward completion of the degree.

Formal Study Plan

The candidate is required to file a Formal Study Plan prior to completion of 12 units in their program. This plan is completed in consultation with the program advisor and helps the candidate to schedule courses in a sequence that results in timely completion of the program. A Formal Study Plan is required prior to Advancement to Candidacy.

Advancement to Candidacy

- Advancement to master's degree candidacy requires:
- Completing at least 24 units of program-required courses in residence
- Meeting the university Graduation Writing Requirement
- Receiving formal recommendation of the graduate faculty
- Earning a GPA of 3.0 in all coursework included on the formal program of study, and in all coursework completed subsequent to admission to post-baccalaureate standing; and
- Meeting all conditions of admission.

Culminating Experience

The culminating experience is a Comprehensive Examination consisting of questions drawn from material presented in each ELAP course (fieldwork is excluded). Students must receive a minimum score of 80 percent to pass the exam. If a candidate fails to receive a passing mark, s/he will be permitted to retake the Exit Examination one additional time. Students will have three hours to complete the exam.

MS Higher Education Counseling and Student Affairs

General Characteristics

The Master of Science in Higher Education and Counseling and Student Affairs (HECSA) program prepares students for careers as student affairs professionals and counselors in higher education settings.

Admission

Admission to the MS in Higher Education Counseling and Student Affairs degree minimally requires the following:

- 2.5 cumulative GPA
- 3 Letters of recommendation
- Bachelor's degree from a regionally accredited college/university
- Auto-biographical statement
- An interview with program faculty

Program of Study

Students attending full-time complete the 72-unit program in two to three years. Major strengths of the program are its focus on social justice and its extensive fieldwork experience, which provides

students with professional work experience. Students come from a wide variety of educational and professional backgrounds with no specific undergraduate degree required. Although many students have backgrounds in Psychology and Social Sciences, others have come from Agriculture, Business, Mathematics, and the natural sciences.

Advising

The candidate must meet with their advisor on a regular basis. Continued consultation with the advisor assists a smooth progression toward completion of the degree.

Formal Study Plan

The student is required to file a Formal Study Plan prior to completion of 12 units in the program. This plan is completed in consultation with the program coordinator and helps the candidate to schedule courses in a sequence that results in timely completion of the program. A Formal Study Plan is required prior to advancement to candidacy.

Advancement to Candidacy

Advancement to master's degree candidacy requires:

- Completing at least 24 units of program-required courses in residence
- Meeting the university Graduation Writing Requirement
- Receiving formal recommendation of the graduate faculty
- Earning a GPA of 3.0 in all coursework included on the formal program of study, and in all coursework completed after admission to post baccalaureate standing, and
- Meeting all conditions of admission.

Culminating Experience

The culminating experience is a professional portfolio project conducted throughout the final year of the program and presented orally during the student's final quarter in the program as a deliverable within the EDUC 573 Fieldwork course. Students reflect on all past coursework and synthesize this into a professional development plan. The portfolio includes a current professional resume, a professional statement of practice/scholarship including their approach to diversity, equity, and inclusion, reflection statements and key assignment artifacts for each of the program learning outcomes, fieldwork feedback and reflection, and a professional cover letter.

MS Special Education

General Characteristics

The Master of Science in Special Education is designed to develop the knowledge and skills that will contribute to your success as a special day class teacher, resource specialist, inclusion specialist, autism specialist, or clinician. Approved units for the master's degree program directly apply towards the requirements for a Preliminary Education Specialist Credential (Special Education) Mild/Moderate Disabilities. It is possible for qualified students to complete the requirements for the Specialist Credential while pursuing the requirements for the master's degree.

Admission

Admission to the MS in Special Education degree minimally requires the following:

- 2.5 cumulative GPA
- 3 Letters of recommendation
- Bachelor's degree from a regionally accredited college/university

- Auto-biographical statement
- An interview with program faculty

Program of Study

The MS in Special Education (SPED) is a 45-unit, cohort-based program beginning each fall quarter. Cohorts are limited each year to 20 students. The MS in Special Education can be earned in three quarters of full-time enrollment, although there is an option to complete the program in two years. The MS SPED allows students to acquire depth in a "disability area," and understand how action research can improve and enhance a teacher's classroom performance.

Advising

The candidate must meet with their advisor on a regular basis. Continued consultation with the advisor assists a smooth progression toward completion of the degree.

Formal Study Plan

The candidate is required to file a Formal Study Plan prior to completion of 12 units in their program. This plan is completed in consultation with the program advisor and helps the candidate to schedule courses in a sequence that results in timely completion of the program. A Formal Study Plan is required prior to Advancement to Candidacy.

Advancement to Candidacy

Advancement to master's degree candidacy requires:

- Completing at least 24 units of program-required courses in residence
- Meeting the university Graduation Writing Requirement
- Receiving formal recommendation of the graduate faculty
- Earning a GPA of 3.0 in all coursework included on the formal program of study, and in all coursework completed after admission to post baccalaureate standing; and
- Meeting all conditions of admission.

Culminating Experience

The culminating experience is a project consisting of a year-long applied research study in a school placement and submission of a final research paper. Drawing from coursework content on applied behavior analysis and research and evidence-based practices in special education, students design, propose, implement, evaluate, and disseminate a research study intended to address a targeted area of need for a school-aged individual with a mild or moderate disability. Students are evaluated on a final research paper that they submit by the 8th week of the quarter in the spring.

Equity in Education Minor

Required Courses

EDUC/CD 207	Children's Learning and Development in Educational Settings	4
or PSY 256	Developmental Psychology	
EDUC 300	Historical, Philosophical, and Social Foundations of Public Education	3-4
or SCM 300	Early Field Experience	
ES/HNRS 112	Race, Culture, and Politics in the United States	4

Approved Electives

Select from the following (8-9 units must be at the 300-400 level):¹ 12-13

Lower-Division Courses	
ES 253	Introduction to American Indian Studies
ES 254	Introduction to African American Studies
ES 255	Introduction to Latino/a/x Studies
ES 256	Introduction to Asian American Studies
HLTH 250	Healthy Living
LS 214	Constitutional Issues in the History of U.S. and California Education
LS/ENGL 255	Children's Literature in a Diverse Society
SCM 220	Seminar for Science and Math Tutors ²
SCM 230	Seminar for Learning Assistants ²
SOC 111	Social Problems
Upper-Division Courses	
AGED 303	Agricultural Youth Leadership Development
AGED 410	Computer Applications in Agricultural Education
EDUC 403	Developing Teachers of Color
EDUC 405	Social, Historical and Cultural Influences on Latino/a Students in Education ²
EDUC 427	Theories, Methods, and Assessment of First and Second Language Acquisition in Schools
EDUC 428	Foundations of K-8 Literacy Teaching and Learning in Schools with Diverse Populations
ENGL 361	Reading Instruction for the Teaching of Young Adult Literature
ENGL 368	Theory and Practice of Peer-to-Peer Writing Instruction
ES 350/ HNRS 353/ WGQS 350	Gender, Race, Culture, Science & Technology
ES 380	Critical Race Theory
ES 381	The Social Construction of Whiteness
HLTH 443	Health Education for Teachers
KINE 310	Concepts and Applications in Elementary Physical Education
LS 350	Identity and Equity in American Schools
MU 360	Music for Classroom Teachers ²
PHYS 330	Teaching Physics ²
PSY 357	Cognition
SCM 302/ ENGR 322/ HNRS 302	The Learn By Doing Lab Teaching Practicum
SPED 420	Understanding Special Education

STAT 410	Statistics Education: Pedagogy, Content, Technology, and Assessment ²
TH 380	Theatre for Young Audiences ²
WLC 312	Humanities in Chicano/a Culture
WLC 370	Language, Technology and Society

Total units 24

¹ At least half of the units completed for the minor must be upper-division (300-400 level).

² Course requires additional prerequisites.

MA Curriculum and Instruction Program Learning Objectives

1. Action Research: Design and implement an action research project on a key issue in curriculum and instruction in an effort to bring change to their teaching practice and promote meaningful outcomes for students.
2. Advanced Practices & Content Knowledge: Understand and apply perspectives, principles, and practices for designing integrated curriculum and implementing advanced instructional strategies to foster conceptual development and disciplinary ways of knowing in diverse classrooms.
3. Multiple Literacies: Understand and analyze different language and literacy theories that promote multimodal instruction and apply theories through design and critique of appropriate evidence-based instructional practices and activities for students that are most appropriate for integrated instructional situations in diverse classrooms.
4. Social Justice Teaching: Understand and apply social justice theories, pedagogies, and strategies to provide an equitable education for a diverse student body by integrating principles of critical pedagogy and culturally responsive teaching in and out of the classroom.
5. Change Agent: Reflect critically on educational research and practice to identify ways to shape change through advancing pedagogical practices and principles of social justice at the school, community, and societal level.

Required Courses

EDUC 502	Advancing Pedagogical Practices with Technology	4
EDUC 522	Advanced Classroom Pedagogy	4
EDUC 523	Integrative Approaches to Curriculum	4
EDUC 531	Social Justice in Education: In & Out of the Classroom	4
EDUC 532	Advanced Field Experiences in Education	2
EDUC 586	Introduction to Inquiry in Education	4
EDUC 588	Education, Culture, and Learning	4
EDUC 589	Educational Research Methods	4
EDUC 598	Action Research Project in Education	3

Approved Electives

Select from the following: ¹		12
EDUC 412	Access to Learning in a Pluralistic Society	

EDUC 416	Literacy, Language, and Culture in Content Area Classrooms	
EDUC 429	Learning to Teach K-8 Literacy in Schools with Diverse Populations	
EDUC 435	Learning to Teach K-8 Mathematics with Diverse Populations	
EDUC 457	Multiple Subject Clinical Practice Seminar III	
EDUC 521	Literacy Across the Curriculum	
EDUC 528	Advanced Classroom Pedagogy in English Language Arts	
EDUC 535	Advanced Classroom Pedagogy in Mathematics Education	
EDUC 587	Educational Foundations and Current Issues	
Total units		45

¹ Other elective courses may be chosen in consultation with advisor from a program-generated list of acceptable courses in specific disciplines.

MA Educational Leadership and Administration

Program Learning Objectives

1. Development and Implementation of a Shared Vision: Education leaders facilitate the development and implementation of a shared vision of learning and growth of all students.
2. Instructional Leadership: Education leaders shape a collaborative culture of teaching and learning informed by professional standards and focused on student and professional growth.
3. Management and Learning Environment: Education leaders manage the organization to cultivate a safe and productive learning and working environment.
4. Family and Community Engagement: Education leaders collaborate with families and other stakeholders to address diverse student and community interests and mobilize community resources.
5. Ethics and Integrity: Education leaders make decisions, model, and behave in ways that demonstrate professionalism, ethics, integrity, justice, and equity and hold staff to the same standard.
6. External Context and Policy: Education leaders influence political, social, economic, legal and cultural contexts affecting education to improve education policies and practices.

EDUC 510	Education Finance and Resource Allocation	4
EDUC 511	Educational Law and Governance	4
EDUC 512	Education Organization and Management	4
EDUC 513	Education Planning and Decision Making	4
EDUC 515	Educational Program Management and Evaluation	4
EDUC 516	Educational Personnel Supervision and Evaluation	4
EDUC 517	Managing Action Research Communities	2

EDUC 519	Professional e-Portfolios for Educational Leaders	1
EDUC 542	Administration of Special Programs and Services	4
EDUC 586	Introduction to Inquiry in Education	4
EDUC 587	Educational Foundations and Current Issues	4
EDUC 588	Education, Culture, and Learning	4
EDUC 589	Educational Research Methods	4
EDUC 590	Research Application in Education	4
Total units		51

MS Higher Education Counseling and Student Affairs

Program Learning Objectives

1. Explain and evaluate foundational and emerging literature and theories.
2. Demonstrate cognitive complexity, embrace ambiguity, and apply problem solving skills.
3. Effectively integrate and apply appropriate theories, methods, and principles in professional practice.
4. Effectively engage in cross-disciplinary, campus, and community partnerships to effect change.
5. Continuously develop professional skills through ongoing assessment and reflection.
6. Demonstrate ethics, integrity, legality, and leadership.

EDUC 555	Introduction to the Counseling Profession	4
EDUC 556	Multicultural Counseling	4
EDUC 557	Career Counseling	4
EDUC 560	Counseling Theories	4
EDUC 561	Group Counseling	4
EDUC 562	Student Development - Higher Education	4
EDUC 564	Legal and Ethical Issues in Counseling	4
EDUC 565	Counseling Measurement and Assessment	4
EDUC 566	Leadership and Consultation in Counseling	4
EDUC 568	Individual Counseling Techniques	4
EDUC 573	Field Experience in Higher Education Counseling and Student Affairs	12
EDUC 586	Introduction to Inquiry in Education	4
EDUC 587	Educational Foundations and Current Issues	4
EDUC 588	Education, Culture, and Learning	4
EDUC 589	Educational Research Methods	4
EDUC 590	Research Application in Education	4
Total units		72

MS Special Education

Program Learning Objectives

1. Apply understandings of Learner Development, Learning Differences, and Knowledge of Students.
2. Create and maintain classroom routines and environments that promote learning, inclusivity, respect, and health/safety.
3. Demonstrate and apply curricular content knowledge to design and organize effective learning experiences.
4. Select and implement scientifically validated instructional approaches to meet individual learning needs.
5. Collect and analyze assessment data from multiple measures to make data-based decisions about student learning needs, service eligibility, and instructional modifications.
6. Demonstrate professionalism, ethics, legality, collaboration, and continuous growth and reflection.
7. Engage in educational research and inquiry to remain informed of best practices, current research, legislation and debate.

EDUC 532	Advanced Field Experiences in Education	2
EDUC 546	Reading and Language Arts Instruction in Special Education	5
EDUC 550	Assessment Strategies for Special Education	5
EDUC 552	Support and Transition Strategies in Special Education	5
EDUC 554	Behavior Disorders and Positive Behavior Support Strategies	5
EDUC 586	Introduction to Inquiry in Education	4
EDUC 589	Educational Research Methods	4
SPED 545	Mathematics Methods for Students with Disabilities	4
SPED 547	Science and Social Studies Methods for Students with Disabilities	4
SPED 587	Instructional Methods for Learners with Autism	4
SPED 588	Developing Compliant Individualized Education Plans	4
Total units		46

Statistics

Faculty Offices East (25), Room 107D
Phone: 805.756.2709
<https://statistics.calpoly.edu>

Department Chair: Andrew Schaffner

ACADEMIC PROGRAMS

Program name	Program type
Actuarial Preparation	Minor
Cross Disciplinary Studies Minor in Bioinformatics	Minor
Cross Disciplinary Studies Minor in Data Science	Minor
Statistics	BS, Minor

The Statistics Department offers a variety of introductory courses to students majoring in diverse disciplines across the University, in addition to providing a vibrant undergraduate degree program in Statistics for students who want to pursue careers in industry or graduate study in the discipline. The department also offers a minor in Statistics and contributes to a minor program in Actuarial Preparation and two cross-disciplinary studies minor programs: Data Science and Bioinformatics.

Data abound in everyday life, in most academic disciplines, and in many industries. Professionals in many fields need to design studies, collect data, analyze results, and draw sound conclusions. In addition, professional statisticians must apply mathematical underpinnings of the discipline to new problems, use computing skills to organize and manipulate data, and communicate effectively with clients as well as with peers.

Employment prospects for professionals with skills in statistics and data science are very bright. Recent graduates of Cal Poly's program in statistics are working for companies in fields as varied as banking, social media, retail, entertainment, insurance, education, and pharmaceutical development.

Undergraduate Programs BS Statistics

The statistics degree program requires students to develop a strong foundation in mathematics and computer science, as well as experience with a field of application. Coursework in the statistics program can be classified into four areas. Some courses provide mathematical background in probability and theoretical statistics. Others focus on computational thinking and coding skills with software packages. Most courses teach particular statistical methods for various types of data analysis such as regression, experimental design, categorical data analysis, time series techniques, multivariate methods, and survival analysis. Finally, some course specifically develop students' skills with oral and written communication and consulting with clients. Throughout the program students encounter the entire process of conducting statistical investigations, from asking questions and designing studies through drawing conclusions and communicating results. Statistics students repeatedly process and analyze real data from genuine studies and also acquire extensive experience coding, using statistical software, and writing technical reports of their analyses and findings for varied audiences.

Actuarial Preparation Minor

For information regarding the Actuarial Preparation Minor, please see College of Science and Mathematics (p. 360) section.

Cross Disciplinary Studies Minor in Bioinformatics

For information regarding the Cross Disciplinary Studies Minor in Bioinformatics, please see the Biological Sciences (p. 364) section of the catalog.

Cross Disciplinary Studies Minor in Data Science

Through an inter-college collaboration, the Computer Science and Statistics departments offer a cross-disciplinary minor in Data Science – a rapidly evolving discipline that uses elements of statistics and computer science to gather, organize, summarize, and communicate information from a variety of data sources and data types. Job opportunities for data scientists are growing as the availability of data becomes ever abundant via the internet, consumer transactions, sensor arrays, medical records, embedded biometrics, bioinformatics, etc.

The CDSM provides an opportunity for both statistics and computer science students to complement their major training with foundational skills for data science. Statistics majors will acquire essential programming, database, distributed computing, and data mining skills from the Computer Science Department while computer science majors will acquire essential probability, regression modelling, statistical programming, and multivariate analysis skills from the Statistics Department.

Statistics Minor

The statistics minor program allows students from across the University to acquire substantial statistical skills that can be applied in their own disciplines. Please consult the Statistics Department website or the Statistics Department Minor Advisor for admissions requirements for the minor.

BS Statistics

Program Learning Objectives

1. Have good working knowledge of the most commonly used statistical methods, including statistical modeling and omnipresent role of variability, efficient design of studies and construction of effective sampling plans, exploratory data analysis, and formal inference process.
2. Have background in probability, statistical theory, and mathematics, including especially calculus, linear algebra and symbolic and abstract thinking.
3. Be able to synthesize and apply knowledge of common inferential methods, understanding the limitations of procedures and appropriate conclusions.
4. Communicate effectively (written and oral) with skills in collaboration (within and between disciplines) and teamwork, and in organizing and managing projects.
5. Have a good mastery of several standard statistical software packages and facility with data management strategies.

6. Have a focused concentration in an area of application outside the discipline of statistics.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 30) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No course with a STAT prefix may be selected as credit/no credit.

MAJOR COURSES

STAT 150	Introduction to the Discipline of Statistics	2
MATH 141	Calculus I (B4) ¹	4
MATH 142	Calculus II (GE Electives) ¹	4
MATH 143	Calculus III	4
MATH 206	Linear Algebra I	4
MATH 241	Calculus IV	4
STAT 301	Statistics I	4
STAT 302	Statistics II	4
STAT 305	Introduction to Probability and Simulation	4
STAT 323	Design and Analysis of Experiments I	4
STAT 330	Statistical Computing with SAS	4
STAT 331	Statistical Computing with R	4
STAT 334	Applied Linear Models	4
STAT 365	Statistical Communication	2
STAT 425	Probability Theory	4
STAT 426	Estimation and Sampling Theory	4
STAT 427	Mathematical Statistics	4
STAT 466	Senior Project - Statistical Consulting	4

Statistics Electives:

Select from List A below: 12

STAT 405	Applied Probability Models	
STAT 414	Multilevel and Mixed Modeling	
STAT 415	Bayesian Reasoning and Methods	
STAT 416	Statistical Analysis of Time Series	
STAT 417	Survival Analysis Methods	
STAT 418	Categorical Data Analysis	
STAT 419	Applied Multivariate Statistics	
STAT 421	Survey Sampling and Methodology	
STAT 423	Design and Analysis of Experiments II	
STAT 434	Statistical Learning: Methods and Applications	

Select from List B below: 12

Any 400-level STAT course (including those in List A)		
CSC/CPE 202	Data Structures	
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	
CSC 248	Discrete Structures	

CSC 349	Design and Analysis of Algorithms	
CSC 365	Introduction to Database Systems	
CSC 369	Introduction to Distributed Computing	
DATA 301	Introduction to Data Science	
IME 430	Quality Engineering	
ITP 303	Lean Six Sigma Green Belt	
MATH 242	Differential Equations I	
MATH 306	Linear Algebra II	
MATH 334	Combinatorial Math	
MATH 335	Graph Theory	
MATH 406	Linear Algebra III	
MATH 412	Introduction to Analysis I	
MATH 413	Introduction to Analysis II	
MATH 414	Introduction to Analysis III	
MATH 437	Game Theory	
MATH 451	Numerical Analysis I	

SUPPORT COURSES

CSC/CPE 101	Fundamentals of Computer Science	4
MATH 248	Methods of Proof in Mathematics	4
Approved Support Electives ²		8

GENERAL EDUCATION (GE)

(See GE program requirements below.) 64

FREE ELECTIVES

Free Electives	8
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Total units 180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² Consultation with faculty advisor is required of students, to select and obtain approval for these courses. Students are requested to consult their advisors before the start of their junior year.

General Education (GE) Requirements

- 72 units required, 8 of which are specified in Major and/or Support.
- If any of the remaining 64 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science	4
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	

B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B 4		
Area C Arts and Humanities		
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2 4		
Upper-Division C 4		
Area D Social Sciences - Select courses in Area D from at least two different prefixes		
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D 4		
Area E Lifelong Learning and Self-Development		
Lower-Division E 4		
Area F Ethnic Studies		
F	Ethnic Studies	4
GE Electives in Areas B, C, and D		
Select courses from two different areas; may be lower-division or upper-division courses.		
GE Electives (4 units in Major plus 4 units in GE) ¹ 4		
Total units 64		

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

Cross Disciplinary Studies Minor in Data Science

CSC/CPE 101	Fundamentals of Computer Science	4
CSC/CPE 202	Data Structures	4
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	4
CSC 248 or MATH 248	Discrete Structures Methods of Proof in Mathematics	4
CSC 349	Design and Analysis of Algorithms	4
CSC 365	Introduction to Database Systems	4
CSC 369	Introduction to Distributed Computing	4
CSC 466	Knowledge Discovery from Data	4
DATA 301	Introduction to Data Science	4
DATA 401	Data Science Process and Ethics	3
DATA 402	Mathematical Foundations of Data Science	3
DATA 403	Data Science Projects Laboratory	1
DATA 451	Data Science Capstone I	2
DATA 452	Data Science Capstone II	2

MATH 143	Calculus III	4
MATH 206 or MATH 244	Linear Algebra I Linear Analysis I	4
STAT 302 or STAT 312	Statistics II Statistical Methods for Engineers	4
STAT 305	Introduction to Probability and Simulation	4
STAT 334	Applied Linear Models	4
STAT 331	Statistical Computing with R	4
STAT 419	Applied Multivariate Statistics	4
Technical Electives (CSC/DATA/MATH/PHYS/STAT)		5
Total units		80

Statistics Minor

Select one of the following introductory sequences: 12

STAT 217 & STAT 313 & STAT 323	Introduction to Statistical Concepts and Methods and Applied Experimental Design and Regression Models and Design and Analysis of Experiments I
STAT 217 & STAT 313 & STAT 324	Introduction to Statistical Concepts and Methods and Applied Experimental Design and Regression Models and Applied Regression Analysis
STAT 217 & STAT 313 & STAT 334	Introduction to Statistical Concepts and Methods and Applied Experimental Design and Regression Models and Applied Linear Models
STAT 218 & STAT 313 & STAT 323	Applied Statistics for the Life Sciences and Applied Experimental Design and Regression Models and Design and Analysis of Experiments I
STAT 218 & STAT 313 & STAT 324	Applied Statistics for the Life Sciences and Applied Experimental Design and Regression Models and Applied Regression Analysis
STAT 218 & STAT 313 & STAT 334	Applied Statistics for the Life Sciences and Applied Experimental Design and Regression Models and Applied Linear Models
STAT 251 & STAT 252 & STAT 323	Statistical Inference for Management I and Statistical Inference for Management II and Design and Analysis of Experiments I

STAT 251 & STAT 252 & STAT 324	Statistical Inference for Management I and Statistical Inference for Management II and Applied Regression Analysis
STAT 251 & STAT 252 & STAT 334	Statistical Inference for Management I and Statistical Inference for Management II and Applied Linear Models
STAT 301 & STAT 302 & STAT 323	Statistics I and Statistics II and Design and Analysis of Experiments I
STAT 301 & STAT 302 & STAT 324	Statistics I and Statistics II and Applied Regression Analysis
STAT 301 & STAT 302 & STAT 334	Statistics I and Statistics II and Applied Linear Models
STAT 312 & STAT 313 & STAT 323	Statistical Methods for Engineers and Applied Experimental Design and Regression Models and Design and Analysis of Experiments I
STAT 312 & STAT 313 & STAT 324	Statistical Methods for Engineers and Applied Experimental Design and Regression Models and Applied Regression Analysis
STAT 312 & STAT 313 & STAT 334	Statistical Methods for Engineers and Applied Experimental Design and Regression Models and Applied Linear Models
STAT 312 & STAT 323 & STAT 324	Statistical Methods for Engineers and Design and Analysis of Experiments I and Applied Regression Analysis
STAT 312 & STAT 323 & STAT 334	Statistical Methods for Engineers and Design and Analysis of Experiments I and Applied Linear Models
STAT 321 & IME 326 & STAT 323	Probability and Statistics for Engineers and Scientists and Engineering Test Design and Analysis and Design and Analysis of Experiments I
STAT 321 & IME 326 & STAT 324	Probability and Statistics for Engineers and Scientists and Engineering Test Design and Analysis and Applied Regression Analysis
STAT 321 & IME 326 & STAT 334	Probability and Statistics for Engineers and Scientists and Engineering Test Design and Analysis and Applied Linear Models

STAT 305	Introduction to Probability and Simulation
STAT 323	Design and Analysis of Experiments I
STAT 324	Applied Regression Analysis
STAT 330	Statistical Computing with SAS
STAT 331	Statistical Computing with R
STAT 334	Applied Linear Models
STAT 405	Applied Probability Models
STAT 410	Statistics Education: Pedagogy, Content, Technology, and Assessment
STAT 414	Multilevel and Mixed Modeling
STAT 415	Bayesian Reasoning and Methods
STAT 416	Statistical Analysis of Time Series
STAT 417	Survival Analysis Methods
STAT 418	Categorical Data Analysis
STAT 419	Applied Multivariate Statistics
STAT 421	Survey Sampling and Methodology
STAT 423	Design and Analysis of Experiments II
STAT 425	Probability Theory
STAT 426	Estimation and Sampling Theory
STAT 427	Mathematical Statistics
STAT 431	Advanced Statistical Computing with R
STAT 434	Statistical Learning: Methods and Applications

Total units **24**

Select from the following: 12
 DATA 301 Introduction to Data Science

Interdisciplinary Degree Programs

A degree that is jointly offered by different colleges is known as an interdisciplinary program. Cal Poly offers the following interdisciplinary degree program.

- BS Liberal Arts and Engineering Studies
- Concurrent CE-MS/MCRP with Specialization in Transportation Planning

Liberal Arts and Engineering Studies

<https://laes.calpoly.edu>
laes@calpoly.edu

Program Co-Director: David D. Gillette
Phone: 805.756.2331
ddgillet@calpoly.edu

Program Co-Director: Michael L. Haungs
Phone: 805.756.5531
mhaungs@calpoly.edu

Academic Programs

Program name	Program type
Liberal Arts & Engineering Studies	BS

The Liberal Arts and Engineering Studies (LAES) degree is jointly offered by the colleges of Liberal Arts and Engineering. This program prepares students for a wide range of innovative careers in emerging professional fields that combine skills and interests in the arts, technology and culture, and also prepares them for further study in graduate school. This program, which only accepts students as internal transfers after the first year, is open to all students at Cal Poly. This program is not intended to be an ABET-accredited engineering program.

Undergraduate Program BS Liberal Arts and Engineering Studies

The curriculum allows Liberal Arts and Engineering Studies students, in collaboration with students from all other Cal Poly majors, to participate in development teams working on national and international technology and cultural projects. To further prepare students for work with diverse teams that include participants from across the globe, the program strongly encourages students to spend three to six months studying and/or working abroad.

The BS in Liberal Arts and Engineering Studies can lead to careers in fields such as:

- Animatronics
- Audio Engineering
- Digital Media Production and Management
- Digital Publishing
- Environmental Technology Education
- Film and Television Production
- Game Design
- Government Policy Making / Analysis
- International Technology Management
- STEM Education in School and Out-of-School Contexts

- Sustainable Community Development
- Technical Communications
- Technology Services and Management
- Web Design

Program Learning Objectives

Graduates of the Liberal Arts and Engineering Studies program receive a solid foundation in engineering and scientific principles, as well as a cultural appreciation that supports them in careers requiring significant levels of technical and cultural fluency. To support these goals, the primary learning objectives are to:

1. Think critically and creatively in the process of solving technological problems considering philosophical, aesthetic and expressive concerns.
2. Communicate effectively through a variety of media in diverse, multicultural perspectives and facilitate communication between technical and non-technical collaborators.
3. Use mathematics, science, and engineering principles to produce solutions to problems within the student's Liberal Arts and Engineering concentrations.
4. Function effectively as a member of interdisciplinary or international teams, formulating sustainable solutions to problems at the intersection of technology and society.
5. Demonstrate ethical and professional responsibilities associated with the creation, use and integration of technology.
6. Serve as informed and responsible citizens in a global culture and remain involved with learning and helping society improve.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (p. 28) section of this catalog, including:

- 60 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit.

MAJOR COURSES

CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) ¹	4
LAES 301	Project-Based Learning in Liberal Arts and Engineering Studies	4
LAES 302	Advanced Project-Based Learning in Liberal Arts and Engineering Studies	4
LAES 461	Senior Project in Liberal Arts and Engineering Studies	4
LAES 462	Capstone Senior Seminar in Liberal Arts and Engineering Studies	4
MATH 141	Calculus I (B4) ¹	4
MATH 142	Calculus II (GE Electives) ¹	4
MATH 143	Calculus III	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4

PHYS 141	General Physics I	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
STAT 312	Statistical Methods for Engineers (Upper-Division B) ¹	4
or STAT 321	Probability and Statistics for Engineers and Scientists	
or STAT 350	Probability and Random Processes for Engineers	
Study Abroad or Global Perspectives courses		
300-400 level		8
Engineering Concentration or Individualized Course of Study ²		
Minimum 12 units at 300-400 level		34-36
Liberal Arts Concentration or Individualized Course of Study ²		
Minimum 12 units at 300-400 level		24
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		56
FREE ELECTIVES		
Free Electives ²		0-2
Total units		180

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

² If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be required to complete the total units required for the degree.

Concentrations

LAES students must select *one* concentration from Engineering and *one* from Liberal Arts. Students may choose to follow an individualized course of study in Engineering or/and in the Liberal Arts, constructed in consultation with LAES advisors.

Engineering (select one)

- Computer Graphics (p. 428)
- Electrical Engineering (Power) (p. 428)
- Industrial/Manufacturing Engineering - System Design (p. 428)
- Usability Studies (p. 428)

Individualized Course of Study in Engineering

Consists of 34 units of an advisor approved integrated course of study from courses offered in the College of Engineering designed to meet the LAES learning objectives, with at least 12 of the units at the upper-division level. Courses must be drawn from at least two engineering disciplines.

Liberal Arts (select one)

- Interactive Communication - Cinematic Focus (p. 428)
- Interactive Communication - Theatrical Focus (p. 429)
- Publishing Technology (p. 429)
- Technical Communication (p. 429)

Individualized Course of Study in the Liberal Arts

Consists of 24 units of an advisor approved integrated course of study from courses offered in the College of Liberal Arts designed to meet

the LAES learning objectives, with at least 12 of the units at the upper-division level.

Students may complete a minor program selected from pre-approved minors. These minors include any minor offered by the College of Liberal Arts, as well as interdisciplinary, cross-college minors in which students complete a minimum of half of the units in the College of Liberal Arts (e.g., Indigenous Studies in Natural Resources & the Environment; Sustainable Environments).

General Education (GE) Requirements

- 72 units required, 16 of which are specified in Major and/or Support.
- If any of the remaining 56 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (p. 30).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A	English Language Communication and Critical Thinking	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
Area B	Scientific Inquiry and Quantitative Reasoning	
B1	Physical Science (4 units in Major) ¹	0
B2	Life Science	4
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (4 units in Major) ¹	0
Upper-Division B (4 units in Major) ¹		0
Area C	Arts and Humanities	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English	4
Lower-Division C Elective - Select a course from either C1 or C2		4
Upper-Division C		4
Area D	Social Sciences - Select courses in Area D from at least two different prefixes	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
D2	Lower-Division D	4
Upper-Division D		4
Area E	Lifelong Learning and Self-Development	
Lower-Division E		4
Area F	Ethnic Studies	
F	Ethnic Studies	4

GE Electives in Areas B, C, and D

Select courses from two different areas; may be lower-division or upper-division courses.

GE Electives (4 units in Major plus 4 units in GE) ¹ 4

Total units 56

¹ Required in Major or Support; also satisfies General Education (GE) requirement.

LAES - Engineering - Computer Graphics Concentration

CSC/CPE 101	Fundamentals of Computer Science	4
CSC/CPE 202	Data Structures	4
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	4
CSC/CPE 123	Introduction to Computing	4
CSC 225	Introduction to Computer Organization	4
CSC 248	Discrete Structures	4
CSC/CPE 357	Systems Programming	4
CSC/CPE 471	Introduction to Computer Graphics	4
CSC 476	Real-Time 3D Computer Graphics Software	4

Total units 36

LAES - Engineering - Electrical Engineering (Power) Concentration

EE 111	Introduction to Electrical Engineering	1
EE 151	Introduction to Electrical Engineering Laboratory	1
EE 112	Electric Circuit Analysis I	2
EE 211	Electric Circuit Analysis II	3
EE 241	Electric Circuit Analysis Laboratory II	1
EE 212	Electric Circuit Analysis III	3
EE 242	Electric Circuit Analysis Laboratory III	1
EE 255	Energy Conversion Electromagnetics	3
EE 295	Energy Conversion Electromagnetics Laboratory	1
EE 335	Electromagnetic Fields and Transmission	4
EE 375	Electromagnetic Fields and Transmission Laboratory	1
EE 406	Power Systems Analysis I	4
EE 407	Power Systems Analysis II	4
EE 444	Power Systems Laboratory	1
Advisor approved Power Technical Elective		4

Total units 34

LAES - Engineering - Industrial/Manufacturing Engineering - System Design Concentration

IME 101	Introduction to Industrial and Manufacturing Engineering	1
IME 223	Process Improvement Fundamentals	4
IME 239	Industrial Costs and Controls	3
IME 301	Operations Research I	4
IME 303	Project Organization and Management	4
IME 314	Engineering Economics	3
IME 319	Human Factors Engineering	3-4
or IME 320	Human Factors and Technology	
IME 326	Engineering Test Design and Analysis	4
IME 420	Simulation	4
IME 443	Facilities Planning and Design	4

Total units 34-35

LAES - Engineering - Usability Studies Concentration

CSC/CPE 101	Fundamentals of Computer Science	4
CSC/CPE 202	Data Structures	4
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	4
CSC 225	Introduction to Computer Organization	4
CSC 248	Discrete Structures	4
CSC 307	Introduction to Software Engineering	4
CSC/CPE 357	Systems Programming	4
CSC 484	User-Centered Interface Design and Development	4
CSC 486	Human-Computer Interaction Theory and Design	4

Total units 36

LAES - Liberal Arts - Interactive Communication-Cinematic Focus Concentration

ENGL 371	Film Styles and Genres	4
ENGL 411	New Media Arts I	4
TH 210	Introduction to Theatre	4

Approved Electives

Select from the following: 12

COMS 206	Communication Theory	
COMS 384	Media Effects	
COMS 385	Media Criticism	
ENGL 372	Film Directors	
ENGL 412	New Media Arts II	

POLS 470

Selected Advanced Topics

Total units 24

LAES - Liberal Arts - Interactive Communication-Theatrical Focus Concentration

ENGL 411	New Media Arts I	4
TH 210	Introduction to Theatre	4
TH 227	Theatre History I	4
or TH 228	Theatre History II	

Approved Electives

Select from the following:¹ 12

ENGL 412	New Media Arts II	
ISLA 320	Topics and Issues in Values, Media and Culture	
TH 220	Acting I	
TH 230	Stagecraft I	
TH 330	Stagecraft II	
TH 390	Global Theatre and Performance	
TH 430	Scenic Design	
TH 434	Lighting Design	

Total units 24¹ No more than one lower-division course.

LAES - Liberal Arts - Publishing Technology Concentration

GRC 101	Introduction to Graphic Communication	3
GRC 201	Digital Publishing Systems	3
GRC 211	Materials for Graphic Communication Applications	4
ISLA 303	Values and Technology	4
or PHIL 341	Professional Ethics	
or PHIL 337	Business Ethics	

Approved Electives

Select from the following: 10

COMS 317	Technology and Human Communication	
GRC 316	Flexographic Printing Technology	
GRC 328	Digital and Offset Printing Methods	
GRC 329	Tangible Interactive Product Development	
GRC 402	Digital Printing and Emerging Technologies in Graphic Communication	

Total units 24

LAES - Liberal Arts - Technical Communication Concentration

COMS 317	Technology and Human Communication	4
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ENGL 317	Technical Editing	4
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ENGL 319	Information Design and Production	4
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Approved Electives

Select from the following: 12

COMS 213	Organizational Communication	
COMS 301	Business and Professional Communication	

ENGL 310	Corporate Communication	
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ISLA 303	Values and Technology	
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PHIL 337	Business Ethics	
or PHIL 341	Professional Ethics	

Total units 24

Concurrent CE-MS/MCRP with Specialization in Transportation Planning

City and Regional Planning
 Architecture & Environmental Design Bldg. (05), Room 313
 Phone: 805.756.1315
<https://planning.calpoly.edu>

Civil & Environmental Engineering
 Engineering Bldg. (13), Room 266
 Phone: 805.756.2947
<https://ceenve.calpoly.edu>

Program name	Program type
Specialization in Transportation Planning	Concurrent CE-MS/MCRP

The Concurrent CE-MS/MCRP with Specialization in Transportation Planning is a joint interdisciplinary program between the Civil and Environmental Engineering Department in the College of Engineering and the City and Regional Planning Department in the College of Architecture and Environmental Design. Participation in the program requires enrollment in both Colleges. Participants successfully completing the program are awarded both the Master of Science in Civil and Environmental Engineering (CE-MS) and the Master of City and Regional Planning (MCRP) with a Specialization in Transportation Planning.

Program Learning Objectives

After successfully completing the Concurrent CE-MS/MCRP with Specialization in Transportation Planning program, students will be able to:

Foundational skills

1. Demonstrate an understanding of the historical, theoretical, legal, and methodological foundations of planning and engineering
2. Effectively represent and communicate technical and policy information

Methodology

1. Gather, organize, analyze and present planning and engineering information
2. Transform data and information into knowledge for action
3. Critically assess and apply scientific research

Integrative skills

1. Integrate and apply the necessary skills and knowledge to address complex planning and engineering problems
2. Develop and manage a design and planning process
3. Work with a variety of audiences: multiple publics, officials, and decision-makers

Professional skills

1. Reflect upon, critique, and evolve the practice of planning and engineering
2. Address issues of sustainability, diversity, and environmental and social justice
3. Practice in accordance with the AICP Code of Ethics and the NSPE Code of Ethics for Engineers
4. Apply best practices and develop novel approaches to solving transportation planning and engineering problems

Degree Requirements and Curriculum

Total for Concurrent Degree: 90 units minimum

Total CRP units: 52
Total CE units: 30
 (not including thesis/project)

Double Counting of Units

This concurrent degree will allow for 27 units to be double-counted for students earning both CE-MS + MCRP (90 units total for both degrees) as a concurrent program.

Required Courses

First Year Core		
CRP 501	Foundations of Cities and Planning	4
CRP 504	Sustainable Communities	4
CRP 510	Planning Theory	4
CRP 513	Planning Research and Analysis	4
CRP 516	Demographic and Analytic Tools	4
CRP 525	Plan Implementation	4
CRP 553	Project Planning and Design Studio	4
Second Year		
CRP 518	Policy Development	4
CRP 530	Planning Agency Management	4
CRP 535	Land Use and Planning Law	4
CRP 552	Community and Regional Planning Studio I	4
CRP 554	Community and Regional Planning Studio II	4
Select one of the following options:		4-9

CRP 556	Community and Regional Planning Studio III (4)	
CRP 596	Professional Project (2, 2, 2)	
CRP 599	Thesis (2, 2, 2)	
CE/ENVE 599	Design Project (Thesis) (6-9)	
Specialization: Transportation Planning & Engineering		
CE 523 or CE 421	Transportation Systems Planning Traffic Engineering	4
CE 527	Sustainable Mobility	4
CRP 435	Transportation Theory	4
Concurrent CE-MS		
CE 422	Highway Geometrics and Design	4
CE 526	Transportation Safety	4
CE 591	Graduate Seminar I	1
CE 592	Graduate Seminar II	1
Select from the following (no double counting):		12-16
CE 423	Intelligent Transportation Systems	
CE 424	Public Transportation	
CE 429	Highway Pavement Designs	
CE 525	Airport Planning and Design	
CE 528	Transportation Economics and Analysis	
CE 529	Modeling and Simulation in Transportation	
CRP 470	Selected Advanced Topics	
ENVE 411	Air Pollution Control	
Total units		90

GRADUATE EDUCATION

Graduate Education
Science Bldg. (52), Room D27A
Phone: 805.756.2328; Email: grad@calpoly.edu

Prospective Graduate Students

Cal Poly offers over 35 Master's degree programs covering all of our six colleges:

- College of Agriculture, Food and Environmental Sciences (CAFES)
- College of Architecture and Environmental Design (CAED)
- Orfalea College of Business (OCOB)
- College of Engineering (CENG)
- College of Liberal Arts (CLA)
- College of Science and Mathematics (CSM) and School of Education (SOE)

A complete listing of our graduate programs can be found on the Cal Poly Graduate Education (<https://grad.calpoly.edu/>) site.

Application for Admission

An application for admission to a Master's program is available at Cal State Apply (<https://www2.calstate.edu/apply/>). The Cal State Apply system allows students to browse through general information about CSU's twenty-three campuses, view multimedia campus presentations, send and receive electronic responses to specific questions, and apply for admission and financial aid.

All graduate and post-baccalaureate applicants (e.g., Master's degree applicants, those seeking educational credentials, or graduate certificates) must file a complete graduate application as described in the graduate and post-baccalaureate admission materials at Cal Poly Admissions (<https://www.calpoly.edu/admissions/>). Applicants who completed undergraduate degree requirements on a CSU campus and graduated the preceding term are also required to complete and submit an application and pay the \$70 nonrefundable application fee.

The CSU advises prospective students to supply complete and accurate information on the application for admission, residence questionnaire, and financial aid forms. Further, applicants must submit Official Transcripts from their bachelor-granting institution directly from the issuing institution to the Cal Poly Admissions Office. Failure to complete, accurate, and authentic application documents may result in denial of admission, cancellation of academic credit, suspension, or expulsion (Section 41301, Article 1.1, Title 5, *California Code of Regulations*).

Applicants for graduate programs should refer to the Cal Poly Admissions Office (<https://www.calpoly.edu/admissions/graduate-student/>) website for program specific deadlines. Some Cal Poly graduate programs require applicants to complete the GRE or GMAT; please check with the Cal Poly Admissions website for requirements for each program at Admissions Dates and Deadlines (<https://www.calpoly.edu/admissions/graduate-student/dates-and-deadlines/>).

Applicants who earned a Cal Poly bachelor's degree may be granted an exemption from the GRE requirement; however, specific programs may waive this exemption and still require the GRE for all applicants. Please keep in mind that any applicant (external or Cal Poly undergraduate) with an undergraduate GPA of 2.5 or lower will be required to take the GRE and

demonstrate results that are at the 50-percentile or higher (Quantitative, Verbal and Writing) to be considered for admission.

Graduate and Post-Baccalaureate Admission Requirements

Graduate and post-baccalaureate applicants may apply for a degree objective, a credential or graduate certificate objective. Depending on the objective, the CSU considers an application for admission as follows:

- **General Requirements** – The minimum requirements for admission to graduate and post-baccalaureate studies at a California State University campus are in accordance with university regulations as well as Title 5, chapter 1, sub-chapter 3 of the *California Code of Regulations*.
- Specifically, a student shall at the time of enrollment:
 1. have completed a four-year college course of study and hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association, or shall have completed equivalent academic preparation as determined by appropriate campus authorities;
 2. be in good standing at the last college or university attended;
 3. have attained a grade point average of at least 2.5 (A = 4.0) in an acceptable earned baccalaureate degree; any applicant with an undergraduate GPA of 2.5 or lower will be required to take the GRE and demonstrate results that are at the 50th percentile or higher to be considered for admission; and
 4. satisfactorily meet the professional, personal, scholastic, and other standards for graduate study, including qualifying examinations, as appropriate campus authorities may prescribe. In unusual circumstances, a campus may make exceptions to these criteria.
- A student who meets the minimum requirements for graduate and post-baccalaureate studies may be considered for admission in one of the four following categories:
 - **Graduate Classified** – To pursue a graduate degree, applicants are required to fulfill all of the professional, personal, scholastic, and other standards, including qualifying examinations, prescribed by the campus.
 - **Graduate Conditionally Classified** – Applicants may be admitted to a graduate degree program in this category if, in the opinion of appropriate campus authority, deficiencies can be remedied by additional preparation.
 - **Post-Baccalaureate Classified** – e.g., *admission to an education credential program* – Persons wishing to enroll in a credential or certificate program, will be required to satisfy additional professional, personal, scholastic, and other standards, including qualifying examinations, prescribed by the campus.
 - **Post-Baccalaureate Unclassified** – To enroll in undergraduate courses as preparation for advanced degree programs or to enroll in graduate courses for professional or personal growth, applicants must be admitted as post-baccalaureate unclassified students. By meeting the minimum requirements, applicants are eligible for admission as post-baccalaureate unclassified students. Admission in this status does not constitute admission to, or assurance of consideration for admission to, any graduate degree or credential program. (Most CSU campuses do not offer admission to unclassified post-baccalaureate students).

Residency Status Determination

The campus Admissions Office determines the residency status of all new and returning students for nonresident tuition purposes. Responses to the application for admission and, if necessary, other evidence furnished by the student are used in making this determination. A student who fails to submit adequate information to establish a right to classification as a California resident is classified as a nonresident. For detailed explanation please refer to Cal Poly Admissions Residency for Tuition Purposes (<https://www.calpoly.edu/admissions/residency-for-tuition-purposes/>).

International (Foreign) Student Admission Requirements

The CSU must assess the academic preparation of foreign students. For this purpose, "foreign students" include those who hold U.S. temporary visas as students, exchange visitors, or in other non-immigrant classifications. The CSU uses separate requirements and application filing dates in the admission of "foreign students". All graduate and post-baccalaureate applicants, regardless of citizenship, whose native language is not English and whose preparatory education was principally in a language other than English must demonstrate competence in English. Those who do not possess a bachelor's degree from a post-secondary institution where English is the principal language of instruction must take either the Test of English as a Foreign Language (TOEFL), the International English Language Testing system (IELTS) exam, or another exam as indicated and approved by Cal Poly Admissions.

The Office of Admissions completes an initial portfolio review that includes verification of an equivalent B.A./B.S. degree, a determination of the appropriate level of study and an evaluation of all work completed. The Office of Admissions notifies all applicants of the documents needed to complete their portfolios. Graduate coordinators may require additional documentation to assist them in determining an applicant's suitability for the program of study.

The process for filing an international application can be found at Cal Poly Admissions International Student (<https://www.calpoly.edu/admissions/international-student/>).

Master's Degrees

In graduate courses, students cope with more complex ideas, problems, techniques and materials than in undergraduate courses. Graduate study requires searching and exhaustive analysis, identification and investigation of theories and principles; application of theory to new ideas, problems, and materials; extensive use of bibliographic and other resource materials, with emphasis on primary sources for data; and demonstration of competence in scholarly presentation of the results of independent study.

Regulations governing fees, grading, and financial aid are located elsewhere in the catalog. This section of the catalog reviews university policy and minimum requirements governing graduate studies. It is not, however, all inclusive.

Within these general requirements there are specific departmental requirements for each degree. These are found in the descriptions of master's degree programs within each school's description. It is important that graduate students, in consultation with their advisors, familiarize themselves with these requirements. Failure to do so may result in a substantial delay in progress towards the degree and graduation. It is the responsibility of the

student to ascertain and comply with all university, college and departmental procedures and requirements.

- All available master's degree programs, graduate certificates and professional certificates can be found on the Cal Poly Graduate Education (<https://grad.calpoly.edu/>) website.

Master's Degree Programs

- Aerospace Engineering, MS (p. 202)¹
- Agricultural Education, Master of (p. 84)
- Agriculture, MS (p. 61)
 - BioResource and Agricultural Systems Specialization (p. 67)
 - Animal Science Specialization (p. 66)
 - Crop Science Specialization (p. 67)
 - Dairy Products Technology Specialization (p. 68)
 - Environmental Horticulture Specialization (p. 68)
 - Irrigation Specialization (p. 68)
 - Plant Protection Science Specialization (p. 69)
 - Water Engineering Specialization (p. 69)
- Architectural Engineering, MS (p. 154)¹
- Architecture, MS (p. 159)¹
- Biological Sciences, MS (p. 378)
 - Specialization in Regenerative Medicine (p. 379)
- Biomedical Engineering, MS (p. 207)¹
 - Specialization in Regenerative Medicine (p. 208)
- Business Administration, MBA (p. 177)
 - Graphic Communication Document Systems Management Specialization (p. 190)
- Business Analytics, MS (p. 191)
- City and Regional Planning, MCRP (p. 164)
- Civil and Environmental Engineering, MS (p. 215)¹
- Computer Science, MS (p. 236)¹
- Concurrent CE-MS/MCRP with Specialization in Transportation Planning (p. 429)
- Curriculum and Instruction, MA (p. 419)
- Educational Leadership and Administration, MA (p. 420)
- Electrical Engineering, MS (p. 245)¹
- Engineering Management, MS (p. 256)¹
- English, MA (p. 286)¹
- Environmental Sciences and Management, MS (p. 137)
- Food Science, MS (p. 112)¹
- Fire Protection Engineering, MS (p. 196)
- Higher Education Counseling and Student Affairs, MS (p. 420)
- History, MA (p. 300)
- Industrial Engineering, MS (p. 257)¹
- Mathematics, MS (p. 407)¹
- Mechanical Engineering, MS (p. 267)¹
- Nutrition, MS (p. 112)
- Packaging Value Chain, MS (p. 191)
- Polymers and Coatings Science, MS (p. 385)¹
- Psychology, MS (p. 337)
- Public Policy, MPP (p. 330)¹
- Quantitative Economics, MS (p. 192)

- Special Education, MS (p. 421)
- Taxation, MS (p. 192)

¹ Blended Bachelor's + Master's program is available. See individual program for information.

Graduate Certificate Programs

An academic graduate certificate program provides an opportunity for a student to satisfactorily complete a sequence of advanced academic courses that provide instruction in a stand-alone, coherent body of specialized knowledge. It is designed to meet requirements for professional competence, expand access to specialized knowledge, or meet occupational needs for advanced interdisciplinary work.

Specific Requirements:

- Admission to a graduate certificate program requires a Bachelor's degree from an accredited institution with a major in a relevant field of study. The applicant must have attained a minimum GPA of at least 2.5 in the last degree completed. Work experience may substitute (at the discretion of the program) for the relevancy of the Bachelor's degree and for the minimum GPA requirements.
- Courses taken to satisfy the requirements of a graduate certificate program may be applied to the requirements of a graduate degree program; however, students must apply separately for admission into a graduate degree program. No course-work for the certificate may be below the 400 level. One 4-unit course in transfer credit, from a regionally accredited institution, may be allowed as determined by the graduate certificate program advisor.
- A minimum GPA of 3.0 is required for successful completion of a graduate certificate program. Students may not elect to take courses required for the certificate as credit/no credit. A graduate certificate program must be completed within three years.
- Students who are enrolled only in a graduate certificate program are exempt from the continuous enrollment requirement for graduate students.

Graduate Certificate Programs:

- Fire Protection Engineering Applications (p. 197)
- Fire Protection Engineering Science (p. 197)

Academic Requirements Graduate Student Continuous Enrollment Policy

Effective Fall Quarter 2009, graduate students are required to maintain continuous enrollment from the time of first enrollment in a graduate program until completion of the degree (AS-692-09). Continuous enrollment is defined as being enrolled during Fall, Winter, and Spring quarters each year. All graduate students must be enrolled during the quarter in which they graduate. Therefore, a student graduating Summer quarter must be enrolled during the summer. Students can maintain continuous enrollment by being enrolled as regular students; obtaining approval for an education or medical leave prior to the quarter when such a leave would begin; or registering in a special course designated for this purpose during quarters in which they are not regularly enrolled. The special course, GS 597, is listed in the University catalog and is taken through Cal Poly Extended Education. GS 597 is a one-unit course, offered credit/no credit; credits in GS 597 do not count toward meeting degree requirements. Students who fail to fulfill this continuous enrollment

requirement will not be permitted to graduate—even if all degree requirements have been completed—until payment has been made for all quarters of non-enrollment. This requirement is not retroactive to terms prior to Fall 2009.

For further information and a registration form, visit the Extended Education (<https://extended.calpoly.edu/>) website.

Degree Requirements

The following conditions and academic requirements are common to all Master's degrees:

- All students must attempt to satisfy the **Graduation Writing Requirement** (EO 665.11.0) during the first quarter of enrollment. Master's students matriculated prior to Fall 2023 must successfully pass this requirement before their degree can be awarded. Master's students who matriculate in Fall 2023 or later are not required to satisfy the GWR requirement before their master's degree can be awarded. Blended students must satisfy the GWR requirement as part of their undergraduate degree requirements.
- A student must file an approved Working Formal Study Plan with a minimum of **45 quarter units** (Title 5, Article 7, 40510 b.2.) before the twelfth unit of graduate study is completed.
- A student must maintain an overall **grade point average of 3.0** (grade of B on a scale where A = 4.0), or better, based on all courses listed in the Formal Study Plan. A course in which a 'CR' is assigned shall not be used in computing the grade point average. (Title 5, Article 7, 40510 b.4.)
 - Only individual graded courses with C- or higher can be used on the Formal Study Plan. See the grade section for more details.
- A student must maintain **satisfactory scholarship and professional standards**. Only those graduate students who continue to demonstrate a satisfactory level of scholastic competence and fitness, as determined by the appropriate university authorities, shall be eligible to continue in such curricula. Students whose performance is judged to be unsatisfactory by the authorities of the University may be required to withdraw from all graduate degree curricula offered by the University.
- A student must successfully complete a **culminating experience** (thesis, project, and/or comprehensive examination). (Title 5, Article 7, 40510 b.3.)
- A student must complete all of the graduate degree requirements, including those to satisfy conditional admittance, within **seven years** (Title 5, Article 7, 40510 b.2.) of being matriculated, even conditionally, into *that* Master's degree-seeking program.
- A student may elect to meet the **catalog** graduation requirements in effect at the time the student was admitted to graduate standing (conditional or classified) provided that continuous enrollment was maintained (AS-692-09), or at the time of graduation. The student may be required to make substitutions for discontinued courses by submitting a new Formal Study Plan.
- Graduate level courses (**500-level**) should make up no fewer than **60%** of the units required for the degree (Academic Senate Resolution AS-825-17 (https://content-calpoly-edu.s3.amazonaws.com/academicssenate/1/images/AS-825-17_0.pdf); Students matriculated prior to Fall 2019 are required to have 50% of their courses required for the degree at the 500-level (Title 5, Article 7, 40510 b.2.B.).
- The majority of the Formal Study Plan coursework should be taken while matriculated as a Cal Poly graduate student (Title 5, Article 7,

40510.A). Cal Poly requires that at least 33 units of a 45-unit program must be completed while in residence at Cal Poly; a limit of 12 units out of residence can be taken. In programs with more than 45 units an equivalent proportion (33/45 or 73%) of units must be taken in residence at Cal Poly.

- In Residence
 - Cal Poly undergraduate courses
 - Cal Poly special session ('S') courses (EO 1099 9.1 and 10.2)¹
 - Only up to 12 units of Cal Poly Open University ('P') courses¹
- Out of Residence (max 12/45 units or 27%)
 - Extended Education ('E') courses (EO 1099 9.2)¹
 - Credit by exam units
 - Transfer units²
- The majority of Formal Study Plan coursework should be taken *after* having been matriculated at Cal Poly as a Graduate Classified or Graduate Conditionally Classified (both seeking a master's degree), or Post-baccalaureate Classified (credential or academic graduate certificate) student. Therefore, Cal Poly limits units taken outside of the Post-baccalaureate or Graduate Classified standing; only **12 unclassified** AND only **12 Cal Poly undergraduate** units can be used on the Formal Study Plan.
 - Post-baccalaureate or Graduate Classified
 - Courses taken (here or in transfer²) *after* having been matriculated into a Cal Poly Master's, credential, or academic graduate certificate program
 - Not Post-bacc/Grad Classified – (max 24 units total)
 - Unclassified (max 12 units)
 - All transfer² and Cal Poly post-baccalaureate enrollment (including professional certificate enrollment) *before* being matriculated into a Cal Poly's Master's, credential, or academic graduate certificate program
 - Cal Poly Undergraduate enrollment (max 12 units)
 - Coursework taken as a Cal Poly undergraduate student, but not needed to meet any baccalaureate degree requirement
- No more than 24 quarter units of approved Cal Poly **Extended Education** [a combination of Special Session (S), Open University (P), or Special Session (E) courses] courses shall be accepted for the Master's degree. (EO 1099 10.1.2)
- No more than nine quarter units shall be in **student teaching**.
- No more than nine quarter units shall be allowed for a **thesis or project** (Title 5, Article 7, b.2.C.).
 - Enrollment in these units must be as a Master's matriculated student, and therefore a student cannot be enrolled through Extended Education.
- Note: Some programs/departments set independent study limits on courses, found in the course description. Typically there is a 12-unit combined maximum of independent study units allowed.

¹ No more than 24 quarter units of approved Cal Poly Extended Education [a combination of Summer Session (S), Open University (P), or Special Session (E) courses] courses shall be accepted for the Master's degree. (EO 1099 10.1.2)

² Transfer units must come from a regionally accredited institution.

meet conditional admittance, is seven years (Title 5, Article 7, 40510 b.2.) from the time the student is matriculated, even conditionally, into that Master's degree-seeking program.

The University, at its option, and in exceptional cases, may extend the time frame. Students who wish to extend the seven-year limit must submit a Graduate Petition for Special Consideration to Graduate Education. The petition must include:

- An explanation of the reasons why the extension is necessary.
- Evidence to support the student's currency in the field of study.
- A copy of the student's Final Formal Study Plan that indicates any additional coursework that needs to be completed as part of this petition and which of those courses will be over seven years old at the proposed time of completion.
 - If the extension is necessary for completion of the culminating experience, list the specific experience being used (thesis, project, or comprehensive exam).
- Indicate the current progress made on the culminating experience and when final degree requirement completion is expected.
- The seven-year rule cannot be extended indefinitely; the student must specify in the petition what quarter and year they will be completing all degree requirements, thus indicating precisely how far the seven-year rule will be extended.

Graduation Writing Requirement (GWR)

The Graduation Writing Requirement (GWR) is a CSU Board of Trustees mandate designed to ensure that students demonstrate effective written communication skills at the upper division before they enter the professional workforce. All undergraduate students who are seeking a Cal Poly degree must fulfill the GWR before a diploma can be awarded.

Undergraduate students with 90 or more completed units should attempt to fulfill the requirement before their senior year. Upper-division transfer students who completed the requirement at another CSU campus prior to enrollment at Cal Poly may transfer completion of the requirement.

Students should review the requirements of their major program of study to determine which of the following options is the appropriate pathway for GWR completion:

1. Pass a GWR-certified course (p.) with a grade of C or better (C- or below does not qualify). The course may be taken on a credit/no credit basis, but the student must earn a minimum grade of C in order to satisfy the GWR component of the class. Available sections of GWR-certified courses are searchable in the class schedule. For a full list of courses, please see the GWR Courses website (p.) in the Courses A-Z section of the Cal Poly Catalog.
2. Pass the GWR Portfolio (<https://writingandlearning.calpoly.edu/gwrportfolio/>) via UNIV 401.

Further information on pathways to meeting this degree requirement may be obtained from the Office of Writing and Learning Initiatives, Kennedy Library (35) Room 202A (805-756-2067), or on the GWR webpage, <https://writingandlearning.calpoly.edu/gwr> (<https://writingandlearning.calpoly.edu/gwr/>).

Time Limit for Degree

The time allowed to successfully complete all Master's requirements, including the Master's culminating experience and any requirements to

General Policies Advisement

Master's students should make an appointment with their graduate advisor during their first quarter of being enrolled in that program to develop a Working Formal Study Plan which serves as an agreement between the student and the university on the specific coursework to be completed in order to fulfill the requirements for the Master's degree (minimum 45 units). A Working Formal Study Plan and Advancement to Candidacy form must be submitted to the Graduate Education Office for review by the end of the 1st quarter of starting that program at Cal Poly. It is understood that changes may occur to this plan as students make progress with their studies; changes in the Working Formal Study Plan and Advancement to Candidacy form do not need to be submitted to the Graduate Education Office. However, students must submit a Final Formal Study Plan within the first 3 weeks of the quarter in which they expect to graduate. This Final Formal Study Plan must accurately reflect the courses that have been completed to satisfy their program requirements. The Working Formal Study Plan and Advancement to Candidacy and Final Formal Study Plan forms are routed for signatures and submitted electronically via AdobeSign at the Graduate Forms (<https://grad.calpoly.edu/checklist-forms/forms.html>) webpage.

Each Master's degree program has specific prerequisites, both in courses and in grade-point average. Deficiencies in prerequisites must be defined by the graduate coordinator as part of conditional acceptance offer, and the graduate coordinator is responsible for verifying prerequisite compliance prior to the submission of the Working Formal Study Plan and Advancement to Candidacy form. Courses taken for this purpose normally do not count toward fulfillment of the unit requirement for the degree.

Departmental advisors and graduate coordinators share the responsibility for advising Master's degree students throughout their work toward a degree. Students are urged to maintain a personal file of transcripts and other records of all undergraduate and graduate work undertaken, and to make this file available whenever they seek advising.

Post-Baccalaureate Change of Objective

If students wish to change their post-baccalaureate objective, they must formally file this intention by completing a Post-baccalaureate Change of Objective (PBCO) form, available at Graduate Forms (<https://grad.calpoly.edu/checklist-forms/forms.html>). Students applying to blended Bachelor's/Master's programs need to follow the guidelines under that section. A student must enroll and start courses in the program to which they were admitted before filing a Postbaccalaureate Change of Objective.

Formal Study Plan

The student should make an appointment with their Graduate Program Coordinator during their first quarter of graduate study to develop a Working Formal Study Plan and Advancement to Candidacy form. All forms are routed for signatures and submitted electronically via AdobeSign at the Graduated Forms (<https://grad.calpoly.edu/checklist-forms/forms.html>) website. A Formal Study Plan is an agreement between the student and the college on the specific coursework to be completed in order to fulfill the course requirements for the Master's degree. The student should always consult with their advisor to ensure that only approved courses are selected, since departmental requirements vary, and some courses are excluded. A copy of the Formal

Study Plan must be submitted to Graduate Education for review and final approval.

Courses below the 400-level may not constitute any part of the approved units on the Formal Study Plan (AS-313-89). However, in those programs where specific courses below the 400-level may be essential for a student's success, the student may be conditionally admitted to the program contingent upon completing those courses. Do not list any prerequisite courses on the Formal Study Plan.

Graduate Courses Taken by Undergraduates for Graduate Credit

Cal Poly undergraduates may take courses in the 400 or 500 series for graduate credit while still matriculated as undergraduates. If they subsequently enter a Cal Poly Master's, credential, or academic certificate program, they may have such course credit applied toward that program only if the units were not used for the baccalaureate degree. No more than 12 units of Cal Poly undergraduate work is allowed on either Formal Study Plan.

Cal Poly's Office of the Registrar will validate if Cal Poly undergraduate courses listed on the Formal Study Plan were not needed to meet any undergraduate degree requirement. However, students who want to use undergraduate courses from another institution must provide Cal Poly's Office of the Registrar with an official letter from the other regionally accredited institution indicating that the coursework was not needed to meet any undergraduate degree requirement.

Advancement to Candidacy

Advancement to Candidacy (Title 5, Article 7, 40510a and 41011) recognizes that the student has, so far, sufficiently demonstrated the ability to operate at and sustain a level of scholarly competence that is satisfactory for successful completion of the degree requirements. The student is then cleared for the final stages of the program, which include the thesis, project, and/or comprehensive examination, in addition to any remaining coursework.

As the Advancement to Candidacy form has been combined with the Working Formal Study Plan, it must be submitted to the Graduate Education Office by the end of the first quarter of enrollment. A student's signature on the form signifies understanding of the 3.0 GPA requirement for Formal Study Plan courses and compliance with the Continuous Enrollment Policy. The form will be processed only when:

- An anticipated graduation date has been declared.
- The Graduate Writing Requirement (GWR) has been satisfied.
- The culminating experience has been identified as either a thesis, a project, and/or an exam.

Culminating Experience/Research

The student must successfully complete the culminating experience required by the specific program (thesis, project, and/or comprehensive examination) to be granted a graduate degree (Title 5, Article 7, 40510 b.3.). The quality of work accomplished, including the quality of the writing, is the major consideration in judging the acceptability of the thesis, project, and/or comprehensive examination. Note: The degree award date is based on the submission of the Master's Thesis Approval Form, Master's Project Approval Form, and/or Master's Exam Approval Form to the Graduate Education Office (52-27D). These forms are routed for signatures and submitted electronically via Adobe Sign at the

Graduate Forms (<https://grad.calpoly.edu/checklist-forms/forms.html>) website.

Thesis

"A thesis is the written product of a systematic study of a significant problem. It identifies the problem, states the major assumptions, explains the significance of the undertaking, sets forth the sources for and methods of gathering information, analyzes the data, and offers a conclusion or recommendation. The finished product evidences originality, critical and independent thinking, appropriate organization and format, and thorough documentation. Normally, an oral defense of the thesis is required." (Title 5, Article 7, 40510 b.3.A.)

The following are requirements for a thesis committee: 1) that the graduate student have a thesis advisor who is a permanent full-time faculty member from the student's program; 2) that the thesis advisor and the student recommend, for approval by the graduate coordinator and/or department head, a thesis committee comprising of at least three faculty members; 3) that two of these members, one of which is the committee chair, be from the student's program. Exceptions to the thesis committee composition must be approved by the College Dean.

If a thesis report is required in a Master's degree program, a committee-approved copy must be completed in accordance with University specifications. Guidelines to be followed in preparing a final copy for filing with the University can be obtained from Graduate Education, or online at Cal Poly Graduate Education Master's Thesis (<https://grad.calpoly.edu/masters-thesis/masters-thesis.html>) website.

All Master's theses must go through Graduate Education's Thesis Formatting Review Process wherein an Editor reviews and provides the student with needed corrections. Upon completion of any corrections required by the Editor or thesis committee, the student contacts the Graduate Education Office (grad@calpoly.edu) to submit the electronic thesis report to the DigitalCommons@CalPoly, a digital archive for the University. The thesis formatting review process does not impact a student's degree completion.

Project

"A project is a significant undertaking appropriate to the fine and applied arts or to professional fields. It evidences originality and independent thinking, appropriate form and organization, and a rationale. It is described and summarized in a written report that includes the project's significance, objectives, methodology, and a conclusion or recommendation. An oral defense of the project may be required." (Title 5, Article 7, 40510 b.3.B.)

Projects require an advisor who is a permanent full-time faculty member from the student's program. A project may also include a committee that must be approved by the graduate coordinator and/or department head. Project reports are not submitted to Graduate Education and typically are not uploaded to the DigitalCommons@CalPoly.

Comprehensive Examination

A comprehensive examination is one of the possible culminating experiences for the Master's degree and assesses "the student's ability to integrate knowledge of the area, show critical and independent thinking, and demonstrate mastery of the subject matter. The results of the examination should provide evidence of these abilities and achievement. A record of the examination questions and responses shall be maintained..." (Title 5, Article 7, 40510 b.3.C.).

Research Involving Special Conditions

Research that involves the use of human subjects, vertebrate animals, hazardous materials, or information and materials subject to export-control regulations requires special campus review before the study begins. If your research involves any of these special conditions, check with your Graduate Coordinator and Graduate Education for procedures.

Grades/Repeats

Report In Progress (RP) Grades

The grade of RP is used in connection with courses that extend beyond one academic term. It indicates that work is in progress and has been evaluated and found to be satisfactory to date, but that assignment of a grade must await completion of additional work. Work is to be completed within a time period stipulated by the instructor. The RP symbol shall be replaced with the appropriate final grade within one year for all courses or will convert to an F for graded courses or NC for CR/NC-only courses.

There is an exception for graduate degree thesis or project courses (539/596/598/599) for which the time may be up to seven years, but may not exceed the overall time limit for completion of all Master's degree requirements (AS-647-06). Failure to complete the assigned culminating experience work will result in the RP, only in these courses, being converted to an NC (AS-443-95).

Earned D+ or Lower

If a student earns a D+ or lower, the course can be retaken with the permission of the student's program and both grades will be averaged into the Formal Study Plan. Alternately, if the course is not required, it can be removed from the Formal Study Plan and replaced with a suitable alternative.

Repeating a Course

Students may enroll in a course for credit more than once only if the catalog course description states that the course may be repeated for credit. An exception to this policy allows the repeating of a course in cases where a grade of D or F was received. Unlike for undergraduates at Cal Poly, a graduate student repeating a course cannot qualify for the removal of a lower letter grade from the overall GPA calculation on the student's transcript. See the [Earned D+ or Lower](#) section above for more information.

Credit/No Credit Grading

Courses which are offered only on a credit/no credit basis also satisfy the unit requirement if a credit grade is earned. The equivalent of an A or a B (including a B-) is required to earn credit in such courses (AS-8-76). Graduate students may elect to take courses that are not part of their Formal Study Plan on a credit/no credit basis.

Registration

The schedule and instructions for registration and payment of fees are available through the registration and enrollment tab at the MyCalPoly web portal. Detailed descriptions of courses can be found here (p. 511).

Enrollment/Prerequisites

To enroll in a 500-level graduate course a student must have postbaccalaureate/graduate standing or the permission of the instructor. Please note that prerequisites are not waived for 400-level courses; a graduate student may need to get a permission number from the instructor teaching that course to enroll in a 400-level course.

Credit by Exam for Coursework

See Evaluation of Transfer Credit (p. 50).

Status

Full-Time Status

A full-time graduate student is defined as one taking 8 or more units in a quarter. Students receiving financial aid may need to meet different requirements to be considered full-time and should consult with the Financial Aid Office. Graduate students are not permitted to enroll in more than 22 units each quarter.

Leaves of Absence

Educational, medical and military leaves are permitted if students meet the eligibility requirements and submit a Leave of Absence form with the required signatures and documentation to the Office of the Registrar. The maximum duration for any single Leave of Absence is 6 academic quarters (not including summer).

See undergraduate section (p. 57).

Discontinuation

Matriculated students who have not registered for three consecutive quarters and have not been on an approved Leave of Absence will be discontinued and will not be allowed to enroll. Graduate students who are discontinued will contact the Graduate Education Office (grad@calpoly.edu) to begin the process to re-matriculate and complete their degree in coordination with the Admissions Office. To enroll again, students must apply for readmission before the deadline dates listed on the Admissions Office (<https://www.calpoly.edu/admissions/returning-students/>) website for each quarter. An application fee must accompany the application for readmission.

A graduate student who has been discontinued but has completed all degree requirements except for their culminating experience (thesis, project, and/or exam) may be able to return to Cal Poly to receive their Master's degree without reapplying to their Master's program. Please note that if there are units remaining to complete the thesis, project, or exam, then the student will need to submit a returning student application (596, 597, 598, and 599 units cannot be taken through Open University). Matriculated students who have not registered for one quarter or two consecutive quarters will maintain their registration priority without applying for readmission.

Graduation

A student planning to graduate must file an Application for Graduation with the Graduate Education Office by the listed deadline in the quarter before the student intends to participate in the appropriate commencement ceremony (either in December or June). This form notifies the Evaluations Office that a graduate student intends to graduate and participate in a commencement ceremony. The student should only submit the form after the Working Formal Study Plan and Advancement to Candidacy form has been approved. A student cannot graduate without this application, available at the Graduate Forms (<https://grad.calpoly.edu/checklist-forms/forms.html>) website. **It is the student's responsibility to ensure that all of their necessary forms have been signed and approved.**

Students can confirm that they will appear on the bookstore list (which allows them to purchase a cap and gown) and the Commencement Bulletin by checking their status on Poly Profile only after all of their paperwork has been received and processed by the Office of the

Registrar. On the Poly Profile, under the Career Program Plan section and the Postbaccalaureate Graduate career, students will see an "Expected graduation is..." notation once the paperwork has been processed. Corresponding deadlines for these items are communicated to students via email from Graduate Education.

Note that, despite participation in commencement ceremonies, students are not official Cal Poly graduates until they have completed ALL degree requirements satisfactorily and have received a 'Congratulations' email from the Office of the Registrar, Evaluations Unit.

Academic Excellence

Master's degree candidates who are academically in the top 10 percent of their program and are nominated by their Graduate Coordinator are eligible to be recognized for Academic Excellence. Nominations must be approved by the appropriate College Dean. If approved, the student will be permitted to wear "*honor cords*" at Commencement. Students can contact their Graduate Coordinator for details.

Note that Latin honors (summa, magna, cum laude) are only for undergraduate degrees.

Distinction

Graduation with Distinction will be determined by the Office of the Registrar only at the time of degree posting. ***It will NOT be noted or awarded at the Commencement Ceremonies.*** Instead, the designation will appear on a student's final transcript and diploma. The criterion for graduation with distinction is a Final Formal Study Plan grade point average of 3.75 or better.

June Only Commencement Awards

Faculty in each Master's program should make recommendations for ***Outstanding Graduate Students*** to the appropriate Graduate Coordinator by the date set by Graduate Education. For a program having more than 50 students, two nominations per award can be made. Graduate Education awards one Outstanding Graduate Student per college and the School of Education. Finalists for the awards may be asked to supply additional information or material to a review committee appointed by the Dean of Graduate Education. The students selected for these awards will be recognized only at the Spring Commencement ceremony.

Conduct/Probation/Disqualification/Dismissal

Student Conduct and Discipline

It is expected that all Cal Poly students are enrolled for serious educational pursuits and that they conduct themselves so as to preserve an appropriate atmosphere of learning. It is also expected that all students who enroll at Cal Poly are willing to assume the responsibilities of membership in the campus community. Association in such a community is voluntary, and students may withdraw from their graduate programs any time they consider the obligations of membership disproportionate to the benefits. While enrolled, students are subject to campus authority that includes the prerogative of dismissing those whose conduct is inimical to the aims of an institution of higher education. While enrolled, students are subject to the regulations governing discipline stated in Education Code Section 66017 and in Title 5 of the California Code of Regulations, Sections 41301–41302, and to such rules and regulations as have been approved and promulgated by authority of the University President. Students are subject to other applicable regulations contained in this Catalog, in the Campus Administrative Policies, the Standards for Student Conduct, Rights and

Responsibilities, and in other official university publications, including the Cal Poly website.

Academic Probation

A student who is enrolled in a graduate degree program in conditionally classified or classified standing may be placed on academic probation for failure to maintain a cumulative grade point average of at least 3.0 (grade of B on a scale where A = 4.0) in all courses in the Formal Study Plan for the degree.

A student who has been admitted as postbaccalaureate classified in order to pursue a credential program shall be subject to academic probation for failure to maintain a cumulative grade point average of at least 3.0 in all units taken in the credential program.

A postbaccalaureate unclassified student (one who has not been admitted to either a credential or graduate degree program) shall be subject to academic probation for failure to maintain a cumulative grade point average of at least 2.5 in all units attempted subsequent to admission to postbaccalaureate standing.

Academic Disqualification

A graduate or postbaccalaureate student who has been placed on academic probation may be disqualified from further attendance in a program by action of the Dean of the College (or the Dean's designate) in which the student is enrolled and in consultation with the Dean of Graduate Education for any of the following reasons:

1. The conditions for removal of academic probation are not met within the period specified.
2. The student goes on administrative probation while on academic probation.
3. The student is subject to administrative probation for the same or similar reason for which the student has been placed on academic probation previously, although not currently in such status.

When such action is taken, the student is notified via email from the Dean of Graduate Education that includes an explanation of the basis for the action. Disqualification may be either from further registration in the program or from further enrollment at the University as determined by the Dean of Graduate Education.

Administrative Probation

A graduate student may be placed on administrative-academic probation by action of the Dean of the College (or the Dean's designate) in which the student is enrolled for any of the following reasons:

1. Withdrawal from all or a substantial portion of a program of study in two successive quarters or in any three quarters. (Note: a student who is on an approved Leave of Absence is not subject to administrative-academic probation for such withdrawal.)
2. Repeated failure to make progress toward the stated degree or program objective when such failure appears to be due to circumstances within the control of the student.
3. Failure to comply, after due notice, with an academic requirement or regulation which is routine for all students or a defined group of students (for example, failure to complete a required campus or program examination, failure to complete a required practicum, failure to complete a required internship, failure to comply with professional standards appropriate to the field of study, failure to make satisfactory progress in the academic program, etc.).

When such action is taken, students are notified via email and are provided with the conditions for removal from probation and the circumstances that would lead to disqualification, should probation not be removed.

Administrative Disqualification

A graduate student who has been placed on administrative probation may be disqualified from further attendance in a program by action of the Dean of the College (or the Dean's designate) in which the student is enrolled and in consultation with the Dean of Graduate Education for any of the following reasons:

1. The conditions for removal of administrative probation are not met within the period specified.
2. The student goes on academic probation while on administrative probation.
3. The student is subject to administrative probation for the same or similar reason for which the student has been placed on academic probation previously, although not currently in such status.

When such action is taken, the student is notified via email from the Dean of Graduate Education that includes an explanation of the basis for the action. Disqualification may be either from further registration in the program or from further enrollment at the University as determined by the Dean of Graduate Education.

Dismissal from University

This is an administrative action that prevents students from enrolling at Cal Poly for any future quarters. Dismissal may result from academic disqualification, administrative disqualification, or from a disciplinary action.

Blended Bachelor's + Master's Programs Overview

Blended programs may provide an accelerated route to a graduate professional degree with simultaneous conferring of both Bachelor's and Master's degrees. Some Blended programs with undergraduate degrees that exceed the 180-unit requirement may allow for the possibility of students' earning graduate credit for several of their senior electives, effectively decreasing the summed unit requirements for both degrees. In addition, Blended programs may provide an opportunity for students to integrate their senior project more seamlessly with their graduate thesis/project. Students must still complete all undergraduate requirements and must have a minimum total of 225 discrete units between the two degrees.

Blended program students can progress from undergraduate to graduate status with a Blended Programs Application Approval Form, a Postbaccalaureate Change of Objective (both forms available through the Graduate Education website), and a verification of successful completion of the GWR; Blended program students do not need to apply through the Admissions Office. This eliminates the need to pay the application fee.

Students who are interested in pursuing Blended programs should first visit the Graduate Education website for more information. Students should then submit a request to the appropriate Department Head or Graduate Coordinator for all required paperwork. The Department Head/Graduate Coordinator, with assistance from the Graduate Education Office, determines whether each student meets the eligibility criteria detailed below. Graduate Education performs a final review of the Postbaccalaureate Change of Objective before forwarding the

information on to the Office of the Registrar. After the form is processed, students can see their change in status on their Poly Profile.

Eligibility

1. The following are minimum eligibility criteria; *individual departments may have more stringent requirements.*
2. Students must successfully complete a minimum of 91% of Expected Academic Progress. Degree-applicable units are those counted towards the undergraduate degree and are determined using Expected Academic Progress criteria.
3. Students must have a minimum 2.5 GPA in the last 90 quarter units attempted. (*Note that students, once admitted to graduate standing, must maintain a 3.0 GPA or better in courses counting toward the graduate degree.*)
4. Students must have completed the Graduation Writing Requirement (GWR) or demonstrate that this requirement was satisfied during their undergraduate program.

Process to Graduate with Both Degrees

1. Students must be matriculated at graduate standing for a minimum of two quarters prior to graduation.
2. Students must submit all required graduate paperwork to the Graduate Education Office and maintain a minimum 3.0 GPA for courses counting toward the completion of the Master's degree.
3. When all requirements are met for both the undergraduate program and the graduate program, both degrees will be awarded at the same time and graduation ceremony.
4. If a student fails to complete the Master's program requirements, the Bachelor's degree may be granted when all requirements for that degree are met. A new Postbaccalaureate Change of Objective is required to transition back to baccalaureate standing before the Bachelor's degree can be conferred.

Second Master's Degree

A student can earn only one Master's degree in any one of the programs offered at Cal Poly. A student who wishes to complete a second Master's degree in another discipline, or two Master's degrees simultaneously, must complete all requirements for both degrees. For students admitted Fall 2017 and after, there will be no double-counting of any units for students who are pursuing a second Master's degree¹. Units taken toward a degree that was never earned either at Cal Poly or elsewhere will not be considered double-counting. Cal Poly's Office of the Registrar will validate if Cal Poly postbaccalaureate/graduate enrollments listed on the Formal Study Plan were not needed to meet any previously awarded Master's degree. However, students who want to use postbaccalaureate/graduate enrollment from another institution must provide Cal Poly's Office of the Registrar with an official letter from a regionally accredited institution indicating that the coursework was not needed to meet any Master's requirements.

To add a second Cal Poly's Master's degree, a student must complete a Postbaccalaureate Change of Objective form, secure all signatures, and submit the completed form to the Graduate Education office.

¹ This limit does not apply to any programs that have Chancellor's Office preapproved unit reductions such as the Engineering Management (EMP) degree.

EXTENDED EDUCATION

Science Bldg. (52), Room E34
Phone: 805.756.2053
extended@calpoly.edu
<https://extended.calpoly.edu/>

Interim Dean of Extended Education: J. Kevin Taylor

Cal Poly Extended Education is a self-support unit that works closely with its university, business, community, and international partners to provide access to Cal Poly's unique academic programs and educational resources. We offer a diverse range of degree programs, professional certificates, online courses, and international education programs. Our primary international education program for incoming short-term students is VISIT, visit.calpoly.edu (<https://visit.calpoly.edu/>).

Information on programs and current courses is listed on our website at Extended Education (<https://extended.calpoly.edu/>) where online registration is available.

For details about Cal Poly's continuous enrollment requirements for graduate students, see the Graduate Education Continuous Enrollment webpage (<https://grad.calpoly.edu/policies/continuous-enrollment.html>).

Academic Credit

These programs are offered on a self-support, special session basis in cooperation with colleges on campus.

Graduate Degrees

Program name	Program type
Business Analytics	MS
Fire Protection Engineering	MS
Packaging Value Chain	MS
Quantitative Economics	MS
Taxation	MS

Graduate Certificates

Program name	Program type
Fire Protection Engineering Applications	Graduate Certificate
Fire Protection Engineering Science	Graduate Certificate

Fire Protection Engineering – Graduate Certificates

The College of Engineering offers graduate certificate programs in Fire Protection Engineering Science and Fire Protection Engineering Applications through Extended Education. Both graduate certificates provide students with the knowledge, skills and tools needed to solve FPE problems and develop fire safety design solutions in a variety of professional settings. The **FPE Science certificate** highlights the science and engineering principles of fire protection engineering. Alternatively, the **FPE Applications certificate** emphasizes the fire service aspect of the industry, including courses that identify fire safety codes and regulations, understanding evacuation models, and information about fire detection and alarm systems.

Open University

Open University allows access to Cal Poly's quality Learn by Doing instruction without formally enrolling in the university as part of a

degree granting program. Open University is not available to students matriculated in state-supported programs at Cal Poly. Enrollment in courses is based on a space available basis.

A maximum of 36 units of Open University credit and other extension credit may be applied towards a Cal Poly bachelor's degree. If approved by the Graduate Coordinator, graduate students may apply a maximum of 12 non-matriculated units toward the completion of their Cal Poly Master's degree. All units taken outside of matriculation in a Cal Poly Master's program—including Open University units, Special Session units, and units taken at another institution—count toward this maximum. For more details on this policy, please visit the **Courses Taken Through Cal Poly Open University** on Office of the Registrar's website.

Enrollment forms, guidelines, deadlines, and other information about Open University is available online at Open University (<https://openuniversity.calpoly.edu/>). Enrollment in Open University is available year round.

Summer Term

Cal Poly Extended Education manages a self-support Summer Term which provides over 400 academic classes to matriculated Cal Poly students and community members. Summer Term is typically scheduled in four sessions: 5-week (2), 8-week, and 10-week.

Quarter Plus

The Quarter Plus is an intensive academic program for incoming Cal Poly first-year students that allows incoming students to take courses and experience the campus before the beginning of fall quarter. More information is available on the Quarter Plus website (<https://quarterplus.calpoly.edu/>).

Professional Advancement

For those desiring to upgrade their skills or knowledge, Extended Education offers a wide range of educational opportunities ranging from professional certificate programs to one-day seminars. These courses may offer academic credit, continuing education units (CEUs), or be offered on a non-credit basis.

Current Professional Certificates

Program name	Program type
Agricultural Specialist Certificate Program	Professional Certificate
Business Analytics	Professional Certificate
Design for Packaging Value Chain	Professional Certificate
Packaging Analytics	Professional Certificate
Packaging for Logistics and Supply Chain	Professional Certificate
Packaging for Marketability	Professional Certificate
Packaging Value Chain	Professional Certificate

Other noncredit courses and programs for professional upskilling and reskilling are detailed at the Extended Education (<https://extended.calpoly.edu/programs/professional/>) website.

Corporate and Organizational Training

Extended Education will customize training to meet the specific needs of a business, corporation, or organization. This process starts with a needs assessment and continues through design, implementation and evaluation. Past clients include PG&E, the State of California, and the U.S. Forest Service.

ACADEMIC SUPPORT AND CAMPUS LIFE

Academic Services and Programs

Academic Advising

Our Vision and Mission

Cal Poly strives to provide effective academic advising in an encouraging and welcoming atmosphere to support students as they navigate their undergraduate academic experience and learn to value their education, in order to foster individual academic success.

Academic Advising at Cal Poly is an on-going, intentional, educational partnership dedicated to student success. Cal Poly is committed to building collaborative relationships and a structure that guides students to discover and pursue life goals, support diverse and equitable educational experiences, advance students' intellectual and cultural development, and teach students to become engaged, self-directed learners and competent decision makers.

Which Academic Advisor You Should See

Faculty Advisor

- Advising for major and support courses
- Concentration and elective selection
- Interpretation of courses
- Senior project
- Mentorship
- Internship Opportunities
- Career/graduate school selection

Mustang Success Center Advisor

- Academic advising for first time, first year students
- Change of major information
- Understanding online advising/registration tools/block scheduling
- Selecting General Education (GE) courses
- Transfer credit including AP/IB and courses taken at other colleges
- Connecting with appropriate campus resources

College Primary Role Advisor

- Academic advising for transfer students and continuing students
- Overall degree requirements/creating a degree plan
- Students on academic probation and other specific student populations with specific needs
- Referral to appropriate support services

How to Maximize Your Advising Experience

- Think through what questions you have and contact the appropriate advisor.
- Take the initiative to meet with your academic advisor regularly and follow through with recommendations.

- When you email faculty or staff members, use your Cal Poly email account (@calpoly.edu) and be sure to sign your name. Be professional. Be sure to clearly explain questions or requests.
- Check your Cal Poly email daily, and reply in a timely manner to all correspondence methods (both email and phone calls).
- Silence your cell phone prior to advising appointments.

What We Expect of You, the Student

Students share responsibility for a successful university experience and are expected to contribute to effective advising experiences by doing the following:

- Be an active learner by fully engaging in the advising process.
- Attend and be on time to advising appointments and programs, and cancel or reschedule if necessary.
- Be prepared to discuss your goals and educational plans during meetings with advisors.
- Be open and willing to consider advice from advisors, faculty, and other mentors.
- Inform an advisor of any concerns, special needs, or barriers that might affect academic success.
- Know that you are responsible for fulfilling all the requirements of the curriculum which you are enrolled.
- Keep and organize personal copies of all important documents relevant to your academic career and progress to degree.
- Become knowledgeable of the university catalog, campus-/college-/major-specific academic policies and procedures, academic calendar deadlines and degree or program requirements.
- Review your Degree Progress Report (DPR) each quarter and seek assistance to resolve any errors or questions in a timely manner.
- Accept responsibility for your decisions and your actions (or inactions) that affect your educational progress and goals.

What You Can Expect of Your Advisors

Advisors share responsibility for a successful university experience and are expected to contribute to effective advising experiences by doing the following:

- Provide a respectful and confidential environment where you can comfortably discuss academic, career, and personal goals and freely express your concerns.
- Understand and effectively communicate the curriculum, degree/college requirements, graduation requirements, and university policies and procedures.
- Assist you in defining your academic, career, and personal goals, and empower you to create an educational plan that is consistent with those goals.
- Actively listen to your concerns, respect your individual values and choices, and empower you to make informed decisions.
- Serve as an advocate and mentor to promote your success.
- Encourage and support you as you gain the skills and knowledge necessary for success.
- Respond to your questions through meetings, phone calls, or email in a timely manner during regular business hours.
- Collaborate with and refer you to campus resources to enhance your success.
- Maintain confidentiality of your student records and interactions.

- Keep regular office hours and be available to meet with you.
- Participate in evaluating and assessing advising programs and services to better serve you.

Contact Information for College Advising Centers

Contact	Phone #
Mustang Success Center	805.756.6211
College of Agriculture, Food & Environmental Sciences	805.756.7574
College of Architecture & Environmental Design	805.756.1325
Orfalea College of Business	805.756.2601
College of Engineering	805.756.1461
College of Liberal Arts	805.756.6200
College of Science & Mathematics	805.756.2615

Other Academic Advising Services

Contact	Phone #
Academic Skills Center	805.756.1256
Athletics Advising	805.756.7041 or 805.756.7043 or 805.756.6495
Disability Resource Center	805.756.1395
Educational Opportunity Program	805.756.2301
Mathematics Placement Exam (MAPE)	805.756.2206
Graduate Education	805.756.2328
Health Professionals Advising	805.756.2615
Student Academic Services	805.756.2301
TRIO Achievers	805.756.1395
Writing and Learning Center (EPT, Early Start English, GWR, tutoring)	805.756.6032

For more information, go to <https://advising.calpoly.edu/>.

Cal Poly International Center

Cari Vanderkar, Assistant Vice Provost for International Programs

Bldg (52), Room E-32
 Phone: 805.756.1477
international@calpoly.edu
<https://international.calpoly.edu/>

The primary mission of the Cal Poly International Center is to provide leadership and coordination for international activities and programs and to serve as a catalyst for internationalization efforts at Cal Poly. The IC maintains administrative authority and university-wide oversight of international engagement and initiatives supported by the campus. We are committed to providing equity and access to services and programs for the populations we serve, including for students studying abroad and international students and scholars at Cal Poly. We provide support to campus efforts in internationalizing the curriculum and in creating global partnerships.

Cal Poly's vision for internationalization is to provide foundational experiential learning, teaching, service and scholarship opportunities at home and abroad that will best equip graduates and the campus

community at large to solve complex global challenges sustainably, ethically and inclusively. Learn by Doing in a global context drives students, faculty and staff to critically evaluate themselves, their own cultures and cultural identities, their values and place in the world. It promotes growth in character, ability to handle ambiguity, reflexive and relative thinking, and ultimately, greater personal fulfillment. It fuels informed global systems thinkers and doers, and activates Cal Poly students to be positive forces in the world.

International Students and Scholars

intlservices@calpoly.edu
<https://intladvicing.calpoly.edu/>

The International Students and Scholars unit of the International Center provides services and programs aimed at meeting the unique needs of international students and scholars throughout their academic careers at Cal Poly. International Center staff provide immigration advising and visa documents, pre-arrival information, orientation programs and cross-cultural programming for all international students, which include degree-seeking students and non-degree students (those attending Cal Poly through our Cal Poly International Exchange Programs, CSU International Programs, and the VISIT Cal Poly Program).

Programming offered by the International Students and Scholars unit includes the International Welcome Ambassador Program which pairs incoming international students with continuing Cal Poly students to share their cultures and to develop friendships. International Welcome Ambassadors also provide a support system to assist new international students with adjusting to Cal Poly and the "SLO Life." The Poly Hosts Program (pairing Cal Poly employees with international students) and the English Conversation Program are some of the other programs provided by the International Students and Scholars unit to assist students with cultural adjustment and connecting with the community.

The International Students and Scholars unit is also the first point of contact for campus community members who want to invite visiting scholars such as faculty, staff, and researchers from abroad to come to Cal Poly to help foster collaboration, joint research, and cross-cultural exchange.

Study Abroad Programs

studyabroad@calpoly.edu
<https://abroad.calpoly.edu/>
<https://studyabroad.calpoly.edu/>

Students interested in studying abroad should begin by visiting the Cal Poly Abroad website, registering for and participating in a Study Abroad 101 Workshop, and planning ahead to meet their academic, financial and personal goals. Peer Advisors and Study Abroad Advisors are available to provide guidance. Please check Cal Poly Abroad for drop-in advising hours, appointment hours, workshop and info sessions, and study abroad planning resources.

Study Abroad and Exchange Eligibility Requirements

Students must be in good academic and disciplinary standing at Cal Poly to be eligible to participate in study abroad or exchange programs. In addition, students must meet the eligibility requirements of their chosen programs. Academic eligibility standards vary by program, and most require a minimum 2.5 GPA and at least one letter of recommendation. Participants may not study abroad during their first quarter at Cal Poly. Students who are on Academic Probation at the time of application, or the term prior to studying abroad, are ineligible to participate. Students

must be off Disciplinary Probation by the time of their programs start abroad and have completed other sanctions by the time of application to the programs abroad. Students are strongly encouraged to seek pre-approval for courses prior to departing for their terms abroad. If a program is located in a country where there is a U.S. Department of State Travel Advisory of Levels 3 or 4, Cal Poly may not provide the approval to participate in the program or pre-approve the transfer of credits.

Cal Poly Global Programs

Cal Poly Global Programs are study abroad programs that offer students opportunities to study with Cal Poly faculty in multiple locations worldwide. Ranging from one week to a full term in length, these programs present a highly flexible model responding to specific curricular goals. Planned with a focus on general education courses and/or courses applicable to one or more Cal Poly major(s) or minor(s), Cal Poly Global Programs may be open to students in all majors or to students in targeted fields of study only. Check our website for the current program offerings.

Cal Poly International Exchange Programs

Cal Poly colleges have exchange agreements with a variety of universities around the world. Through these exchanges, students have an opportunity for cost effective, easily arranged study abroad experiences within their own academic disciplines. Students who qualify for one of these exchanges pay Cal Poly tuition fees and applicable fees. Students can spend up to one academic year at overseas universities as regularly enrolled students. For further information about international exchange programs, students should check with the Cal Poly Abroad website.

California State University International Programs

California State University (CSU) International Programs are CSU systemwide programs that allow participants to earn resident academic credit at their home CSU campuses while they pursue full-time study at host universities or study centers abroad for a semester or academic year. The CSU International Programs suite of options serves the needs of students in over 100 designated academic majors. Affiliated with more than 50 recognized universities and institutions of higher education in 18 countries, CSU International Programs also offers a wide selection of study abroad destinations and learning environments.

Cal Poly Partner Programs

Cal Poly has formal partnership relationships with several non-profit and/or consortium program providers that allow Cal Poly students to study as guests of affiliated universities or at specialized study centers. Each partner provider offers thematic study options at a variety of locations throughout the world. For further information about partner programs, students should check with the Cal Poly Abroad website, visit partner websites, or schedule appointments with an advisor in the International Center.

National Student Exchange (NSE) Consortium

Undergraduate students are able to spend up to one calendar year at another NSE member college or university in the U.S., Canada, or the U.S. Territories (of Puerto Rico, Guam, and U.S. Virgin Islands). Since its founding in 1968, more than 118,000 students from all majors nationwide have had the opportunity to study away through the National Student Exchange (NSE). Because students have the option to pay in-state tuition and can use applicable financial aid funding, it can be an affordable study away program option.

International Travel

polytravel@calpoly.edu (Individual faculty and staff travel requests)
<https://abroad.calpoly.edu/> (International Travel for students & groups)

All faculty, staff, and students traveling outside of the U.S. on university business are required to obtain approval and will be enrolled in the foreign travel insurance program (FTIP) through Cal Poly. All documentation must be submitted by the stated deadlines prior to travel and approvals received before travel expenses are incurred. Travel abroad may include activities such as attending or presenting at conferences, participating in tours, conducting funded research, student internships, club activities, or taking students on non-credit international field trips. Please check to see if your destination is deemed high hazard. In general, independent student travel to countries listed as high hazard will not be approved unless the student is accompanied by a Cal Poly faculty or staff member. Students must remain in good academic and disciplinary standing to participate. For deadlines and information on how to complete a travel packet, faculty and staff traveling without students are to go to University Travel - Cal Poly. Students and faculty and staff traveling with students are to go to International Center - Cal Poly Abroad and select *International Travel*. Please note, researching or applying for a Study Abroad program is a separate process under *Study Abroad*.

Cal Poly Scholars

Bldg. 52, Room E-25
 Phone: 805.756.7164
<https://scholars.calpoly.edu/>

The Cal Poly Scholars Program seeks to support and retain high-achieving, low-income students from California schools by providing financial, academic, and community resources and support. As a university-wide program, the Cal Poly Scholars program brings together a network of services including the Office of Financial Aid & Scholarships, Mustang Success Center, all six academic colleges advising centers, Career Services, University Housing, Student Academic Services, and other campus collaborators. The Scholars are enrolled across all six academic colleges and are actively pursuing degrees from 50+ majors.

Intercollegiate Athletics

Mott Athletics Center Bldg. (42), Room 207
 Phone: 805.756.2924
 Athletic Advising: 805.756.7043, 805.756.7041 or 805.756.6495

Eligibility for competition in intercollegiate athletics is regulated, in general, by the rules of the National Collegiate Athletic Association (NCAA), as well as the University and applicable conference. The Director of Athletics is responsible for adherence to all eligibility rules. The Faculty Athletic Representative has the responsibility for the interpretation of the NCAA, conference, and university rules for determining student-athlete eligibility to represent the university in intercollegiate athletic events.

All 21 teams compete at the NCAA Division I level.

Cal Poly is committed to providing equal opportunities to men and women students in all campus programs, including intercollegiate athletics.

Library Services

Adriana Popescu, Dean of Library Services

Robert E. Kennedy Library (Bldg 35)

Phone: 805.756-5760

<https://lib.calpoly.edu/>

Kennedy Library supports Cal Poly's mission by promoting open and informed inquiry in an inclusive and welcoming environment, fostering collaboration and innovation, supporting the unique needs of every student and scholar at Cal Poly, and contributing to the cultural life of San Luis Obispo.

Kennedy Library selects and delivers information in all formats, provides active learning environments, promotes the skills that are needed for student success, and collects and preserves unique collections.

Services

The library offers consultative and instructional services delivered by expert library faculty serving each of Cal Poly's colleges as well as in areas that serve the entire academic community, such as digital scholarship and special collections. In addition, the library provides students with print and electronic access to selected course materials through its course reserves service; and rapid access to books and articles held by other regional libraries through its interlibrary borrowing service. Reference and research help is provided at service desks and via 24/7 live chat. The 24-hour study space, Hub24, is located on the first floor of the library and is open 24 hours every day throughout the year.

Instruction

Librarians partner with faculty to help students develop research skills relevant to all disciplines. They work with students to ensure they acquire and practice the skills they need to succeed in a complex information environment. This includes finding quality information and using it to communicate skillfully through a variety of media. The librarians and a team of peer-to-peer student assistants teach more than 400 workshops each year and provide web-based resources to supplement in-class instruction.

Technology

In partnership with Information Technology Services, the library offers students, faculty, and staff many services including access to the campus high-speed wireless network, technology rentals, and 300 computers with instructional related software applications. Oversized and specialty (CAD) printing services are also available from the campus print and copy service located in the library. Student technicians are on staff to help.

Assistive Technology

Kennedy Library provides general-use assistive technology/collaboration stations throughout the building, featuring a range of assistive hardware and software applications including screen readers, dual displays and height adjustable tables. Sensus Access software is also provided for a self-service, alternate media solution to automatically convert files into a range of alternate media including audio books, e-books, and digital Braille.

Electronic and Print Resources

Kennedy Library provides access to more than 60,000 electronic scholarly journal titles, as well as to major online indexes and full text databases. These electronic resources are available to Cal Poly students, faculty and staff anytime and anywhere. The library also has over 600,000 eBooks, a physical collection of 300,000 print volumes, and a significant number of

other items, including maps, government documents, senior projects and master's theses.

Special Collections and Archives

Established in 1969, Special Collections and Archives makes primary source collections available for public research and customized instruction sessions. Each year, thousands of items are digitized for easy online access, from organizational records and architectural drawings to oral histories and photographs. Collecting strengths include California architecture, limited edition artists' books, the graphic arts, and regional history. Examples include the Central Coast Farm Labor Organizing Collection, the Julia Morgan Papers, the Louis Family Papers, the Moore Underground Comix Collection, the Re/Collecting Project Archive, and the San Luis Obispo Environmental Archives, and the Women's Zine Collection.

The University Archives documents the history, growth and development of Cal Poly, dating from the founding of the university in 1901 to the present. The archives include presidents' papers, campus and student publications, the LGBTQIA Oral History Project, and web content such as the Mustang News website and the Cal Poly YouTube channel.

DigitalCommons@CalPoly

One of the first and largest institutional repositories in the California State University system, DigitalCommons@CalPoly promotes discovery, research and cross-disciplinary collaboration by collecting, preserving and providing online access to scholarly work created at Cal Poly. DigitalCommons@CalPoly archives faculty research and student scholarship including theses, senior projects, and graduate internship reports. Since its inception in 2008, more than 23 million scholarly items have been downloaded worldwide. Members of the Cal Poly academic community are invited to contribute completed scholarship for long-term preservation and worldwide access through DigitalCommons@CalPoly.

Digital Projects Lab

Digital Project Lab provides specialized guidance in learning complex data analysis and data visualization tools. With dedicated computers, large screen monitors, and GIS and statistics tutors on-site, Digital Project Lab provides an ideal environment for students to learn, experiment and develop their skills in analyzing and visualizing data.

Facilities

Kennedy Library offers a variety of seating and study spaces on five floors, with ample natural light and views of the surrounding hills. The library offers 40 study and collaboration spaces, including large collaboration rooms, group study rooms and two dedicated graduate student study rooms; all are equipped with large screen monitors and whiteboards. There are two additional collaboration rooms, the Video Studio and Virtual Meeting Room, which support student presentation preparation and virtual conferencing. The library offers a secure and expanded 24-hour study space on the first floor. The library offers more than 2000 seats for study and collaboration, specialty printing and copying services and a café. The library's atrium features a landscaped patio and shaded seating on four upper balconies. Kennedy Library is visited more than 1.5 million times a year and has been regularly voted "Best Study Spot" by students.

Events and Exhibits

Kennedy Library offers ongoing events and exhibits including: Faculty Exhibit Program; Conversations with Cal Poly Authors, which celebrates books published by Cal Poly faculty; and Data & GIS Workshops, a series of talks and events related to data resources and visualization tools.

Exhibits are curated in partnership with Cal Poly students and faculty, as well as members of the Cal Poly community, and often feature faculty and student creative works and unique holdings of Special Collections and Archives.

Partners

Kennedy Library is proud to partner with programs that support student learning. Among the partners located in the library are Academic Programs and Planning; Academic Skills Center; the Center for Teaching, Learning and Technology; the Writing and Learning Initiatives, ITS Service Desk and Tech Rental; Student Ombuds Services; Cal Poly Print and Copy; and the University Honors Program.

Office of Student Research

Research, Economic Development & Graduate Education (R-EDGE), Bldg. 38, Room 101

Phone: 805.756.6442

<https://studentresearch.calpoly.edu>

studentresearch@calpoly.edu; [@calpolystudentresearch](#) (Instagram)

Director: Dr. Jane Lehr

The aim of the Office of Student Research is to increase Learn by Doing research opportunities for students at Cal Poly. The Office of Student Research also coordinates Cal Poly's participation in the annual CSU Research Competition, the UNIV 421 Summer Undergraduate Research Experience course, and —with the CSU LSAMP Program — serves as a primary contact for students participating in the California Forum for Diversity in Graduate Education.

The goals of the Office of Student Research are to:

1. Increase transparency of access for student research opportunities in all disciplines
2. Support the professional development of mentors and mentees — including a focus on diversity, equity, inclusion and justice in student research contexts — via individual advising, consultations, workshops, and other collaborations
3. Work with colleges, Graduate Education, and other campus entities to enhance their existing student research programs and build capacity in new areas
4. Increase the funding available to support student research
5. Develop and integrate meaningful metrics that allow us to measure outcomes and impact of research participation for students and mentors

The Office of Student Research aims to support all interested Cal Poly students to find and thrive in student research opportunities.

Office of Writing and Learning Initiatives

Academic Skills Center (p. 446)

Writing and Learning Center (p. 446)

Dawn Janke, Executive Director

Kennedy Library, Room 202A

Phone: 805.756.2066

<https://writingandlearning.calpoly.edu>

The Office of Writing and Learning Initiatives supports student learning and achievement by coordinating a variety of programs and services, including the CSU Early Assessment Program, academic preparation and placement in English, the Graduation Writing Requirement, the Academic Skills Center, and the Writing and Learning Center.

Academic Skills Center

Kennedy Library (35), Room 112

Phone: 805.756.1256

<https://asc.calpoly.edu/>

The Academic Skills Center (ASC) offers academic enrichment resources and programs, including an online study strategies library, Supplemental Workshops in Math and Science, and Study Session groups. The goal of Supplemental Workshops and Study Session groups is to provide a peer-to-peer collaborative learning environment whereby students engage in activities designed to foster deep knowledge and understanding in foundational courses. The ASC is committed to empowering students to take an active approach to their learning and attain their academic goals. For more information on learning services available through the ASC, visit their website at <https://asc.calpoly.edu>.

Writing and Learning Center

Kennedy Library (35), Room 111C

Phone: 805.756.6032

<https://writingandlearning.calpoly.edu/center> (<https://writingandlearning.calpoly.edu/center/>)

The Writing and Learning Center supports academic achievement by offering peer-to-peer tutoring in a welcoming environment. Undergraduate and graduate tutors are available for one-to-one or small-group consultations on any activity, assignment, or exam for courses and subjects across all six colleges; drop-in learning support is also available through subject-specific Help Hubs. The Center's free, collaborative tutoring sessions are student-driven, which means that the learning experience is propelled by the specific questions and individual needs the student brings to the session. As a result, the center provides a unique space on campus dedicated to student-centered learning. More information on the Writing and Learning Center's services is available at <https://writingandlearning.calpoly.edu/center> (<https://writingandlearning.calpoly.edu/center/>).

Pre-Health Career Advising

College of Science and Mathematics Student Services

Bldg. 53, Room 211

Phone: 805.756.2615

prehealth@calpoly.edu

<http://prehealth.calpoly.edu> (<http://prehealth.calpoly.edu/>)

Cal Poly State University offers excellent advising and resources for all university students and alumni who are interested in preparing for a career within a health professions field. The College of Science and Mathematics Student Services is dedicated to mentoring students throughout their college career, helping them to prepare for post-baccalaureate studies in the health professions. Due to the competitive nature of these programs, it is strongly recommended that students plan to seek advice early in their college career to gain an understanding of the components needed to build a competitive applicant profile.

Pre-Health Career Advising

Pre-health career advising is designed to help students explore the health professions as a possible career and enhance a student's competitiveness for admission into a graduate and/or post-baccalaureate program in the health professions. Students should meet with a Pre-Health peer advisor to learn about health career options, required coursework, gaining experience in health care, and other aspects of becoming a competitive candidate. Professional staff provide specific, detailed application advising for students in their application year including personal statement development, interview preparation and more, all targeted at developing the most competitive, well rounded applicants.

Pre-Health Related Courses

Cal Poly offers health-related courses to assist students who are interested in exploring a health professions career. Please see course descriptions below.

SCM 101 Introduction to Health Profession Careers

SCM 301 Professional School Preparation for Health Profession Careers

SCM 363 Public Health Fieldwork

BIO 253 Health Professions Shadowing

BIO 301 Service Learning in the Health Professions

Student Academic Services

Student Academic Services

Building 52, Room E7
Phone: 805.756.2301
<https://sas.calpoly.edu/>

Student Academic Services (SAS) offers comprehensive programs that directly support academic excellence. Students can utilize a network of academic services, advisors, and activities designed to assist them in acclimating and excelling at Cal Poly. Services include admissions and transition support, new first-year student seminars, supplemental workshops and study group assistance. Advising services are focused on students from traditionally underrepresented backgrounds in the California State University System. Counselors provide assistance to students with class scheduling, assessment of academic skills, graduation planning, career clarification and related learning and study skills. The goal of SAS is to ensure that all students have equal opportunity to achieve academic success, feel a sense of belonging and graduate. Student Academic Services incorporates the following programs:

Center for Military-Connected Students

Building 52, Room E4
(805) 756-6838
military@calpoly.edu

The Center for Military-Connected Students provides assistance and support to student veterans and military dependents to navigate available Veterans Affairs and community resources.

Educational Opportunity Program (EOP)

Building 52, Room E7
Phone: 805.756.2301
<https://sas.calpoly.edu/>

EOP provides admissions, academic and personal support programs for low-income, historically disadvantaged students. EOP offers counseling, study sessions, academic orientation courses, career and post-graduate advising, and referrals to campus and community resources.

Educational Talent Search

Building 58, Room 109
Phone: 805.756.2301
<https://sas.calpoly.edu/>

Cal Poly Educational Talent Search (ETS) is a federally funded TRIO program that serves low-income and/or potential first-generation students in grades 7 through 12 in local targeted area schools. The goal of ETS is to assist students in graduating from high school and to encourage them to enter college. ETS offers interactive school site workshops and informational sessions led by program staff, University field trips, parent information workshops and pre-college advising focused on college entrance requirements and financial aid.

TRiO Achievers

Student Services Bldg (124), Room 119
Phone: 805.756.1395
<https://sas.calpoly.edu/>

TRiO Achievers is a federally funded TRIO program of the U.S. Department of Education. It is designed to assist low-income, first-generation students, as well as students with disabilities, by enhancing their academic skills, increasing their retention and graduation rates, and promoting graduate and professional school programs.

Summer Institute

Building 52, Room E7
Phone: 805.756.2301
<https://sas.calpoly.edu/>

Summer Institute (SI) is a residential summer academic orientation program held annually for newly-admitted EOP first-year and transfer students. The program provides a mini-quarter of academic and social activities, including six units of courses, opportunities to become familiar with the campus and its services, connections with academic advisors, faculty, and students in the same field of study, and study skills which help students realign current study habits to meet college level demands.

Upward Bound

Building 58, Room E7
Phone: 805.756.2301
<https://sas.calpoly.edu/>

Upward Bound (UB) is a federally funded TRIO college preparatory program for low-income and/or potential first-generation college students. This program motivates and academically prepares students in local target area high schools. The academic program and residential summer school session at Cal Poly offer tutoring, career advising and supplemental instruction, as well as cultural and recreational activities.

Transfer Center

Bldg (52), Room E-30
 Phone: 805.756.7778
transfer@calpoly.edu
<https://transfercenter.calpoly.edu/>

The Cal Poly Transfer Center is committed to serving the particular needs of our diverse transfer student population while advancing institutional support for transfer students. Resources, community, and advocacy are the three main goals of the Transfer Center. The Transfer Center offers support and tools to assist students in achieving their desired personal, community, academic, and professional goals as they progress through their educational journey. The Transfer Center is a resource for all current transfer students as they navigate the academic and cultural landscapes of transitioning to and graduating from Cal Poly.

University Advising-Retention

Building (52) Room, D-28
Retention@calpoly.edu (retention@calpoly.edu)

Our Vision and Mission

We envision a student-centered and compassionate campus community where the path to graduation for all Cal Poly students is free of institutional barriers, guided by equitable policies, and bolstered by proactive advising.

Our mission is to put students and equity first in Cal Poly's efforts to increase persistence and graduation rates. The University Advising-Retention team prioritizes proactive advising strategies, provides timely and supportive outreach to students, and serves as a guide for navigating campus systems. We amplify student voices, leverage data, and nurture campus relationships in our efforts to remove institutional barriers and cultivate a culture of care.

Provide guidance for those needing time off from Cal Poly

Retention specialists assist undergraduate students in navigating Informal Time Off, Leave of Absence and University Departure. This includes help preventing unexpected financial and academic costs related to time off, making individual referrals to supportive campus professionals and providing support to ensure a smooth reentry following time off.

Strengthen academic support systems

In partnership with campus academic advising centers, University Advising-Retention applies insight gathered from data and student voices to inform advising priorities. The retention staff develops systems to reach students at pivotal points in their academic journeys (e.g., while students are on leave, quarterly registration periods, just before graduation) to provide an additional level of advising support when action is time-sensitive.

Address barriers to academic progress and graduation

Retention partners with campus colleagues to implement more student-centric policies and practices. This includes increasing accessibility to and simplifying processes for taking time off, ensuring student change of major inquiries receive timely responses from academic departments and that requirements meet

university guidelines, and improving access to necessary student support resources.

University Honors Program

Jasna Jovanovic, Director
 Robert E. Kennedy Library, Bldg. 35, Room 510
 Phone: 805.756.7029
<https://honors.calpoly.edu/>

Cal Poly founded its University Honors Program in 1999. The mission of the program is to offer an academically enriched learning experience for Cal Poly's most outstanding and highly motivated students. Serving the entire university, the program provides a supportive and inclusive community for aspiring scholars seeking to challenge themselves, participate in experiential and interdisciplinary learning, serve others, and expand the boundaries of their academic potential.

In support of this mission, the Honors Program provides curricular and co-curricular programming designed to foster intellectual engagement, knowledge discovery, interdisciplinary collaboration, and the mutual exchange of ideas. Courses, seminars, leadership opportunities, research projects, mentoring experiences, service projects, study abroad programs, dedicated meeting/study space, and a learning community in campus housing provide Honors students with opportunities to expand and enrich their academic experiences in the company of similarly motivated peers. Following Cal Poly's hands-on approach to education, students may participate in community projects and co-curricular activities to enhance their coursework, develop leadership skills, gain global perspectives, and build relationships across academic disciplines.

The Honors Program currently supports hundreds of Cal Poly students demonstrating a wide variety of backgrounds, interests, and talents. These students represent nearly 60 different majors in all six colleges on campus. Graduates of the Honors Program leave Cal Poly with a broad and enriched education. In addition, they earn "with Honors" distinction on their diploma and special recognition during commencement.

Students interested in joining the Honors Program should contact the Honors Office in Kennedy Library, Room 510 (Ph: 805-756-7029; E-mail: honors@calpoly.edu) regarding the application procedure and minimum qualifications. Applications are accepted from first-time freshmen, community college transfers, and continuing Cal Poly students who have completed less than five quarters in residence.

Academic Standards

To maintain membership in the Honors Program, students must perform well academically, complete their Honors course requirements in a timely manner, communicate regularly with the program, and maintain good character. The Honors Program reviews each student's academic performance and progress quarterly. A student's Cal Poly (CPSLO) cumulative GPA is used as the primary measure of academic performance. Minimum CPSLO cumulative GPA requirements are as follows:

- 3.3 by the end of the student's first year;
- 3.4 by the end of the student's second year;
- 3.5 by the end of the student's third year; and
- 3.5 by the end of the student's fourth year and at the time of graduation.

Program Learning Objectives

The following Program Learning Objectives (PLOs) define what Honors students will know and be able to do by the time they graduate from Cal Poly and the University Honors Program:

1. Demonstrate attitudes supportive of the Honors Program community;
2. Mentor peers effectively;
3. Communicate effectively with others;
4. Apply leadership principles to organize and direct the efforts of a group
5. Make reasoned decisions based on an understanding of diversity, sustainability, global perspectives, technology, and ethics;
6. Function effectively as a member of an interdisciplinary group or team;
7. Integrate knowledge and skills from different disciplines to solve problems;
8. Plan, carry out, document, and defend a capstone project;
9. Demonstrate skills in information literacy and the ability to self-direct one's learning;
10. Demonstrate a strengthened sense of community, civic responsibility, and philanthropy.

Program Requirements and Curriculum

In addition to the academic standards listed on this page, Honors students must satisfy the program course requirements, complete a senior project or capstone experience within their major, document a campus or community leadership experience, and document a mentor (or learning assistant) experience. Honors students must file leadership and mentor experience documentation prior to their final quarter on campus.

Program course requirements are noted below. Honors students declare a research, study abroad, or community service track during their second year in the program. Students enroll in HNRS 361 to complete their "Honors Track" requirement. Guidelines, conditions, and requirements associated with these tracks are available through the Honors Program office.

REQUIRED COURSES

Select from the following: 2-6

HNRS 100	Introduction to the Honors Community ¹	
HNRS 161 & HNRS 162 & HNRS 163	Creating Sustainable Communities I and Creating Sustainable Communities II and Creating Sustainable Communities III	
HNRS 261	Leadership: Self Evaluation	1
HNRS 361	Honors Track - Research, International, and Community Service Experience ²	1
HNRS 461	Honors Capstone Seminar	1

APPROVED ELECTIVES

Select at least five additional HNRS or HNRC courses¹ 14-18

Total units **23**

¹ Students who take HNRS 100 will need to take an additional 4 units of Approved Electives HNRS courses.

² Complete one of the following Honors Tracks: a research project, a study abroad or international experience, or community service.

University Studies

Academic Programs and Planning
Kennedy Library (35), Room 319
Phone: 805.756.2246
<https://academicprograms.calpoly.edu/>

University Studies (UNIV) courses provide an opportunity for interdisciplinary study, addressing university-wide learning objectives (such as diversity and sustainability). UNIV courses are offered across college boundaries, typically carrying GE credit. The offerings are subject to available funding.

Office of University Diversity and Inclusion

Bldg. 01, Room 209
Phone: 805.756.2250
<https://diversity.calpoly.edu/>

Established in 2010, the Office of University Diversity and Inclusion (OUDI) leads university efforts to build and support diversity, equity, and inclusion into all aspects of campus life, both academic and co-curricular. OUDI connects with partners and aligns university-wide efforts in order to achieve inclusive excellence, attract and respond to a diverse campus community, and nurture an equitable and inclusive campus climate. OUDI is a primary stakeholder at university decision making tables and is committed to ensuring that Cal Poly is a place where respect and sense of belonging are present for all. OUDI also leads the BEACoN Mentors Program, the President's Diversity Awards, and a number of other initiatives across campus.

Student Resources

Campus Health and Wellbeing

Student Health Center (Bldg. 27)

<https://chw.calpoly.edu/>

Campus Health and Wellbeing supports student success through quality, holistic care and the promotion of lasting wellness. A variety of services are offered for students, including primary medical care and walk-in medical services, laboratory testing, onsite X-rays, prescription medications, over-the-counter medications, mental health crisis intervention, individual, couples and group mental health counseling, mental health trainings/workshops, health education programs, and wellbeing services. Campus Health and Wellbeing assists students by minimizing class time lost due to illness, injury, or personal concerns. The Health Services Fee covers most of these services. An After-Hours Nurse Advice Line and a Psychological Crisis Line are available at no cost when the Student Health Center is closed. Students may reach the After-Hours Nurse Advice Line by calling the regular Health Center's phone number (805.756.1211). The Psychological Crisis Line may be accessed by calling the regular Counseling Services phone number (805.756.2511).

Health Services: Phone: 805.756.1211 (24/7 Advice Nurse Line)
Counseling Services Phone: 805.756.2511 (24/7 Psychological Crisis Line)

Wellbeing Services Phone: 805.756.6181
 Safer (Sexual Assault Advocacy): 805.756.2282

Health Services offers primary medical care, walk-in medical services, symptomatic COVID-19 testing, nursing services, sexual health care, gender-affirming care, and routine laboratory testing and X-ray procedures. Services are provided year-round, Monday through Friday, 8:00 a.m. to 4:30 p.m. (Wednesdays, 9:00 a.m. to 4:30 p.m.) All of these services are included in the Health Services Fee.

Low-cost additional medical services include prescription medication, over-the-counter items, outside laboratory tests, immunizations, orthopedic supplies, and specialized services as available.

Wellbeing Services offers evidenced-based prevention education and programming to support the holistic well-being of students. Led by a team of professional staff, the wellbeing team trains students to be certified peer health educators in the PULSE Program (Peers Understanding Listening Supporting Educating) and offers professional services, including advocacy and recovery support to provide a safe and inclusive community for students.

- **Safer advocacy** provides individual crisis advocacy for students experiencing sexual violence, dating violence, intimate partner violence and stalking. Services are provided by state-certified advocates.
- **Individual Health Education consultations** can be scheduled with a Health Educator or certified peer health educator to discuss various health topics, resources and strategies to manage stress, alcohol and drug use, physical health and emotional health.
- **Recovery support** programming is available for students with a history of addiction. Students can join the Mustangs for Recovery program to build their community of support. Allies are welcome!
- **Prevention, Education & Outreach** programming, including workshops, wellness fairs and alternative programs, are a great way for students to learn healthy habits and build their community.
- The **Cal Poly Food Pantry** is a no-cost service and is a part of the Hunger Program. It is available to students in need of healthy, nutritious food.
- The **Massage Chair** is available for students to schedule 30-minute massages.

All of these services are included in the Health Services Fee.

Counseling Services promotes the development of holistic emotional health. As mental health professionals, the department serves the campus community through advocacy and the provision of confidential, accessible services. Counseling Services helps students develop and maintain the skills integral to mental health through hands-on workshops; individual, couples and group therapy; crisis intervention; consultations with parents, faculty, and staff; and, mental health trainings. All of these services are included in the Health Services Fee. For more details, visit Counseling Services (<https://hcs.calpoly.edu/content/counseling/counseling-home/>).

Career Services

Student Services (Bldg. 124)
 Phone: 805.756.2501
<https://careerservices.calpoly.edu/>

Career Services empowers students to achieve a lifetime of meaningful career success and supports them throughout their academic journey at Cal Poly.

Career Counseling and Exploration

Career Counselors assist students with discovering their strengths, interests and personality characteristics, creating dynamic career plans, and building their professional network. Students considering a change of major are encouraged to utilize Career Services so that they become better informed about career options. Students will learn how to explore the link between academic majors, their areas of interest and internship, co-op, fellowship, job, and graduate school choices. Through advising, workshops, and interactive experiences, students will develop the skills and strategies needed to achieve their professional goals.

Internship and Job Search

Students are guided through the search process, which includes identifying and researching employers, developing resume/cover letters, preparing for interviews, and meeting with employers through career fairs, campus interviews, networking events, information sessions and other career-related events.

Various opportunities, on-campus employer interviews, career fairs, and networking events are listed through the MustangJOBS online platform. Employers enthusiastically recruit our students for local part-time jobs (on-campus and off-campus), co-ops, internships, summer jobs, fellowships, and career positions (state, regional, and national). Students may also schedule career counseling appointments through MustangJOBS with a Freshman Focus Team member or specific College Specialist.

Graduate School Exploration

Career Counselors can assist students with the graduate school admission process, which includes identifying and researching potential graduate programs. As part of this service, students learn about the process of applying to graduate school, preparing personal statements and completing the necessary requirements for admissions.

The Center for Bystander Intervention and Cal Poly (WITH US)

Administration Building (01) Room 206
<https://www.withus.org/>

WITH US: The Center for Bystander Intervention at Cal Poly is a national research center aiming to create safe campus communities where all students can thrive. The mission is to empower peer-led movements of proactive bystander intervention. The Center is dedicated to the study of college student bystander behavior and expanding the application of bystander intervention theory and research to prevent harm and lives lost in situations where bystander intervention could have been a mitigating factor.

Specific focus areas of prevention and harm reduction include: (1) sexual assault, sexual harassment, and intimate partner violence, (2) bias, exclusion, and discrimination (3) hazing, (4) unhealthy alcohol and other drug misuse, and (5) mental health concerns.

WITH US is led by a team of expert social psychology and public health faculty researchers, multidisciplinary prevention practitioners, and experienced higher education administrators. Our work is dedicated to combating bystander apathy and empowering communities of proactive

bystanders (Upstanders) to improve the health, safety, and success of college students.

The organization is centered on four commitments:

- **Research:** committed to conducting and supporting quality research on college student bystander intervention behavior, attitudes, motivators and barriers to helping.
- **Resources:** committed to developing and curating evidence-based resources to support students and educators in their campus prevention and health promotion efforts.
- **Outreach:** committed to fostering national movements of bystander intervention alongside the National Network for Peer Accountability, a national prevention coalition.
- **Education:** committed to providing research-based education programs and awareness campaigns that cultivate communities of skilled prosocial bystanders

CSU-LSAMP Program

California State University (CSU) Louis Stokes Alliance for Minority Student Participation (LSAMP) in STEM Program

Center for Engineering, Science & Mathematics Education (CESAME), Bldg. 25, Room 129
Phone: 805.756.2875
lsamp@calpoly.edu
<https://lsamp.calpoly.edu/>

Faculty Director at Cal Poly: Dr. Jane Lehr
Staff Coordinator: Erica M. Garcia

The CSU-LSAMP Program is designed to support undergraduate students who face or have faced social, educational and/or economic barriers to careers in science, technology, engineering, and mathematics (STEM) fields. The goal of the CSU-LSAMP Program is to increase the persistence and graduation rates of students from underrepresented groups who major in STEM disciplines. To accomplish this goal, the CSU-LSAMP Program at Cal Poly provides advising, community-building activities, professional development opportunities, and financial assistance to support successful transitions to Cal Poly and to careers in STEM fields. The CSU-LSAMP program emphasizes activities designed to enhance graduate school and career preparedness, including undergraduate research experiences, support for community college transfer students in STEM, and opportunities for student participation in academic conferences and international activities. CSU-LSAMP is supported by the National Science Foundation (NSF) under Grant No. HRD-1826490 and the CSU Chancellor's Office.

To be eligible for financial assistance, students must face or have faced social, educational and/or economic barriers to careers in STEM; be a U.S. citizen or permanent resident; and be enrolled at Cal Poly in an eligible STEM major. Examples of social, educational, and/or economic barriers include: a first generation college student; California community college transfer student; low income (as represented by Pell Grant, EOP, or SSS eligibility or via eligibility for need-based financial aid); a U.S. military veteran; disability-eligible based on documentation from the Disability Resource Center; a graduate of a Cal Poly Partner High School; and being a member of a racial-ethnic group that is recognized by the National Science Foundation as "historically underrepresented in STEM: African American, Hispanic American, American Indians, Alaska Natives, Native Hawaiians, and Native Pacific Islanders." Please see for

more information and to apply online at CSU-LSAMP at Cal Poly (<https://lsamp.calpoly.edu/>).

Disability Resource Center

Student Services Building (124), Room 119
Phone: 805.756.1395
www.drc.calpoly.edu (<http://www.drc.calpoly.edu>)

The Disability Resource Center's mission is to cultivate an accessible and inclusive community where students with permanent and temporary disabilities have an equal opportunity to participate in all aspects of campus life. It facilitates student learning and access through partnerships with students, faculty, and staff.

Students wishing to use disability-related services and accommodations meet with an access specialist to review eligibility. Advance planning is strongly encouraged.

Office of the Dean of Students

Hillcrest Building 81
Phone: 805.756.0327
deanofstudents@calpoly.edu
deanofstudents.calpoly.edu (<https://deanofstudents.calpoly.edu/>)

The Office of the Dean of Students creates opportunities that increase access, allow for exploration of advocacy and privilege, and promote a welcoming campus climate. We foster individual strengths, self-exploration, community building and collaboration; encourage personal and academic success through self-advocacy, leadership and accountability; and equip the Cal Poly community with tools to become lifelong learners and global citizens.

Programs and services housed within the Office of the Dean of Students support student learning and service through:

- Helping students manage academic and nonacademic situations;
- Consulting extensively with faculty and staff on behalf of student concerns;
- Interpreting and assisting with understanding campus policies and procedures;
- Providing student centers, clubs and organizations to foster a healthy student life;
- Cultivating a caring, supportive campus and community environment;
- Engaging supporters meaningfully to enhance the student's experience, and;
- Creating space for the celebration of great achievements and unity, culminating with commencement.

Student Rights and Responsibilities

Student Rights and Responsibilities (<https://osrr.calpoly.edu/>) administers the California State University Standards for Student Conduct. This ensures a fair and impartial administration of the disciplinary process while educating students about their responsibilities and protecting the rights of all members of the university community.

Student Support, Success and Retention

Student Support, Success and Retention (<https://deanofstudents.calpoly.edu/sssr/>) is responsible for ensuring students' success by providing support, advocacy and follow-up services in collaboration with other university departments, individuals and

stakeholders. It provides support to academic colleges by working directly with students, faculty and administration to reduce barriers to student success, collaborating with the colleges to establish meaningful campus support services, and by providing direct, early intervention in problem-solving to ensure retention and graduation.

Students with Dependents

The Students with Dependents program provides care and support to Cal Poly students who are parents, guardians, and caregivers at the undergraduate and graduate level. The program is committed to helping students succeed, both as parents and scholars by offering programs and advocacy that enrich and support parenting student's academic, personal, and professional goals.

Former Foster Youth (FFY)

The Former Foster Youth initiative provides support to students formerly in the foster care system. This initiative aims to create a support system that enhances the academic success and personal well-being of former foster youth attending Cal Poly.

Student Diversity and Belonging

Administration Bldg. 01, Room 206
805.756.1521

<https://studentaffairs.calpoly.edu/diversity> (<https://studentaffairs.calpoly.edu/diversity/>)

We believe every person has the right to feel welcomed, respected and valued at Cal Poly. Together with our campus partners, Student Affairs aims to create campus communities that reflect the diverse population of our state, and provide equity, access and opportunities for all students, faculty and staff. As a division, we acknowledge that history includes examples of both formal and informal structures, policies, and practices that have limited or excluded opportunities for individuals or groups of people. While efforts have been made to address these inequities, the impact of these structures continues to exist.

<https://culture.calpoly.edu/home> (<https://culture.calpoly.edu/home/>)

Student Diversity & Belonging is a collective of campus resource programs and centers that support and empower students experiencing marginalization, through intersectional advocacy and cultural connections to build a more just and equitable Cal Poly community.

Campus Programs and Centers:

Black Academic Excellence Center

Bldg. 52, Room E23
Phone: 805.756.6774
<https://baec.calpoly.edu/>

The Black Academic Excellence Center (BAEC) is committed to supporting the advancement and excellence of Black students and Black student groups within the Cal Poly community. By fostering an inclusive environment, providing academic support, and promoting a Black excellence, our goal is to empower Black students to take full advantage of all the opportunities presented at Cal Poly while actively engaging with Black history and culture.

Dream Center

Bldg. 52, Room E11
Phone: 805.756.6362

<https://dreamcenter.calpoly.edu/>

The Dream Center offers a safe, inclusive space for all undocumented students, those from mixed-status families, and their allies. The Center maintains the confidentiality of individual students while fostering a welcoming community environment that aligns with the university's commitment to diversity and inclusion. The Dream Center offers a range of programs and services to educate the campus community and support undocumented students' access, persistence, graduation, and post-graduate pursuits.

Gender Equity Center

Bldg. 65, Room 217
<https://gec.calpoly.edu/>

As a part of Student Diversity and Belonging, the Gender Equity Center (GEC) welcomes and supports people of all genders and experiences to cultivate a brave space where they can learn and grow together. Through social justice-based education, programming, and community-building, our work centers students of marginalized genders, including those who are womxn, feminine-of-center, trans, and/or nonbinary.

Men & Masculinities Program

Bldg. 65, Room 209
<https://masculinities.calpoly.edu/>

As a part of Student Diversity and Belonging the Men & Masculinities Program engages the Cal Poly Community with the purpose of creating spaces to critically evaluate expressions of masculinities, their intersections, and men's health and wellbeing. The Men & Masculinities Program is also home to the Men of Color Success initiative which aims to increase retention and graduation rates for men of color through identity exploration, holistic development through cultural affirmation, and "brave space" communities.

Multicultural Center

Bldg. 65, Room 111F
<https://multicultural.calpoly.edu/>

As a part of Student Diversity and Belonging, the MultiCultural Center (MCC) is dedicated to the retention and success of historically underserved students. It is a communal space that is committed to serving the holistic development of our campus' student body, by providing programs and services that: engage students in their identity exploration and development through critical self-reflection and dialogue, center and celebrate the voices and experiences of underrepresented students, and cultivate a sense of belonging through community building, mentorship, and intersectional learning.

Pride Center

Bldg. 65, Room 209
<https://pride.calpoly.edu/>

As a part of Student Diversity and Belonging, the Pride Center supports and empowers students of all sexualities, gender identities, and expressions (SOGIE) to strengthen and unite our Cal Poly community. Within our mission we support and advocate for the unique academic and developmental needs of lesbian, gay, bisexual, transgender, queer or questioning, intersex, asexual/aromantic, pansexual, non-binary and non-conforming students to promote personal growth and success. The Pride Center designs programs that emphasize holistic identity development,

promote individual and community health and wellbeing, and education through an intersectional lens.

LatinX Initiatives

Bldg. 52, Room E22

<https://culture.calpol> (<https://culture.calpoly.edu/home/>)
(<https://culture.calpoly.edu/home/>)

The Latinx Center aims to create an environment that fosters belonging, empowers Latinx students to thrive, and provides them holistic support. In turn, the center will offer Latinx students the opportunity to gather and build community while exploring their cultures, histories, and traditions.

The Latinx Center also host Heritage month programs, including the *State of Latinx* each fall, as well as dialogue, panel, and speaker series throughout the year that are rooted in the diverse needs and experiences of Latinx students. Educational experiences like these will provide everyone in the Cal Poly community opportunities to learn about the Latinx student experience.

Native Center

Bldg. 172

<https://culture.calpol> (<https://culture.calpoly.edu/home/>)
(<https://culture.calpoly.edu/home/>)

The Native American and Indigenous Cultural Center (NAICC) provides a community gathering space featuring mentorship opportunities, academic support, beading and basket weaving workshops, and an Indigenous Peoples' Day celebration. The center will also host Native and Indigenous Heritage Month programs, a speaker series, decolonial healing workshops, dialogues and book circles, art and dance presentations, a film series and commencement ceremony. NAICC will be an intertribal space that will foster partnerships with Cal Poly's American Indian Student Association (AISA), American Indian Science and Engineering Society (AISES), American Indian and Indigenous Faculty and Staff Association, University Housing and Academic Affairs, as well as the yak tit#u tit#u yak ti#ini Northern Chumash Tribe and other local and statewide tribes.

Student Ombuds Services

Patricia Ponce, Student Ombuds

Robert E. Kennedy Library (35), Room 113

Phone: 805.756.1380

<http://ombuds.calpoly.edu>

The Office of Student Ombuds Services provides students with a safe place to seek confidential guidance on university related concerns and complaints. All communications are confidential, informal, and neutral, and will not be disclosed to anyone unless given permission to do so except when required by federal or state law, when there appears to be imminent risk of serious harm to self or others and issues around sexual misconduct. The Ombuds is committed to hearing about students' experiences, assisting them in understanding applicable university policies and procedures, and - as appropriate - helping them to resolve informally any university-related issue. The Ombuds adheres to the Code of Ethics and Standards of Practice of the International Ombudsman Association.

Technology Services at Cal Poly

Bill Britton, Vice President for Information Technology and Chief Information Officer, Information Technology Services (ITS)

Hub24, Kennedy Library

Phone: 805.756.7000

Email: servicedesk@calpoly.edu

<https://tech.calpoly.edu/>

Cal Poly's Information Technology Services (ITS) offers a wide range of technology services and resources (<https://tech.calpoly.edu/services/>) in support of student success. Upon acceptance into the university, each student receives credentials (<https://tech.calpoly.edu/services/calpoly-account/>) from ITS that allow them to log in to their Cal Poly email account (<https://tech.calpoly.edu/services/email-and-calendar-o365/>), connect to campus Wi-Fi (<https://tech.calpoly.edu/wifi-connect-cal-poly-networks/>) and access the My Cal Poly Portal (<https://tech.calpoly.edu/services/my-cal-poly-portal/>) (my.calpoly.edu). The Portal is the online hub where many official university transactions are handled, like planning quarterly schedules, registering for classes and paying tuition. As a Cal Poly student, a number of software titles are available for little or no cost. A list can be found at: Software Downloads (<https://tech.calpoly.edu/services/software-downloads/>).

Whether you are in search of services or need urgent tech help, the ITS Service Desk offers friendly concierge support by phone, email and walk-in from their location in the Hub24 Computer Lab in Kennedy Library (<https://tech.calpoly.edu/contact/>). Service Desk staff offer assistance with account passwords (<https://calpoly.atlassian.net/wiki/spaces/CPKB/pages/2424940/Password+Help/>), PolyCard (<https://tech.calpoly.edu/services/polycard/>), connecting devices to Wi-Fi, and other campus technology needs.

Student Affairs

Office of the Vice President for Student Affairs

Administration Building (01) Room 206

805.756.1521

<https://studentaffairs.calpoly.edu/>

Student Affairs delivers innovative co-curricular learning experiences that directly impact student recruitment, retention, and graduation from Cal Poly. The division is committed to the active engagement, wellbeing, inclusion, and success of all students as they progress to graduation and accomplish lifelong aspirations. Student Affairs drives graduation initiatives set forth by the California State University (CSU) and is intrinsically involved in the university's commitment to create a comprehensive, integrated strategy that improves graduation rates and closes the achievement gap for various student populations.

The Office of the Vice President for Student Affairs oversees departments that promote success throughout the Cal Poly experience by providing Learn by Doing opportunities, delivering innovative, student-centered programs, encouraging personal growth, and empowering our students within a safe, healthy, inclusive and supportive environment.

Vision

The vision of Student Affairs is to inspire all students to embrace their unlimited possibilities.

Values

Champion the student

Student Affairs provides comprehensive support, guidance and advocacy to create the environment for all students to reach their full potential.

Create visionary programs and services

Student Affairs serves as a leader in delivering innovative and extraordinary co-curricular learning experiences that directly impact student recruitment, retention and graduation.

Sustain meaningful partnerships and collaboration

Student Affairs partners throughout the campus and local community, building strong relationships through active communication to foster an inclusive environment for student success.

Cultivate continuous learning

Student Affairs matches the quality of Cal Poly's in-class experiences with out-of-class experiences that enhance Learn by Doing.

Promote ethics, integrity and respect

Student Affairs values and celebrates all students, staff, faculty, parents and the extended community with a commitment to employ honest and ethical decision-making practices in all that the division does.

Student Success-Focused Programs and Services

The Office of the Vice President for Student Affairs provides divisional leadership, support and oversight of the following units and departments: Associated Students, Inc. (student government, facilities operations, programs and services), Intercollegiate Athletics, access and equity programs (New Student and Transition Programs, Educational Opportunity Program, Cal Poly Scholars, Academic Skills Center, Disability Resource Center, Center for Military-Connected Students), Campus Health and Wellbeing (medical services, counseling services, health education, wellbeing, Safer), Career Services, Commencement, Leadership and Service (Clubs and Organizations, Fraternity and Sorority Life, Center for Leadership, Center for Service in Action), Office of the Dean of Students (Cal Poly Cares, Office of Student Rights and Responsibilities, student crisis management), Student Diversity and Belonging (Black Academic Excellence Center, Dream Center, Gender Equity Center, Men and Masculinities Program, Multicultural Center, Native American and Indigenous Cultural Center, Pride Center), Parent and Family Programs, and University Housing. In addition, the office oversees divisional strategic planning, assessment and research, marketing, fund development, dining programming, and advocates to the community, policy-makers, and the Chancellor's Office for all student engagement and programming outside of the classroom.

Campus Life

Associated Students, Inc.

Location: Julian A. McPhee University Union, Building 65, Room 212
Phone: 805-756-1281
Email: asi@calpoly.edu
www.asi.calpoly.edu (<http://www.asi.calpoly.edu>)

Mission Statement

Our mission is to enhance the quality of student life and complement the educational mission of Cal Poly through meaningful social, cultural, recreational, and educational programs. We provide valuable experiences through student advocacy, shared governance, student employment, and leadership opportunities.

Vision Statement

Connecting students to their ultimate college experience.

ASI Tagline

Experience life outside of the classroom.

About ASI

Associated Students, Inc. (ASI) is an inclusive, empowering, student-driven organization committed to providing programs, services, and facilities that enhance and develop the student learning experience. Cal Poly students are stakeholders in ASI and have access to leadership positions through Student Government and on-campus employment. All of these opportunities are designed to complement Cal Poly's educational mission, support a balanced education, and give students ownership and pride in their college experience.

History

Cal Poly's Associated Students organization was established in 1940 and officially incorporated in 1964. ASI operates in the form of shared student governance representing the collective student voice of Cal Poly. We are one corporate, legal entity responsible for the administration and oversight of all ASI programs and services.

ASI continues to relish in its heritage of serving students. It is fully invested in student success and here to provide state-of-the-art, well-managed facilities, programs, and resources to help students reach their full potential.

Funding

The primary funding for ASI comes from student fees comprised of two major components: the ASI fee and the University Union fee. These fees are collected when Cal Poly students enroll in classes and provide base funding for all ASI operations.

Fees are intended to serve students through ASI programs and services, as well as the maintenance and operation of ASI-managed facilities, including the Julian A. McPhee University Union, Cal Poly Recreation Center, Cal Poly Sports Complex, Orfalea Family and ASI Children's Center, and Doerr Family Field.

ASI Student Government

University Union (65), Room 202
Phone: 805-756-1291

ASI Student Government is comprised of elected and volunteer student leaders who act as the collective voice of the student body. Student leaders work together to practice shared governance, student advocacy, and collaboration with campus and community entities to ensure student interests are represented at every level.

There are three branches of Student Government:

ASI Executive Cabinet: Members are appointed by the ASI president and chief of staff and work to carry out the president's goals. Elected in the spring, the ASI president serves for the academic year and is responsible for providing input regarding corporate operations and student advocacy.

ASI Board of Directors: The official voice of Cal Poly students. The board is comprised of representatives from each academic college who establish policies and parameters for the affairs, properties, personnel, and operations of ASI.

University Union Advisory Board (UUAB): Works to maintain the integrity of the University Union student body fee, which students pay quarterly as part of their tuition. Makes policy recommendations regarding ASI-managed facilities.

ASI Children's Programs

The Orfalea Family & ASI Children's Center is one of the most sought-after learning facilities on the Central Coast.

Cal Poly students have first priority to enroll their children at the center, which provides quality early care and education services to children from four months of age through kindergarten. Cal Poly faculty and staff receive second priority for enrollment, followed by Cal Poly alumni and community members.

The center provides a learning environment where children are encouraged to explore ideas and interests through detailed project work that is focused on the children's interests, ideas, and discoveries.

The center serves 125 children and currently maintains a waitlist to enroll new children. Adding a child's name to this list is the first step toward enrollment.

Cal Poly Rose Float

Building 50L
Phone: 805-756-1268

Students of Cal Poly Universities in San Luis Obispo and Pomona work together each year to create the only student-built float in the annual Rose Parade. Cal Poly has been invited to participate in the parade for over 70 years. The university's Learn by Doing motto is exemplified in all facets of the program as students get hands-on experience turning their concepts into creations.

The Cal Poly Universities have been recognized for their float designs over 10 straight years, earning the Viewers' Choice Award, Bob Hope Humor Trophy, Fantasy Trophy, and the Lathrop K. Leishman Trophy for the most beautiful non-commercial float.

All majors and skill levels are welcome to contribute to any stage of the creative process, including designing, welding, metal shaping, woodworking, painting, and flower harvesting.

ASI Business Office

University Union (65), Room 212
Phone: 805-756-1281

The ASI Business Office is located within the University Union and is the operational location for numerous internal services, including Human Resources, Information Technology, general corporate administration, and Accounting. This is the hub that supports all programs and services of ASI.

ASI employment and job recruitment is managed through the ASI Business Office. The organization employs more than 75 full-time and part-time career employees. ASI also employs over 500 students, who act as the driving force behind the organization's ability to create quality programs and services for all students. On-campus employment through ASI provides valuable work experiences and leadership opportunities. Students are equipped with the tools to develop their skills in a professional setting with an organization that prioritizes academics above all else.

Students can work in a variety of positions, including childcare, graphic design, fitness instruction, lifeguarding, photography, event planning, facility management, and more. Students interested in employment opportunities with ASI can visit the ASI Jobs website to apply.

ASI PROGRAMS

ASI Club Services

University Union (65), Room 203
Phone: 805-756-5807

ASI Club Services connects students to more than 350 clubs at Cal Poly, working as a partner with the university to administer day-to-day club operations. ASI Club Services also works with ASI Student Government for the allocation of club funding, which the ASI Board of Directors provides to student organizations on an annual basis to support their club, club event, or club insurance needs.

ASI Events

University Union (65), Room 203
Phone: 805-756-1112

ASI Events offers a variety of fun activities and social events for Cal Poly students to enjoy at little-to-no cost. From comedians and trivia to movie nights and concerts, ASI Events provides a variety of opportunities throughout the year for students to build connections and experience college life outside of the classroom.

ASI Craft Center

University Union (65), Room 111
Phone: 805-756-1266

Create, design, relax, and restore in the ASI Craft Center with a variety of class offerings and studios for all skill levels to explore. Student instructors lead creative classes that all students and Cal Poly community members can experience at low costs, including ceramics, baseball-bat making, frameworking, skateboard making, and surfboard shaping.

ASI Poly Escapes

Cal Poly Recreation Center (43)
Phone: 805-756-1287

Limitless adventure awaits with ASI Poly Escapes, a premier outdoor adventure program with more than 60 outstanding yearly excursions and guided trips throughout San Luis Obispo County and California. Trips are led by student leaders who receive 12 to 18 months of training and take students to destinations including Big Sur, Yosemite National Park, and Death Valley National Park.

ASI Poly Escapes boasts an outdoor climbing park at the Cal Poly Recreation Center that is available to all skill levels. A rental shop featuring a variety of camping, hiking, paddling, and climbing gear is also available to help students and community members gear up for their next adventure.

ASI Recreational Sports Programs

With ASI Recreational Sports, students have access to numerous activities and programs that allow them to go above and beyond their recreational ambitions. Programs and services are housed at the Cal Poly Recreation Center and include the following:

ASI Intramural Sports: With more than 3,000 participants per quarter, ASI Intramural Sports are a popular activity among Cal Poly students. A variety of indoor and outdoor team sports, leagues, and tournaments are available at low costs to keep participants in the game all quarter long.

Students can create their own teams or register as free agents for basketball, soccer, flag football, softball, futsal, volleyball, dodgeball, racquetball, and more.

Wellness: A healthy lifestyle starts with you, and our wellness program is here to help you reach your goals. We bring world-class experts in nutrition, diet, and exercise to the Cal Poly Recreation Center for interactive classes and workshops that all members of the Cal Poly community can experience.

Fitness & Personal Training: More than 80 group exercise classes are available per week for students and Cal Poly Recreation Center members. Complimentary classes represent discipline areas of mind and body, cardio, strength and tone, and cross training including yoga, Pilates, indoor cycling, and more.

Additional fee-based classes, such as TRX and Krav Maga, provide an opportunity to experience unique classes that will challenge the body and mind for a well-rounded fitness experience.

Nationally certified personal trainers are available to individuals or small groups to provide specialized fitness programs and training. A complimentary personal training session is available to all Recreation Center members. This orientation session includes an introduction to facility equipment and a customized workout designed to help the member reach their fitness goals.

Aquatics: Students and Cal Poly Recreation Center members can choose from a variety of classes and activities in the Olympic-size lap and leisure pools. Swim instruction, group exercise, safety certifications, scuba certification, and pool deck relaxation are all available through the aquatics program.

The Pro Shop: Located in the main lobby of the Cal Poly Recreation Center, The Pro Shop provides members easy accessibility to workout gear, class reservations, lost and found items, and towel service. The Pro Shop provides a wide selection of items available for checkout, rental, or purchase for members to use during their workout or recreational activity.

ASI-MANAGED FACILITIES

Julian A. McPhee University Union (UU)

The Julian A. McPhee University Union is the gathering place for the Cal Poly community. Commonly referred to as the UU and its surrounding outdoor area as the UU Plaza, it acts as the center for campus activities. The UU is home to the majority of ASI programs, including ASI Events, ASI Club Services, the ASI Craft Center, ASI Student Government, and ASI Business Services, in addition to Chumash Auditorium, Chandler Lounge, numerous university organizations, and dining establishments. It is fashioned with a variety of seating areas, computer kiosks, charging stations, Wi-Fi, sound, hydration stations, and digital TV displays for advertising and up-to-the-minute news or sports coverage. Conference rooms, Chumash Auditorium, and the UU Plaza are available for reservation to hold meetings, conferences, or events.

Cal Poly Recreation Center

Cal Poly Recreation Center (43)
Phone: 805-756-1366 Main

The Cal Poly Recreation Center is the premier destination for fitness, recreation, relaxation, and wellness on campus. This cutting-edge facility offers state-of-the-art equipment, a variety of complimentary group fitness classes, multiple exercise rooms, an indoor track, six gymnasium courts, six racquetball courts, equipment checkout at The Pro Shop, personal training, an Olympic-size lap pool, leisure pool, sand volleyball courts, recreation areas, relaxation zones, wellness workshops, and the ASI Poly Escapes Climbing Park and Rental Center. Faculty, staff, alumni, and emeritus staff are welcome to purchase memberships and utilize the facility.

Orfalea Family and ASI Children's Center

Orfalea Family and ASI Children's Center (133)
Phone: 805-756-1267

The Orfalea Family and ASI Children's Center features seven classrooms and an outdoor area for play and discovery. Two full-time teachers and several Cal Poly student employees are present in every classroom to ensure each child receives individual care and attention. The center serves approximately 120 children from four months of age through kindergarten. Student parents have the first priority for enrollment, followed by Cal Poly faculty and staff, alumni, and community members. The center provides a learning environment where children are encouraged to explore their ideas and interests through detailed project work. The center is licensed and monitored by Community Care Licensing, is a demonstration site for the Outdoor Classroom Project, and has achieved all standards for national accreditation.

Cal Poly Sports Complex

The Cal Poly Sports Complex refers to the more than 40 acres of outdoor, lighted playing fields primarily used for student recreational sports programs, intercollegiate athletics, and outdoor club activities. These spaces include five basketball courts, four soccer fields, three softball fields, and three artificial turf fields. Lower fields include a NCAA regulation baseball stadium and softball stadium.

Doerr Family Field

Doerr Family Field is a synthetic turf field lined for flag football, NCAA football, and soccer. The field is open to the Cal Poly community for Frisbee, football, soccer, or fitness conditioning and used for student recreational sports programs, intercollegiate athletics, and special events.

Cal Poly Corporation

Corporation Administration Bldg. (15)
Phone: 805.756.1131

The Cal Poly Corporation is a separate non-profit §501(c)(3) organization serving the university across several key support functions:

- Commercial Operations – Campus Dining, University Store, Cal Poly Downtown, Cal Poly Print & Copy, Conference and Event Planning, Commercial Licensure, and Alcohol Licensure
- Financial & Support Services – Post-award sponsored projects, centers and institutes, Aid-to-Instruction Programs, Swanton Pacific Ranch, Technology Park, ASI, Performing Arts Center, Cal Poly Arts, Bella Montana faculty-staff housing, administration of gifts, holding, usage and liquidation of real property & gifts-in-kind, administration

of special activity accounts, and funding advances or guarantees for projects

A Board of Directors comprising of students, faculty, community leaders and university administrators oversees Cal Poly Corporation operations.

Leadership and Service

Center for Leadership

The Center for Leadership (<https://leadership.calpoly.edu/>) fosters socially responsible leadership development through high-impact practices, programs and events that are innovative, inclusive and educational. Its events and services combine theories of leadership with action-based approaches that aim to help students serve their communities and society as a whole. Students are encouraged in their leadership skill development, leadership competency, assumption of leadership and service roles, and the continuation of service to one's community after graduation.

Center for Service in Action

The Center for Service in Action (<https://serviceinaction.calpoly.edu/>) connects students with meaningful community service opportunities that complement their educational experience, strengthen their understanding of diversity and social responsibility, and develop skills to become ethical and knowledgeable leaders who contribute to a global society. The center cultivates reciprocal service and learning partnerships between the university and community partners. It also serves community-based organizations and governmental institutions seeking university support to address unmet community needs.

Clubs and Organizations

The mission of the Clubs and Organizations (<https://clubs.calpoly.edu/>) Cal Poly is to develop a safe, fun, and competitive environment, experience recreational and competitive athletic events, and represent Cal Poly at competitions across the nation. Cal Poly Club Sports promotes the positive values of physical activity, learned skills, team development, and sportsmanship acquired through participation in competitions and organized activities.

Club Sports

The Club Sports (<https://clubs.calpoly.edu/>) program provides a form of athletic and educational activity, which is an integral part of collegiate life. It provides a common theme for a diversified student body, faculty, staff, and alumni to operate as partners both inside and outside the community. The program promotes positive values of physical activity, learned skills, team development, and sportsmanship acquired through participation in competitions and organized activities.

Fraternity and Sorority Life

The Fraternity and Sorority Life (<https://greeklife.calpoly.edu/>) office fosters the learning and development of students who affiliate with the social fraternities and sororities, and provides opportunities and support for our community to be a relevant and contributing part of fulfilling the mission of both the Office of the Dean of Students and Cal Poly. The office supports Greek members to become ethical leaders and to fulfill the mission of their organizations. It also works to resolve sensitive issues relating to Greek students; recommend training programs for leaders and advisers; assist in prevention and resolution of conflicts between organizations, the campus and community; and serve as the campus representative to national Greek organizations.

New Student & Transition Programs

Science Bldg. (52), Rooms E8-10

805.756.2400

orientation@calpoly.edu

[orientation.calpoly.edu \(https://orientation.calpoly.edu/\)](https://orientation.calpoly.edu/)

The first step for newly-admitted students and their families begins at orientation with a campus visit to preview the campus during the Spring quarter. Summer orientation provides the next steps with an introduction to the Cal Poly community, academic programs, extensive services, and rich traditions.

New Student and Transition Programs offers several program sessions throughout the summer and at the start of the academic year to support new students as they enter and transition into Cal Poly:

- Student Life Orientation (SLO) Days – a Summer Orientation Session for all incoming first-year and transfer students
- Parent & Supporter Orientation – for the parents and family members of new students
- Week of Welcome – a Fall Quarter program for advising and enrollment support

Cal Poly Open House

Cal Poly Open House is an annual, three-day event that showcases the campus to admitted and current students, their supporters, alumni, and the San Luis Obispo community. Stemming from Poly Royal, Open House began in 1994 and has since featured programs such as the university and college welcomes, Friday Nite Invite, Poly Royal Campus Showcase, Poly Royal Rodeo, the tractor pull, and many more fun activities. This event takes place in April each year. Cal Poly's Admitted Students' Preview Day (during Open House weekend) is when admitted students and their supporters have an opportunity to preview the campus and connect with its leaders. Preview Day features presentations, tours and event opportunities to meet college deans, faculty, and current students, and hear from President Jeffrey D. Armstrong about the many resources and programs available to Cal Poly students.

Student Life Orientation (SLO) Days

Student Life Orientation (SLO) Days is a summer orientation program for all incoming students and their supporters. This summer orientation introduces students and supporters to the university through campus tours, information sessions from our many campus offices, student and parent panels, and presentations from Cal Poly's administrators. "The Mustang Way" and "Learn by Doing" mottos are integrated throughout the student and supporter sessions to provide a true Cal Poly experience.

Week of Welcome (WOW)

Week of Welcome (WOW), recognized as one of the nation's largest university orientation programs, integrates thousands of new students to life at Cal Poly during their first week before classes begin in the fall. More than 900 student WOW Leaders volunteer their time to educate new students about campus and community life, educational resources, and valuable services and programs that will help them have successful and fulfilling experiences at Cal Poly.

Student participation in both SLO Days and WOW is mandatory for incoming freshmen.

Parent and Family Programs

Administration Building (01) Room 206
 Parent Helpline: 805.756.6700
 Email: calpolyparent@calpoly.edu
<https://parent.calpoly.edu/>

Parent and Family Programs provides support, resources and exciting programming for the proud parents, family members and supporters of Cal Poly students. The office strives to facilitate communication between and among parents and the university, support student success by increasing parent awareness of university resources and help parents develop strategies to meet the unique challenges of parenting students through the college years.

Parent and Family Programs hosts events throughout the year, including orientation sessions, move-in receptions and Mustang Family Weekend. The office also oversees the Parent Advisory Council, a group of parents and supporters who collectively provide feedback and support to Parent and Family Programs and give input to university leadership on matters involving student development and success.

Public Safety

Building 36
 Administration: 805.756.6652
 Dispatch: 805.756.2281
<https://afd.calpoly.edu/police/>

Cal Poly Public Safety consists of three departments that comprise the Police Department, Department of Emergency Management, and Transportation and Parking Services.

The Cal Poly Police Department (CPPD) is a full service police agency certified by the California Department of Justice. It has the same responsibilities and authorities as any other law enforcement agency in the State of California and has state-wide authority. The CPPD embraces a community policing approach and works collaboratively with the community to address crime and quality of life to create a safe living, learning, and working environment. It includes a 9-1-1 emergency dispatch center that is responsible for all phones, radio communications, emergency medical dispatch, alarm monitoring and dispatch, and all communications for events.

Transportation and Parking Services, includes the management of over 7,300 parking spaces, four parking structures, parking and event planning and traffic flow. Special Events management staff is responsible for the traffic and parking coordination of over 500 campus events a year which brings approximately 700,000 visitors to campus. Commuter and Access Services provide resources for alternative transportation in partnership with local transit, regional RideShare, and bicycle organizations. The Escort Van Service provides free transportation for students, faculty and staff on campus during evening hours.

The Cal Poly Department of Emergency Management (DEM) is the lead coordinating department for all campus-wide emergency management preparedness, response, recovery, and mitigation operations. DEM is responsible for the development, maintenance, and sustainability of a campus-wide comprehensive all-hazard, risk-based emergency management program that engages the whole community. DEM consists of three full time and two part time employees.

Sustainability Practices

Sustainability Practices

"This is an exciting time in campus history as we envision the facilities needed to ensure future generations of students will get the most from Cal Poly's hands-on Learn by Doing education. Our student-created Climate Action Plan to achieve carbon neutrality and climate resilience is a tremendous example of Campus as Living Lab, and will help guide campus development to ensure these new facilities are not only beautiful and functional, but achieve high performance and sustainability through innovation and integrated design." – Jeffrey D. Armstrong President Cal Poly San Luis Obispo, California

Operations

Climate Action Planning

Created over the 2015–2016 academic year in collaboration between Facilities Management and Development and Cal Poly's City and Regional Planning Department, Cal Poly's Climate Action Plan (PolyCAP) was written by a team of 27 senior and graduate students in the CRP 410/411 studio. Many of the proposed strategies are already underway or have been completed ahead of schedule, such as Cal Poly's 4.5 MW solar farm. Data show the university has already reduced greenhouse gas emissions from the built environment (Scopes 1 & 2) to pre-1990 levels, five years ahead of the state mandate, in spite of 100 percent growth in building square footage and on-campus housing since that time. Please download the full report and supporting documents here (<https://afd.calpoly.edu/sustainability/campus-action/climate-resilience/>).

Renewable Energy and Energy Conservation

Cal Poly continues to make progress on its goal of carbon neutrality by 2050. In 2019, greenhouse gas emissions from the campus' built environment (Scopes 1 & 2) were 19 percent below the 2015 baseline year, and 28 percent below 1990 levels. Energy conservation efforts have reduced campus energy use intensity 22% from 2002 levels. Accelerated installation of renewable energy generation across the state from solar, wind, and other renewable energy, have resulted in over 80% percent of Cal Poly's electricity purchase coming from carbon-free sources—up from 59 percent in 2015. Additionally, with the completion of the 4.5 MW Gold Tree Solar Farm in May of 2018, 22 percent of Cal Poly's total electricity needs are now being met by on-site solar generation, with more solar projects in development. Read more about ways Cal Poly is working to reduce GHG from energy (<https://afd.calpoly.edu/sustainability/campus-action/energy/>).

Water Conservation

Being good stewards of water resources and eliminating waste rank among Cal Poly's most important sustainability efforts. Throughout the years, Cal Poly has been an excellent steward of its water resources, having implemented hundreds of water conservation measures. Since 2003, total campus water usage has remained nearly flat despite a 60% growth in building square footage and 100% growth of on-campus residency over the same period. Cal Poly is in the process of increasing water system sustainability and resilience through the development of an on-campus recycled water facility. This facility will treat campus waste water into up to 400 acre-feet per year of recycled water, enough to meet the needs of Cal Poly's campus farm, sports complex, and future landscape. Read more about water conservation at Cal Poly here (<https://afd.calpoly.edu/sustainability/campus-action/water/>).

Waste Reduction

The 2014 CSU sustainability policy set a goal of reducing per-capita landfill disposal 80 percent by the year 2020, then continue toward zero waste. In 2018 Cal Poly achieved 37 percent reduction and in 2019 and 55 percent reduction in per capita disposal over our 2006 base year. Campus recycling efforts include collection of cardboard, paper, bottles and cans, construction and demolition debris, scrap metal, and collection of food scraps, yard waste, and animal manure for composting. But in order to move toward Zero Waste, we need to move up the waste hierarchy and focus on waste prevention, waste reduction and reuse, which are better for the environment than recycling. To that end, Cal Poly has increased reuse of materials through campus surplus and collection of food, clothing and household goods during student Move-Out. Campus Dining is working with Copia to capture edible food for donation rather than compost. In order to further our campus Zero Waste efforts, we are looking at redesigning products and processes in order to eliminate waste before it happens, including reducing single-use packaging, reducing paper use by implementing electronic processes, and encouraging the use of Canvas to deliver all class materials electronically. Want to learn more about how Cal Poly is working towards zero waste, click here (<https://afd.calpoly.edu/sustainability/campus-action/zero-waste/>).

Sustainable Transportation

The greatest challenge Cal Poly faces on its path to carbon neutrality is transforming the way commuters get to campus, as commuting accounts for nearly half of total campus carbon emissions. When commuter and other transportation related emissions (Scope 3) are considered, Cal Poly has reduced total emissions 5% below 1990 levels and only 2% below the 2015 baseline. Transportation and Parking Services implemented numerous initiatives to reduce emissions from commuting, including prohibition of cars for freshmen living on campus, addition of bike racks, expansion of ZipCar and vanpool programs, limiting sale of parking permits, and a pilot to assign parking areas for permit holders to reduce circling. To learn how you can commute to campus more sustainably click here (<https://afd.calpoly.edu/parking/commutingtocampus/>).

Sustainable Food and Dining

As one of the largest commercial services at Cal Poly, Campus Dining strives to lessen the university's environmental impact with programs, products and services that reduce the campus's overall ecological "foodprint." Our sustainability efforts are focused around four key areas; food, waste, water and energy, and green buildings and transportation.

Campus Dining received a Best Practice Award for its food sustainability program in the 2017 Energy Efficiency and Sustainability Best Practice Awards Competition. The program was recognized for increasing food sustainability through procurement, production and waste practices, building partnerships across the campus and employing community outreach and education to promote food sustainability. Read more about Campus Dining sustainability efforts here (<https://www.calpolydining.com/sustainability/>).

Curriculum and Research Infusion

SusCat

As Cal Poly educates future leaders, the university recognizes the benefits teaching sustainability in the classroom. To fulfill sustainability goals set forth by the 2014 CSU Sustainability Policy, Second Nature Climate Commitment, and AASHE STARS a catalog of sustainability focused and related courses and programs was developed, often referred to as SusCat or the Sustainability Catalog. The purpose of the SusCat digital resource is threefold; to help student find courses and

programs that focus on sustainability, to allow faculty to highlight the courses they teach in sustainability, and to track and grow the list of sustainability offerings in Cal Poly academics. Students wishing to focus their studies on sustainability should use this website as a tool to guide selections of major and minor programs and use the site quarterly to determine course choices. To learn more visit suscat.calpoly.edu (<https://suscat.calpoly.edu/>). For a full list of courses, please see the Sustainability Courses website (p.) in the Courses A-Z section of the Cal Poly Catalog.

University Honors Program

In 2018, Cal Poly's University Honors Program won a UC/CSU/CCC Best Practice Award in the Sustainability in Academics category for a three-quarter, first-year learning experience in which students investigated environmental, social, economic and political elements of sustainable communities using both a historical and contemporary lens. The interdisciplinary experience satisfies a general education course requirement and incorporates a number of high-impact educational practices, including collaborative projects, service learning, research, diversity learning and e-portfolios. Learn more here (<https://honors.calpoly.edu/>).

CAFES Center for Sustainability

In 2010, the University formally recognized the CAFES Center for Sustainability, which started as a student-led program in 2000. The Center helped establish the Cal Poly Organic Farm, numerous professional development programs in sustainable pest management, composting, artisan foods and, most recently, the FEED (Farmer Experiential Education and Development) program for veterans entering agriculture. The Center has hosted many of the leaders of the sustainable agriculture movement at Cal Poly and has offered scores of public education programs on organic gardening, permaculture, holistic management, fair trade, bee keeping, carbon farming, and more. The Center also facilitates campus-community collaborations, which have resulted in regional food system initiatives, buy local campaigns, and young farmer coalitions. Visit the Center for Sustainability here (<https://cfs.calpoly.edu/>).

Sustainable Environments Minor

In 2015, the College of Architecture and Environmental Design's 25+ year-old interdisciplinary Sustainable Environments Minor program, completed by approximately 80 students/year from every college on the campus, won a UC/CSU/CCC Energy Efficiency and Sustainability Best Practice Award for Sustainability in Academics. This same program received the top national American Institute of Architects award in 2005 for "Ecological Literacy in Architectural Education." Learn more about the program here (<http://www.catalog.calpoly.edu/collegesandprograms/collegeofarchitectureandenvironmentaldesign/sustainableenvironmentsminor/>).

Campus and Community Engagement

AASHE-STARs Certification

The AASHE (Association for the Advancement of Sustainability in Higher Education) STARs (Sustainability Tracking, Assessment, and Rating System) offers a framework to implement, measure, and improve sustainable practices across the entire university. AASHE STARs uses a detailed data collection and certification process to foster sustainability across the entire campus. Cal Poly began working on AASHE STARs in 2016, earning a silver rating in February 2017, and a gold rating in September, 2019. The full report appears online here (<https://reports.aashe.org/institutions/california-polytechnic-state-university-ca/report/2019-09-19/>).

Green Campus

The Green Campus team works from a student led model with oversight from the Energy, Utilities, and Sustainability department in Facilities. Having the CSU policy goals to work from, the Green Campus team implements conservation projects, expands educational outreach and marketing, infuses sustainability into curriculum, and empower student leaders and clubs to be more impactful. Every year Green Campus team members are trained directly by Sustainability staff on strategies and tactics to engage their peers. Green Campus team members are responsible for targeting all students at the university to become sustainability experts. Green Campus conducts peer to peer outreach by hosting a variety of events ranging from film screenings, festivals and fairs, art installations, panels, and workshops. Team members are also responsible for conducting training for all incoming freshmen during all orientation events and tabling on a weekly basis. In the 2018/19 academic year, Green Campus employed 8 team members who each worked on average 10 hours per week for 30 week of the school year resulting in 2400 hours of peer to peer outreach planning and execution. Interested in joining the team, learn more here (<https://afd.calpoly.edu/sustainability/student/green-campus/>).

Eco Reps

Eco Reps are a group of students committed to creating a culture of environmental stewardship on campus at Cal Poly. Managed by the Green Campus Team within Facilities, Eco-Reps exemplify the "learn by doing" motto and play a direct role in Cal Poly's advancement to a fully sustainable future. Every year Eco Reps collect Green Living Certifications from students who live on and off campus. Through the Green Room and Green Office programs, Eco Reps provide sustainable consultations to students, staff, and faculty to educate and empower the Cal Poly community to live more consciously and in turn reducing Cal Polys energy, water, and waste. The goal of the Green Room Certifications is threefold: to serve as a mechanism to continue increasing sustainability awareness, to bring together already sustainable minded students, and to bring new students into the community. In the 2018/19 academic year, we trained 25 Eco Reps who each worked on average 5 hours per week for 30 week of the school year resulting in 3750 hours of peer to peer outreach planning and execution. Click here to learn more or get involved (<https://afd.calpoly.edu/sustainability/student/eco-reps-greenroom/>).

Zero Waste Ambassadors

Student Zero Waste Ambassadors educate event attendees about waste sorting and ensure that event waste streams result in high waste diversion. In 2018/19, with nearly 150 volunteers, the program reached more than 14,200 attendees at 25 events over seven months and diverted over 3 tons of waste from the landfill. The 150 volunteers worked on average 3 hours, resulting in 450 volunteer peer to peer outreach hours. As of February 2020, Zero Waste Ambassadors had funding to hire 8 student assistants to support events and manage volunteers. To learn more about the program click here (<https://afd.calpoly.edu/sustainability/student/zero-waste-ambassadors/>).

Central Coast Climate Collaborative

The Central Coast Climate Collaborative (4C) is a membership organization fostering a network of local and regional community leaders throughout six Central Coast counties to address climate change mitigation and adaptation. The Collaborative involves representatives from local and regional government, business and agriculture, academia, and diverse community groups to share information and best practices, leverage efforts and resources and identify critical issues and needs. The Collaborative engages all communities throughout the region to help ensure a resilient and low-carbon Central Coast prepared for the impacts of climate change. 4C engages with other collaborative

throughout the state. The Energy, Utilities and Sustainability Department committed funding for student time to support the faculty lead for the 4C, and campus leadership covers 8 units of release time for the Cal Poly Faculty lead to manage the collaborative. To learn more about 4C visit the homepage (<https://www.centralcoastclimate.org/>).

SLO Climate Coalition

In 2017, a group of San Luis Obispo County community leaders formed the SLO Climate coalition to address a growing need for local leadership on Climate Change in order to create a vibrant, just, and climate-resilient Central Coast. The SLO Climate Coalition brings together community expertise, creativity, and resources to champion high impact regional climate solutions that inspire other communities to do the same. The SLO Climate Coalition works in partnership with the City of San Luis Obispo and other local and regional partners. The university partners in this effort by providing technical support from the Energy Utilities and Sustainability department Director and Program Analyst. Read more about the SLO Climate Coalition here (<https://carbonfreeslo.org/>).

Poly Canyon Ventures

Poly Canyon Ventures is a 501(c)(3) non-profit founded by Cal Poly students and managed by Cal Poly Alumni. PCV provides high-impact Cal Poly student-led startups with funding, consulting, and other resources to help them grow and thrive. PCV is accelerating cleantech innovation and entrepreneurship at Cal Poly through the Climate Changer's Fund in partnership with the city of San Luis Obispo Mayor's office (?) and the Cal Poly Department of Energy, Utilities, and Sustainability. The Energy Utilities and Sustainability department has committed \$10K per year for up to 5 years. To learn more about PCV visit their site (<https://polycanyonventures.org/>).

University Housing

Building 31
Phone: 805.756.1226
<http://www.housing.calpoly.edu/>

University Housing provides an inclusive living experience for more than 8,000 Cal Poly students. Engaging programs, led by professional staff and peer leaders in diverse Residential Learning Communities, provide a foundational experience that supports Learn by Doing, encourages excellence, and promotes student success.

Because students who live on campus have greater success in college, Cal Poly requires all first-year students to live on campus.* A second year housing requirement is currently being phased in; please see our website for more information. All campus residents have access to academic, social, wellness and awareness events and enjoy opportunities to build life-long friendships.

**First-year students who do not intend to live on campus may request an exemption. Exemptions from the residential requirement are considered based upon the first-year On-Campus Living Exemption Policy.*

Residential Learning Communities (RLC)

Every resident is part of a Residential Learning Community. RLCs are intentionally designed to respond to the specific academic and social needs of resident students. Students benefit from established learning outcomes and initiatives that support and expand upon their academic experience. Different RLCs are offered to meet the unique needs of first-year, transfer and continuing students. Students can choose RLCs based on their academic college, co-curricular interests, culture and identity or

gender-inclusive preferences. View the complete list of RLCs here (http://www.housing.calpoly.edu/content/res_life/learning-communities/).

Residential Student Experience Staff

RLC programs and activities are administered by Coordinators of Student Development (CSDs)—full-time, live-in professionals who assist residents with getting involved on campus, general referrals, upholding community standards and building a community environment where students live. The CSDs also oversee the Resident Advisors (RAs). Resident Advisors (RAs) are the face and voice of University Housing for students living on campus.

RAs live with and develop positive relationships with every resident in their community. RAs role model the Mustang Way, promote a safe and comfortable living environment, develop community among their residents and staff, and are committed to every student's personal and academic success.

Student Leadership

Student representatives are elected in fall term to serve on community councils (governing boards) in each of the halls and apartments. Participants contribute to their hall's community by planning social, recreational, and educational events, and voicing student-related concerns. The Inter Housing Council is the umbrella student government organization for all the Community Councils.

Residential Technology

Residents have access to technology amenities that support student success in the residential communities. All campus rooms have 24/7 access to the Cal Poly Network and wireless Internet services, including support for academic success and personal connectivity, with a focus on delivering the latest network standards. Additional services include common room media centers, digital signage, TV/streaming media services, and access to a comprehensive Housing Portal to manage your residential service offerings. A current listing of technology services available to residents, including FAQs, can be found here <https://sat.calpoly.edu/restech> (<https://sat.calpoly.edu/restech/>).

Securing Campus Housing

New students

Only students who accept Cal Poly's offer of admission are able to apply for campus housing. To secure a space for first-year or transfer student housing, students must: 1) accept the offer of admission from Cal Poly; and, 2) complete the online housing application, electronically sign the license agreement, and make the initial payment.

Continuing students

To secure a space for continuing student housing, students must complete the online housing application, electronically sign the license agreement, and make the initial payment.

University Housing offers double, triple and quad rooms in our residence halls. Campus apartments feature single and double shared rooms in 4-, 5-, and 6-person apartments. Housing preferences are granted via a lottery system. For complete application information, visit the University Housing website (<http://www.housing.calpoly.edu/student-housing/>).

Fees

The initial payment, required to secure housing, is the first step in the payment process. A non-refundable initial payment may be required for continuing and transfer student applications. The balance of fees for the academic year may be paid via one-time payment, monthly or quarterly payment plan or by quarterly financial aid disbursements. Automatic housing grants are provided to cover a portion

of campus housing fees for students with the greatest financial need. View the current housing fees here:

First-year fees (<http://www.housing.calpoly.edu/student-housing/freshman-housing/freshman-student-housing-fees/>)
Transfer/grad fees (<http://www.housing.calpoly.edu/student-housing/transfer-graduate-student-housing/>)
Continuing student fees (<http://www.housing.calpoly.edu/student-housing/continuing-housing/continuing-student-housing-fees/>)

Off-Campus Housing Resources

University Housing offers off-campus resources for students interested in living in the community including an Educated Renters' Certificate Program to help student renters live successfully in the local community

FACULTY AND STAFF

Office of the President

Title	Name
President	Jeffrey D. Armstrong
Chief of Staff	Jessica Darin
Executive Director of Operations	Kelly Sebastian
Executive Assistant to the President	Barbara Rische
Executive Assistant to the Chief of Staff	Amy Miller
Principal Coordinator for Presidential Events & Protocol	Dana Matteson Seawell
Chief Communications Officer	Chris Murphy
University Legal Counsel	Robin Webb
Ombuds	Patricia Ponce

Academic Affairs

Title	Name
Provost and Executive Vice President for Academic Affairs	Cynthia Jackson-Elmoore
Executive Assistant to the Provost	Delores Lencioni
Associate Vice Provost, Academic Programs and Planning	Bruno Giberti
Interim Dean of Extended Education	J. Kevin Taylor
Assistant Vice Provost for International Programs	Cari Vanderkar
Dean of Library Services	Adriana Popescu
Assistant Vice Provost for University Advising	Beth Merritt Miller
Chair, Academic Senate	Thomas Gutierrez
Interim Dean, Graduate Education	Elizabeth Lowham
Vice President for University Personnel and Chief Human Resources Officer	Al Liddicoat
Associate Vice Provost for Academic Personnel	Kathryn Rummell
Assistant Vice President for AP/Employee & Labor Relations	Adrienne Ratner
CRCO and Clery Director, Title IX Coordinator	Maren Hufton

Colleges

Title	Name
College of Agriculture, Food and Environmental Sciences, Dean	Andy Thulin
College of Architecture and Environmental Design, Dean	Christine Theodoropoulos
Orfalea College of Business, Dean	Damon Fleming
College of Engineering, Dean	Amy Fleischer
College of Liberal Arts, Dean	Philip Williams
College of Science and Mathematics, Dean	Dean Wendt

Administration and Finance

Title	Name
Senior Vice President for Administration & Finance, CFO	Cynthia Vizcaíno Villa
Executive Director, Internal Audit	Dan DiPaola
Assistant Vice President, Divisional Operations	Jennifer Haft
Associate Vice President, Facilities Management and Development	Mike McCormick
Assistant Vice President, Public Safety/Chief of Police	George Hughes
Associate Vice President, Financial Services	Angela Kraetsch
Managing Director, Performing Arts Center	Chris Miller
Assistant Vice President, Strategic Business Services	Dru Zachmeyer

Strategic Enrollment Management

Title	Name
Vice President for Strategic Enrollment Management	Terrance Harris
Director of Admissions and Recruitment	Melissa Furlong
Executive Director of Financial Aid and Scholarships	Gerrie Hatten
University Registrar	Cem Sunata
Executive Director of Institutional Research	Mauricio Saavedra
Interim Director, Enrollment Planning & Management	Joseph Borzellino

Student Affairs

Title	Name
Vice President for Student Affairs	Keith B. Humphrey
Interim Executive Director, Associated Students, Inc.	Michelle Crawford
Director of Cal Poly Athletics	Don Oberhelman
Assistant Vice President for Student Affairs, Health & Wellbeing	Tina Hadaway-Mellis
Interim Executive Director, Career Services	Amie Hammond
Dean of Students	Joy Pedersen
Associate Vice President for Student Affairs, Disability Resource Center	Debi Hill
Director, Leadership and Service	Jason Mockford
Director, New Student and Transition Programs	Andrene Kaiwi
Assistant Vice President for Student Affairs, Diversity and Inclusion	Jamie Patton
Assistant Vice President for Student Affairs, Administration and Divisional Operations	Yukie Murphy

Associate Vice President for Student Affairs and Executive Director of University Housing	Jo Campbell
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Office of University Diversity and Inclusion

Title	Name
Interim Vice President for Diversity & Inclusion and Chief Diversity Officer	Denise Isom
Interim Associate Vice President for Academic Affairs	Jennifer Teramoto Pedrotti
Director of Student Engagement & Inclusion Strategies	Beya Makekau
Staff Fellow	Sarah Macdonald
BEACoN Research Mentoring Program Faculty Fellow	Kelly Bennion
Executive Administrative Assistant	Megan Rivoire

Information Technology Services

Title	Name
Vice President & Chief Information Officer	Bill Britton
Associate Vice President & Deputy Chief Information Officer for Operations	Alison Robinson
Senior Financial Officer	Brett Holman
Director, New Programs	Paul Jurasin
Information Security Officer	Doug Lomsdalen

University Development & Alumni Engagement

Title	Name
Vice President of University Development and Alumni Engagement	Zachary Smith
Associate Vice President, Principal Gifts & Gift Planning	Stacy Cannon
Executive Director, Development Finance & Gift Administration	Lisa Rockwell-Harpster
Associate Vice President, University Development & Alumni Engagement	Grant Kirkpatrick
Director of Administrative Services & Foundation Board Operations	Ericka Horn

Auxiliary Organizations Associated Students, Inc.

Title	Name
Interim Executive Director	Michelle Crawford

Cal Poly Corporation

Title	Name
Chief Executive Officer	Cody VanDorn
Associate Executive Director	Andrea Burns

Cal Poly Chief Executive Officers

Cal Poly has been guided by the following chief executive officers.

Name	Year
Leroy Anderson	1902 to 1908
Leroy Burns Smith	1908 to 1914
Robert W. Ryder	1914 to 1921
Nicholas Ricciardi	1921 to 1924
Margaret Chase (acting)	1924
Benjamin Ray Crandall	1924 to 1933
Julian A. McPhee	1933 to 1966
Dale W. Andrews (acting)	1966 to 1967
Robert E. Kennedy	1967 to 1979
Dale W. Andrews (acting)	1979
Warren J. Baker	1979 to 2010
Robert B. Glidden (Interim)	2010 to 2011
Jeffrey D. Armstrong	2011 to Present

The faculty and staff, who have served at least fifteen years of full-time meritorious service at Cal Poly, are awarded emeritus status. A complete list of faculty emeriti is available at: <https://academic-personnel.calpoly.edu/content/quicklinks> (<https://academic-personnel.calpoly.edu/content/quicklinks/>). Contact Human Resources for information regarding staff emeriti. The University appreciates its emeriti members' contributions to the Cal Poly community.

Distinguished Teaching Award Recipients

In 1963 the University instituted a program of recognizing outstanding teaching efforts through the Distinguished Teaching Awards. Selections for this honor are based upon recommendations of the Academic Senate committee which follows the procedure of soliciting nominations from students and alumni. Evaluations and recommendations of the nominees are based upon an in-depth review by the committee, including classroom visitations. Recipients of the Distinguished Teaching Awards and their departments are listed below.

1963–64	Robert E. Holmquist, Physics John L. Merriam, Agricultural Engineering
1964–65	Joy O. Richardson, Mechanical Engineering Milo E. Whitson, Mathematics
1965–66	A. Norman Cruikshanks, Social Sciences Richard F. Johnson, Animal Husbandry George R. Mach, Mathematics
1966–67	Robert W. Adamson, Mechanical Engineering Kenneth G. Fuller, Mathematics William D. Curtis, Psychology
1967–68	Rodney G. Keif, Environmental Engineering David M. Grant, English Wesley S. Ward, Architecture

- 1968–69 Robert M. Johnson, Mechanical Engineering
Bruce Kennelly, Chemistry
Alice E. Roberts, Education
- 1969–70 Donald W. Hensel, History
David H. Montgomery, Biological Sciences
Philip H. Overmeyer, Business Administration
Willard M. Pederson, English
Omer K. Whipple, Chemistry
- 1970–71 Robert L. Cleath, Speech
Kenneth E. Schwartz, Architecture
Hewitt G. Wight, Chemistry
- 1971–72 Stuart E. Larsen, Aeronautical Engineering
Barton C. Olsen, History
Ronald L. Ritschard, Biological Sciences
Joseph N. Weatherby, Political Science (Social Sciences)
- 1972–73 Lyle G. McNeal, Animal Science
Charles W. Quinlan, Architecture
James E. Simmons, English
- 1973–74 William J. Phaklides, Engineering Technology
Louis D. Pippin, Education
Duane O. Seaberg, Agricultural Management
- 1974–75 Peter Jankay, Biological Sciences
Josephine S. Stearns, Child Development
George J. Suchand, Social Sciences
- 1975–76 James Hayes, Journalism
William V. Johnson, Music
Erna Knapp, Art
- 1976–77 Harry L. Fierstine, Biological Sciences
Grant D. Venerable II, Chemistry
Ralph M. Warten, Mathematics
- 1977–78 Timothy M. Barnes, History
Donald P. Grant, Architecture and Environmental Design
John C. Syer, Political Science
- 1978–79 Pat Pendse, Biological Sciences
Dane Jones, Chemistry
Adelaide Harmon-Elliott, Mathematics
- 1979–80 David J. Keil, Biological Sciences
Thomas Ruehr, Soil Science
Stephen Weinstein, Mathematics
Michael D. Zohns, Ornamental Horticulture
- 1980–81 Sarah E. Burroughs, Food Science and Nutrition (Child Development and Home Economics)
Christina Orr-Cahall, Art
Kendrick W. Walker, Philosophy
- 1981–82 Christina A. Bailey, Chemistry
Kenneth E. Ozawa, Physics
Thomas L. Richards, Biological Sciences
- 1982–83 James Bermann, Agricultural Engineering
Donald J. Koberg, Architecture
Jack D. Wilson, Aeronautical and Mechanical Engineering
- 1983–84 Euel W. Kennedy, Mathematics
- William L. Preston, Social Sciences
Michael J. Wenzl, English
- 1984–85 Robert S. Cichowski, Chemistry
Harvey C. Greenwald, Mathematics
Max E. Riedlsperger, History
- 1985–86 Edward H. Baker, Mechanical Engineering
Sue McBride, Education
Phillip K. Ruggles, Graphic Communication
- 1986–87 Boyd W. Johnson, Mathematics
Craig H. Russell, Music
Calvin H. Wilvert, Social Sciences
- 1987–88 James R. Mueller, Mathematics
Ronald S. Mullisen, Mechanical Engineering
Robert G. Reynolds, Art and Design
- 1988–89 Stephen W. Ball, Philosophy
George Cotkin, History
Abraham B. Shani, Management
- 1989–90 Lloyd N. Beecher, History
Talmage E. Scriven, Philosophy
Jan W. Simek, Chemistry
- 1990–91 Jay L. Devore, Statistics
Linda H. Halisky, English
Ann Morgan, Psychology
James L. Webb, Physical Education & Recreation Admin.
- 1991–92 Mary E. Pedersen, Food Science and Nutrition
John Snetsinger, History
W. Fred Stultz, Psychology and Human Dev.
- 1992–93 Susan Duffy, Speech Communication
Donald K. Maas, University Center for Teacher Education
Charles M. Slem, Psychology and Human Development
- 1993-94 William T. Little, Foreign Languages and Literatures
Steven R. Marx, English
Raymond M. Nakamura, Physical Education & Kinesiology
- 1994-95 Ronald F. Brown, Physics
Lee B. Burgunder, Business Administration
Nancy Lucas, English
- 1995-96 David Keeling, Chemistry and Biochemistry
John Russell, Music
Richard Simon, English
- 1996-97 Leonard Davidman, University Center for Teacher Education
Al Landwehr, English
Robert Thompson, Agribusiness
- 1997-98 John Culver, Political Science
Jay S. DeNatale, Civil and Environmental Engineering
David R. Henry, Speech Communication
- 1998-99 Colette Frayne, Global Strategy and Law
Carol MacCurdy, English
Leonard Myers, Computer Science
- 1999-00 J. Michael Geringer, Global Strategy and Law
Brent G. Hallock, Soil Science

Clinton A. Staley, Computer Science

2000-01 Sky Bergman, Art and Design
Phillip M. Doub, Agribusiness
William Martinez, Jr., Modern Languages and Literatures

2001-02 Kevin Clark, English
Alyson McLamore, Music
Mark Zohns, BioResource and Agricultural Engineering

2002-03 Alvin De Jong, Biological Sciences
Bernard Duffy, Speech Communication
Linda Vanasupa, Materials Engineering

2003-04 Matthew Moelter, Physics
Robert Smidt, Statistics
Nanine A. Van Draanen, Physics

2004-05 Fred DePiero, Electrical Engineering
John Hampsey, English
David Headrick, Horticulture and Crop Science

2005-06 Mary Armstrong, English
Michael B. Miller, Art and Design
Yarrow Nelson, Civil and Environmental Engineering

2006-07 William Fitzhenry, English
Elena Keeling, Biological Sciences
Donald H. Ryujin, Psychology and Child Development

2007-08 Michael Fahs, Communications Studies
Michael Lucas, Architecture
Charles "Tad" Miller, Accounting

2008-09 Derek Gragson, Chemistry and Biochemistry
Josh T. Machamer, Theatre and Dance

2009-10 Eric J. Kantorowski, Chemistry and Biochemistry
J. Kevin Taylor, Kinesiology

2010-11 Thomas H. Davies, Music
Thomas L. di Santo, Architecture

2011-12 Emily N. Taylor, Biological Sciences
Umot Toker, City and Regional Planning
Matthew K Ritter, Biological Sciences

2012-13 Seth Bush, Chemistry & Biochemistry
Jaymie Noland, Animal Science
Dylan Retsek, Mathematics

2013-14 Pat Fidopiastis, Biological Sciences
Matthew Moore, Political Science
Camille O'Bryant, Kinesiology

2014-15 Todd Grundmeier, Mathematics
Sandra Stannard, Architecture
Dustin Stegner, English

2015-16 Robert D. Clark, Kinesology
Karen Muñoz-Christian, Modern Languages and Literatures
Soma Roy, Statistics

2016-17 Brian Kennelly, World Languages and Literatures
Elizabeth Lowham, Political Science
Anthony Mendes, Mathematics

2017-18 Thomas Fowler, Architecture, CAED
Edward Himelblau, Biological Sciences, CSM
Francis Villablanca, Biological Sciences, CSM

2018-19 John Chen, Mechanical Engineering
Dale Clifford, Architecture

2020-21 Aaron Keen, Computer Science and Software Engineering
Matthew Hopper, History
Brad Campbell, English
Francisco Fernflores, Philosophy
Jenn Yost, Biological Sciences

Distinguished Scholarship Award

Prior to 2003-2004, the award was known as the Research, Creative Activities and Professional Development Award but was renamed the Distinguished Scholarship Award. The award was created to recognize faculty member's achievement in scholarship and creative activity across the entire range of disciplines represented at Cal Poly. Nominations are solicited from faculty, students, and alumni, and the Academic Senate's Distinguished Scholarship Awards Committee selects the recipients. The recipients of the award and their departments are listed below:

2003-04 Charles Burt, BioResource and Agricultural Engineering
Joanne Ruggles, Art and Design

2004-05 Estelle Basor, Mathematics
Rami Shani, Management

2005-06 Daniel Bieзад, Aerospace Engineering
Andrew Morris, History

2006-07 Mark A. Moline, Biological Sciences
Craig H. Russell, Music

2007-08 Terry Jones, Social Sciences
Michael Marlow, Economics

2008-09 Patrice L. Engle, Psychology and Child Development
Dean E. Wendt, Biological Sciences

2009-10 George Cotkin, History Department
Rafael Jimenez, Dairy Science

2010-11 Michael Geringer, Management
Jordi Puig-Suari, Aerospace Engineering

2011-12 Christopher Kitts, Biological Sciences
William Hendricks, Recreation, Parks, and Tourism

2012-13 Lanny Griffin, Biomedical & General Engineering
Bernard Duffy, Communication Studies

2013-14 Steven Klisch, Mechanical Engineering
David Marshall, Aerospace Engineering

2014-15 Wyatt Brown, Horticulture & Crop Science
Philip J. Costanza, Chemistry & Biochemistry
Lars Tomanek, Biological Sciences

2015-16 Ronald Den Otter, Political Science
Peggy Papatkakis, Food Science and Nutrition
William Siembieda, City and Regional Planning

2016-17 Patrick Lin, Philosophy
Suzanne Phelan, Kinesiology

- Jay Singh, Industrial Technology and Packaging
- 2017-18 Todd Pierce, English, CLA
 Mohammad Taufik, Electrical Engineering, CENG
 Zoe Wood, Computer Science and Software Engineering, CENG
- 2018-19 John Bellardo, Computer Science and Software Engineering
 Beth Chance, Statistics
 Marni Goldenberg, Experience Industry Management
- 2019-20 Foaad Khosmood, Computer Science and Software Engineering
 Diana Stanton, Theatre and Dance
 Scott Hazelwood, Biomedical Engineering
- 2020-21 Federico Casassa, Wine and Viticulture
 Stephen F. Hamilton, Economics
 Briana Ronan, School of Education

Learn by Doing Scholar Award

The Learn by Doing Faculty Scholar Award recognizes outstanding faculty scholarship on Cal Poly's signature pedagogy. Given for the first time in spring 2015, the award fosters, encourages, shares, and acknowledges Learn by Doing scholarship conducted by Cal Poly faculty.

- 2014-15 Steffen Peuker, Mechanical Engineering
 J. Kevin Taylor, Kinesiology
- 2015-16 Gregory Scott and Alan Kiste, Chemistry and Biochemistry
 Brian Self and James Widmann, Mechanical Engineering
- 2016-17 Lynn Metcalf, Entrepreneurship
 Catherine Waitinas, English
- 2017-18 Soma Roy, Statistics
 Julie Rodgers, Psychology and Child Development
 Graham Doig, Aerospace Engineering
- 2018-19 Katherine Watts, Chemistry and Biochemistry
 Javin Oza, Chemistry and Biochemistry
 Mary LaPorte, Art and Design
 Sara Bartlett, Psychology and Child Development
- 2019-20 Irene Carbonell, Industrial Technology and Packaging
 Javier de la Fuente, Industrial Technology and Packaging
 Robert Arens, Architecture
 Carmen Trudell, Architecture
 Brian Osborn, Landscape Architecture

Outstanding Faculty Advisor Award

In 2001-02 the University instituted a program of recognizing outstanding achievement by a faculty member in the area of student advising. Nominations are solicited from the faculty and staff and students. Recipients' names will be displayed on a perpetual plaque. The recipients of the Outstanding Faculty Advisor Award and their departments are listed as follows:

- 2001-02 Kathryn Rummell, English
- 2002-03 Jack Robison, Accounting
- 2003-04 William Preston, Social Sciences
- 2004-05 Lorraine Donegan, Graphic Communication
- 2005-06 Nfn Taufik, Electrical Engineering
- 2006-07 Abraham Lynn, Architectural Engineering
- 2007-08 Cynthia Moyer, Recreation, Parks and Tourism Administration
- 2008-09 Curtis Illingworth, Architecture

- 2009-10 Philip Costanzo, Chemistry and Biochemistry
- 2010-11 Ron Den Otter, Political Science
- 2011-12 Andrew Davol, Mechanical Engineering
- 2012-13 Leanne Berning, Dairy Science
- 2013-14 John Oliver, Electrical Engineering
- 2014-15 Kristen Cardinal, Biomedical and General Engineering
- 2015-16 Jenell Navarro, Ethnic Studies
- 2016-17 Elena Keeling, Biological Sciences
- 2017-18 Kim Sprayberry, Animal Science
- 2018-19 Lauren Kolodziejski, Communication Studies
- 2019-20 Nishi Rajakaruna, Biological Sciences
- 2020-21 Silvia Marijuan, World Languages and Culture

Provost's Leadership Award for Partnership in Philanthropy

This award was established in 2006 to recognize current or former faculty member's superior achievement in fundraising.

- 2006 Allan J. Hauck, Construction Management
 James A. Rodger, Construction Management
- 2007 Andrew J. Thulin, Animal Sciences
- 2008 Harvey Robert Levenson, Graphic Communication
- 2009 Charles M. Burt, BioResource and Agricultural Engineering
- 2010 Philip S. Bailey, College of Science and Mathematics
- 2011 Bruce L. Golden, Dairy Science Department
- 2011 Phillip S. Tong, Dairy Science Department
- 2012 Allen Estes, Architectural Engineering Department
- 2013 Ignatios Vakalis, Computer Science
 David Wehner, College of Agriculture, Food and Environmental Sciences
- 2014 Jesse Maddren, Mechanical Engineering
- 2015 Jonathan York, Cal Poly Center for Innovation & Entrepreneurship
- 2016 Dennis J. Derickson, Electrical Engineering
- 2017 Raymond H. Fernando, Chemistry and Biochemistry
- 2018 Benoit Lecat, Wine and Viticulture
- 2019 Brian Granger, Physics

President's Diversity Award

This award recognizes campus units that exhibit a commitment to the value of cultural diversity.

- 1997 Staff Council Cultural Awareness Committee
- 1998 Staff Council Cultural Awareness Committee
- 1999 Black Faculty & Staff Association
- 2000 26 Hours of Science & Technology in Agriculture
- 2001 Industrial and Manufacturing Engineering
- 2002 Housing and Residential Life
- 2003 Minority International Research Access Program
 Connections for Academic Success
- 2004 Summer Institute
- 2005 College of Science and Mathematics
 Career Services
- 2006 PolyCultural Committee

Social Sciences Department

- 2007 Counseling Services
Student Life and Leadership
- 2008 Department of Psychology & Child Development
Omega Xi Delta Fraternity
- 2009 Multicultural Engineering Program
Delta Lambda Phi
- 2010 Cal Poly Society of Women Engineers
Ethnic Studies Department
- 2011 Cal Poly Lion Dance Team
Modern Languages and Literatures Department
- 2012 Cultural Inclusion Committee University Housing
Driven Towards Sisterhood
- 2014 Latinos in Agriculture
Louis Stokes Alliance for Minority and Underrepresented Student
Participation in STEM (LSAMP)
Everette Brooks, Staff
Dr. Jane Lehr, Faculty
- 2015 RISE
PRISM
Renoda Campbell, Staff
Dr. Jose Navarro, Faculty
- 2016 Triota
Indigenous Studies in Natural Resources and the Environment
(INRE) Minor
Catherine Trujillo, Staff
Delfina Medina-Maloney, Staff
Dr. Unique Shaw-Smith, Faculty
- 2017 American Indian Student Association
Undocumented Student Working Group
Justin Gomez, Staff
Dr. Jenell Navarro, Faculty
- 2018 Chicax Latinx Faculty Staff Association
Cross Cultural Centers
Black Student Union
Catherine Trujillo
Leilani Hemmings, Student
Jennifer Teramoto Pedrotti, Staff
Oscar Navarro, Faculty

of former recipients of the award, who recommend the awardees to the President for his final selection. Outstanding Staff Employees Award recipients are listed here as follows.

- 1972–73 Everette Dorough
1973–74 Vic Allen
Florence Hauge
Lionel Middlecamp
Jim Neelands
1974–75 Robert Baldrige
John Lee
Gerry Wagner
Arthur Young
1975–76 Merriam Erickson
Viola Hughes
Mary Johnson
Boyd Wettlaufer
1976–77 Trudy Beck
Stella Nuncio
1977–78 Luther Bertrando
Pauline Shaffer
Joanna DeRosier
1978–79 Harold Miller
Doris Anderson
Richard Tartaglia
Frank Lebens
1979–80 Dale Lackore
Steven Riddell
Joan Roberts
1980–81 Joan Cirone
Farlin Halsey
Irene Lund
1981–82 James Neal
Connie Jonte
Frank Kassak
1982–83 Barbara Lund
Larry Grimes
Norman Johnson
1983–84 Jerald (Louie) Budoff
Walter Clark
Gail Simmons
1984–85 Alfred W. Amaral
Ethel Spry
Kathleen Lamoree
1985–86 James Landreth
Geraldine Montgomery
Vicki Stover
1986–87 Lee Brown
Gary Ketcham
French Morgan
1987–88 Lynette Klooster
Judi Pinkerton
Nancy Raetz
1988–89 Debbie Arseneau
June Powell
Jacquie Rossi
1989-90 Grace Arvidson
Janet Carlstrom
Ronald Christensen
1990-91 Barbara Ciesielski
Harriet Clendenen
Harriet Ross

Outstanding Staff Employee Award

The 1972-73 academic year saw the inception of the Outstanding Staff Employee Award. This honor is bestowed upon permanent, full-time employees of the University, Corporation, or Associated Students, Inc. who are in at least their fourth year of employment at Cal Poly. In order to be considered for this award, an employee should be truly dedicated and loyal; exhibit expertise in job performance; demonstrate a willingness to assist others enthusiastically; take initiative in making his or her department more efficient and productive; maintain an excellent relationship with co-workers, faculty, and students; and make contributions to both the University and the community. Nominations are solicited from staff employees, faculty members, and department or division heads. Selection of the awardees is made by a committee

1991–92	Wanda Bolt Pam Parsons Joe Risser		Marcy Maloney
1992–93	Rosemary Bowker Deborah L. Brothwell Andy McMeans	2012-13	Nancy Cochran David Harris Mark Rapoport
1993–94	Connie Davis Jim McLaughlin Richard Tibbetts	2013-14	Jean DeCosta Tammy Martin Craig Stubler
1994–95	Francesca Fairbrother Joyce Kalicicki Lorraine Ridgeway	2014-15	Maria Arvizu-Rodriguez Donald Popham Donetta Rosson
1995–96	George Enriquez Cynthia Jelinek Carol Montgomery	2015-16	Launnie Gin Ray Kisch Alexandra Kohler
1996–97	Kristina Pena Don Shemenske Judy Swanson	2016-17	Josh D'Acquisto Monica Cantu Ray Ward
1997–98	Richard Equinoa Pat Harris Nettie Steels	2017-18	Danielle Borrelli Douglas Brewster Thomas Moylan
1998–99	Darrell Blankenship Delores Estrada Rosemary Wagner	2018-19	Marilyn Allison-Bullock Susan Olivas Brenda Trobaugh
1999–00	Bonnie Krupp Druci Reese Ellen Stier	2019-20	Christina Wolfe-Chandler Kari Roose Jessica Hunter
2000–01	Donna Amos Stacey Breitenbach Joyce Haratani	2020-21	Anthony Knight Cynthia Stocker Michele Kekaha
2001–02	Margaret Booker Judy Drake Jimmy Ray Motley		
2002–03	Sue Bethel Jim Gerhardt Bonnie Long		
2003–04	Carol Erickson Lori La Vine Bob Pinkin		
2004–05	Sharon Arnold Prisila Johnson Dan Mull		
2005–06	Larry Coolidge Alice Gold Mary Whiteford		
2006–07	Michele Abba Peggy Smith Andersen Joyce McAlexander		
2007–08	Carson Crain Ben Johnson Emanuel Vieira		
2008-09	Vera Gee George Leone Colleen Rodriguez		
2009-10	Christine Cobb Vivian Longacre Terry Vahey		
2010-11	Patrick Johnstone Nancy Reid Yolanda Tiscareno		
2011-12	Helen Bailey Shannon Stephens		

Faculty and Staff Emeriti

The faculty and staff, who have served at least ten years of full-time meritorious service at Cal Poly, are awarded emeritus status. A complete list of faculty emeriti is available at Academic Personnel (<https://academic-personnel.calpoly.edu/content/quicklinks/>). Contact Human Resources for information regarding staff emeriti. The University appreciates its emeriti members' contributions to the Cal Poly community.

Faculty Directory

NAME	POSITION	EDUCATION
Abercromby, Kira J. (2008) Aerospace Engineering	Professor	B.S., University of California, Los Angeles, 1994; M.S., University of Colorado, Boulder, 1998; Ph.D., 2000.
Abo Ismail, Mohammed (2019) Animal Science	Assistant Professor	B.S., Alexandria University Damanhour, 2000; M.S., Alexandria University; Ph.D., University of Guelph, 2012
Adams, Nikki L. (2002) Biological Sciences	Professor	B.A., University of California, Santa Barbara, 1988; M.S., University of Maine, 1995; Ph.D., 2000.
Adams, Aubrie S. (2017) Communication Studies	Assistant Professor	B.A., Sonoma State University, 2005; M.A., Sacramento State University, 2013; Ph.D. University of California at Santa Barbara, 2017.
Adan, Elizabeth (2007) Women's, Gender and Queer Studies, Interdisciplinary Studies in the Liberal Arts	Professor and WGQS Department Chair	B.A., University of California, Davis, 1993; M.F.A., University of California, Santa Barbara, 1997; M.A., University of California, Berkeley, 2000; Ph.D., University of California, Santa Barbara, 2006.
Agarwal, Puneet (2021) Industrial and Manufacturing Engineering	Assistant Professor	B.S., Jadavpur University, Kolkata, 2016; M.S., University of Buffalo, New York, 2019; Ph.D., University of Buffalo, Buffalo, New York.
Agbo, Samuel O. (1991) Electrical Engineering	Professor	B.Sc., University of Nigeria, 1975; M.S.E., University of Michigan, 1978; Ph.D., University of Houston, 1984.
Ahlgren, William L. (1999) Electrical Engineering	Associate Professor	S.B., Massachusetts Institute of Technology, 1975; M.S., University of Arizona, 1977; Ph.D., University of Southern California, 1981.
Aivazpour, Zahra (2020) Management, HR, and Information Systems	Assistant Professor	Ph.D., University of Texas @ San Antonio, 2020
Al-Nakib, Farah (2018) History	Associate Professor	B.A., George Washington University, 2001; M.A., University of London, 2006; University of London, 2011, Ph.D.
Alaniz, Ryan C. (2011) Social Sciences	Professor and Department Chair	B.A., California Polytechnic State University, San Luis Obispo, 2000; M.A., University of California, Santa Barbara, 2004; Ph.D., University of Minnesota, 2012.
Alber, Julia M. (2017) Kinesiology	Associate Professor	B.S., University of Illinois, Champaign-Urbana, 2010; MPH, University of North Carolina, Greensboro, 2012; Ph.D., University of Florida, 2015.
Alexander, Benjamin (2015) Management, HR, and Information Systems	Associate Professor	B.S., Tufts University, 2005; M.A., George Mason University, 2009; Ph.D., Tulane University.
Allen, Regulus L. (2006) English	Associate Professor	B.A., University of California, Los Angeles, 1994; M.A., 2000; Ph.D., 2006.
Almeida, Daniel J. (2016) School of Education	Associate Professor	B.A., Dartmouth College, 2002; M.A., Boston College, 2005; Ph.D., University of Southern California, 2016.
Alzraiee, Hani (2018) Civil and Environmental Engineering	Assistant Professor	B.S., Birla Institute of Technology, 2001; M.S., Islamic University of Gaza, 2007; Ph.D., Concordia University, 2013.
Amin, Samir (2015) Food Science and Nutrition	Associate Professor	A.O.S. in Occupational Sciences Culinary Institute of America, 1988; B.S. University of Nevada Las Vegas, 1992; M.S. Michigan State University, 1999; Ph.D. Michigan State University, 2008.
Amos, Dave (2020) City and Regional Planning	Assistant Professor	B.S., Urban and Regional Studies, Cornell University; M.Arch, University of Oregon; MCRP, University of Oregon; Ph.D. City and Regional Planning, University of California, Berkeley
Anderson, Bing (2004) Finance	Associate Professor	B.Engr., University of Science and Technology of China, 1993; M.A., University of Chicago, 1996; M.S., Stanford University, 2000; Ph.D., 2002.
Anderson, Bradford P. (2006) Accounting	Associate Professor	B.A., Purdue University, 1984; J.D., State University of New York, 1987.
Anderson, Christian (2012) World Languages and Cultures	Associate Professor	B.A., University of Maryland, College Park, 1995; M.A., University of California, Davis, 2005; Ph.D., 2010.
Anderson, Paul E. (2019) Computer Science	Assistant Professor	B.S., Wright State University, 2004; M.S., 2006; Ph.D. 2010.

Anderson, Lisa (2021) Accounting	Assistant Professor	Ph.D., University of Arkansas 2021, M.A. of Science in Accounting, Southern Methodist University 2012, B.A. of Science in Accounting, Clemson University 2010
Appel, Christopher S. (2002) Natural Resources Management and Environmental Sciences	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1995; M.S., 1998; Ph.D., University of Florida, 2001.
Arakaki, Dean Y. (2001) Electrical Engineering	Associate Professor	B.S., California State Polytechnic University, Pomona, 1984; M.B.A., California State University, Long Beach, 1989; M.S., 1992; Ph.D., Penn State University, 2000.
Arceneaux, Craig (2001) Political Science	Professor	B.A., California State University, Fullerton, 1989; M.A., Ohio State University, 1991; Ph.D., University of California, Riverside, 1997.
Archer, Graham C. (2002) Architectural Engineering	Professor	B.A.Sc., University of Waterloo, Canada, 1985; M.A.Sc., 1986; Ph.D., University of California, Berkeley, 1996. Professional Engineer, Ontario.
Arens, Robert M. (2005) Architecture	Professor and Associate Department Head	B.S., University of Michigan, 1981; M.Arch., 1984. Registered Architect, Michigan.
Arrington, Nancy (2018) Political Science	Assistant Professor	B.A., University of Texas, Austin, 2010; MIP University of Georgia, 2012; Ph.D. Emory University, Georgia, 2018.
Arrivee, David A. (2004) Music	Professor	B.A., Princeton University, 1993; M.Mu., Boston University, 1995; D.M.A., Northwestern University, 2004.
Askay, David A. (2013) Communication Studies	Associate Professor	B.S., University of California at San Diego, 2004; M.A. University of North Carolina at Charlotte, 2011; Ph.D. 2013.
Awwad, Mohamed (2019) Industrial and Manufacturing Engineering	Assistant Professor	B.S., Cairo University, Egypt, 2009, M.S. Cairo University, Egypt, 2013, M.S. University of Central Florida, 2014, Ph.D. University of Central Florida, 2015
Ayash, Brian (2014) Finance	Associate Professor	B.S., Clarkson University; MBA, University of Rochester; M.S. University of California, Berkeley; Ph.D. University of California, Berkeley.
Babin, Nicholas (2018) Natural Resources Management and Environmental Sciences	Assistant Professor	B.A., UC Santa Cruz, 2004; M.A., UC Santa Cruz, 2008; Ph.D., UC Santa Cruz, 2012.
Baltimore, Craig V. (2001) Architectural Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1986; M.S., Duke University, 1996; Ph.D., 1998. Registered Structural Engineer and Professional Engineer, California.
Barata, Antonio G. (1985) Music	Professor Emeritus (FERP)	B.A., Towson State University, 1977; M.M., Northwestern University, 1979; D.M.A., University of Illinois, 1985.
Barlow, Philip L. (2006) Construction Management	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1987; M.B.A., Golden Gate University, 1993; Ph.D., University of Florida, 2015; Licensed General Contractor, Licensed Broker, Certified Professional Constructor (CPC), Certified Cost Consultant (CCC), Designated Design-Build Professional (DBIA), LEED Accredited Professional (LEED AP).
Bass, Beverly J. (2008) Landscape Architecture	Professor and Department Head	B.F.A., East Carolina University, 1982; M.L.A., University of Arizona, 2003. LEED Accredited Professional. Certified Arborist, Registered Landscape Architecture, California.
Bates, G.W. (2018) BioResource and Agricultural Engineering	Assistant Professor	B.S., California Polytechnic State University, San Luis Obispo, 2003; M.S. University of Washington, Seattle, 2011; Ph.D., Texas Tech University, Lubbock, 2017. Registered Civil Engineer, CA.
Battenburg, John (1989) English	Professor	B.A., Andrews University, 1982; M.A., Ohio University, 1984; Ph.D., Purdue University, 1989.
Battle, Martin (2015) Political Science	Associate Professor	B.A., University of Sheffield, 1997; M.A., University of Wisconsin, Milwaukee, 2000; Ph.D., Washington University, St. Louis, 2006.
Bean, Timothy W. (2019) Biological Sciences	Associate Professor	B.A., Columbia University, 2004; Ph.D., University of California, Berkeley, 2012.
Beaton, Brian (2015) History	Associate Professor	B.A., Emory University, 2000; M.A., New York University, 2002; University of Toronto, Ph.D., 2012.
Bednarek, Ziemowit K. (2012) Finance	Professor and Area Chair	Ph.D., University of California, Berkeley, 2010.
Beekman, Matthew (2016) Physics	Associate Professor	B.S., University of South Florida, 2003; M.S., 2006; Ph.D., 2009.

Behrouzi, Anahid (2016) Architectural Engineering	Associate Professor	B.S., North Carolina State University, Raleigh, 2011; M.S., University of Illinois, Urbana-Champaign, 2013; Ph.D., University of Illinois, Urbana-Champaign, 2016.
Belanger, Jacques (2017) Mechanical Engineering	Assistant Professor	B.S., Laval University, Quebec City, Canada, 1985; M.S., Laval University, 1987; Ph.D., California Institute of Technology, 1993.
Bellardo, John M. (2006) Computer Science, Computer Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1999; M.S., University of California, San Diego, 2001; Ph.D., 2006.
Bencharit, Lucy (2019) Psychology and Child Development	Assistant Professor	B.A., New York College, College of Arts and Sciences, 2007. M.A., New York College, Graduate School of Arts and Sciences, 2010. Ph.D., Stanford University, 2018.
Bennert, Vardha N. (2011) Physics	Professor	B.S., Ruhr-University of Bochum, Germany, 1999; M.S., 2002; Ph.D., 2005.
Bennett, Darin C. (2014) Animal Science	Associate Professor	B.Sc., University of Guelph, 1986; M.Sc., University of British Columbia, 1993; Ph.D., University of British Columbia, 2002.
Bennion, Kelly Ann (2016) Psychology and Child Development	Associate Professor	B.A., Middlebury College, 2010; Ed.M., Harvard Graduate School of Education, 2011; Ph.D., Boston College, 2016.
Bensky, Thomas J. (2001) Physics	Professor	B.S., California State University, Northridge, 1992; Ph.D., University of Virginia, 1998.
Benson, Bridget G. (2011) Computer Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 2005; M.S., University of California Santa Barbara, 2007; Ph.D., University of California, San Diego, 2010
Berber-Jimenez, Lola (1995) Liberal Studies	Professor and Department Chair	B.S., Universidad LaSalle, 1983; Ph.D., University of California, Davis, 1990. K-5 Teaching Credential.
Bergman, Sky (1995) Art and Design	Professor	B.S., University of South Florida, 1987; M.F.A., University of California, Santa Barbara, 1991.
Bernard, Thomas J. (2008) Theatre and Dance	Professor	B.A., University of Minnesota, 1991; M.F.A., Northern Illinois University, 1995.
Berning, Leanne M. (1990) Animal Science	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1982; M.S., University of Wisconsin, 1985; Ph.D., University of Maryland, 1990.
Bettergarcia, Jay (2017) Psychology and Child Development	Associate Professor	B.S., California Polytechnic State University, San Luis Obispo, 2009; M.A., San Francisco State University, 2011; Ph.D., University of California, Santa Barbara, 2016.
Beyramali Kivy, Mohsen (2019) Materials Engineering	Assistant Professor	B.S., Chemical Engineering, University of Tehran, 2009; Ph.D. Materials Science and Engineering, Missouri University of Science and Technology, 2017
Birdsong, Charlene B. (2003) Mechanical Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S., Michigan State University, 1996; Ph.D., 1999.
Black, Michael W. (2001) Biological Sciences	Professor	B.S., Southwest Missouri State, 1993; Ph.D., Stanford University, 1999.
Blank, Jason M. (2009) Biological Sciences	Associate Professor	B.S., Duke University, 1996; Ph.D., Stanford University, 2006.
Blau, Jnan A. (2008) Communication Studies	Associate Professor	B.S., Arizona State University West, 1999; M.S., Southern Illinois University, 2002; Ph.D., 2007.
Bockmon, Emily (2017) Chemistry and Biochemistry	Assistant Professor	B.A., Pomona College, 2008; Ph.D., Scripps Institution of Oceanography, UC San Diego, 2014.
Bodwin, Kelly N. (2017) Statistics	Assistant Professor	B.A., Harvard University, 2011; Ph.D., University of North Carolina, 2017.
Bohr, Gregory S. (2005) Social Sciences	Associate Professor	B.A., University of California, Berkeley, 1993; M.A., San Diego State University, 1997; Ph.D., Louisiana State University, 2004.
Bonini, Vincent (2008) Mathematics	Professor	B.A., University of California, Santa Cruz, 2000; M.A., 2001; Ph.D., 2006.
Bordeman, Adam (2015) Accounting	Assistant Professor	B.S., Marquette University, 2006; M.S., Marquette University, 2007; Ph.D., University of Colorado at Boulder, 2015.
Borzellino, Joseph E. (2001) Mathematics	Professor	B.S., University of California, Irvine, 1987; M.A., University of California, Los Angeles, 1989; Ph.D., 1992.

Boswell, Michael R. (1998) City and Regional Planning	Professor and Department Head	B.A., University of Central Florida, 1989; M.S.P., Florida State University, Tallahassee, 1991; Ph.D., 2000.
Brady, Pamalee (1998) Architectural Engineering	Professor Emeritus (FERP)	B.S., California Polytechnic State University, San Luis Obispo, 1979; M.S., University of California, Berkeley, 1980; Ph.D., University of Illinois, Urbana-Champaign, 2004. Registered Civil Engineer, California.
Brammeier, Meredith (2001) Music	Professor	B.A., Princeton University, 1992; M.M., Eastman School of Music, 1995; D.M.A., University of Southern California, 2000.
Bridger, Sarah (2011) History	Associate Professor	B.A., Brown University, 2000; M.A., Columbia University, 2005; M.Phil, 2006; Ph.D., 2011.
Brown, D. Kenneth (2007) Philosophy	Associate Professor and Department Chair	B.A., University of California, Irvine, 1992; M.A., Claremont Graduate University, 1998; Ph.D., University of California, Irvine, 2006.
Brown, J. Wyatt (1990) Horticulture and Crop Science	Professor Emeritus (FERP)	B.S., Louisiana State University, 1978; M.S., 1985; Ph.D., Cornell University, 1990.
Brussel, Eric S. (2012) Mathematics	Professor	B.A., University of California, Santa Cruz 1982; Ph.D., University of California, Los Angeles, 1993.
Burd, Matthew A. (2003) Animal Science	Professor	B.S., University of Wisconsin–Madison, 1987; M.S., San Jose State University, 1991; D.V.M., University of California, Davis, 1996.
Burgunder, Lee B. (1983) Accounting	Professor Emeritus (FERP)	B.A., Dartmouth College, 1977; M.B.A., Stanford University, 1981; J.D., 1981.
Burke, Ellen (2014) Landscape Architecture	Associate Professor	B.A., Vassar College, 1997; M.L.A., Harvard University Graduate School of Design, 2005.
Burleson, James (2014) Management, HR, and Information Systems	Assistant Professor	B.B.A., Baylor University; M.B.A., Auburn University.
Burn, Shawn Meghan (1990) Psychology and Child Development	Professor Emeritus	B.S., Virginia Commonwealth University, 1982; M.A., The Claremont Graduate University, 1984; Ph.D., 1988.
Bush, Seth (2005) Chemistry and Biochemistry	Professor and Department Chair	B.S., Reed College, 1994; Ph.D., University of California, Berkeley, 1999.
Byrne, Andrew M. (2017) School of Education	Associate Professor	B.A., Grove City College, 1996; M.S., East Carolina University, 2005; M.S., East Carolina University, 2005; Ph.D., East Carolina University, 2013.
Cabrinha, Mark (2003) Architecture	Professor and Associate Dean	B.Arch., California Polytechnic State University, San Luis Obispo, 1995; M.Arch., University of Illinois, 2001; Ph.D., Rensselaer Polytechnic Institute, 2010. Registered Architect, Illinois.
Cacciamani, Laura (2016) Psychology and Child Development	Associate Professor	B.S., Carnegie Mellon University, 2009; M.A., The University of Arizona, 2010; Ph.D., 2014.
Cai, Xiaowei (2008) Agribusiness	Professor	B.S., M.S., Nanjing Agricultural University, 2001; M.S., Ph.D., University of Wisconsin, 2009.
Call, Lewis W. (1996) History	Professor	B.A., University of California, San Diego, 1990; M.A., University of California, Irvine, 1992; Ph.D., 1996.
Callenes-Sloan, Joseph (2017) Computer Engineering	Assistant Professor	B.S., Iowa State University of Science and Technology, Ames, 2007; M.S., University of Illinois at Urbana-Champaign, 2011; Ph.D., University of Illinois at Urbana-Champaign, 2013
Camp, Charles D. (2007) Mathematics	Professor	B.A., University of California, San Diego; 1989; Ph.D., California Institute of Technology, 2004.
Campbell, Brad (2007) English	Associate Professor	B.A., St. Mary's College of California, 1997; M.A., University of Illinois at Urbana-Champaign, 1999; Ph.D., 2007.
Campbell, Tammy (2015) Chemistry and Biochemistry	Associate Professor	B.S. University of California, Los Angeles 2001; M.S. San Francisco State University, 2004; Ph.D. California Institute of Technology, 2010
Campos Chillon, Fernando (2011) Animal Science	Professor	B.S., California State Polytechnic University, Pomona, 1997; M.S., 2000; DVM, Colorado State University, 2004; Ph.D., 2009; Diplomate American College of Theriogenologists, 2009.
Cannon, Karen J. (2018) Agricultural Education and Communication	Assistant Professor	B.A., Colorado State University, Fort Collins, 2000; M.S., 2003; Ph.D., University of Florida, 2011.
Caplan, Lana Z (2016) Art and Design	Associate Professor	B.A., Boston University, 1994; M.F.A., Massachusetts College of Art and Design, 2006.

Cardinal, Kristen O'Halloran (2007) Biomedical Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 2003; Ph.D., University of Arizona, 2007.
Cardinal, Trevor (2007) Biomedical Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 2003; Ph.D., University of Arizona, 2007.
Carlton, Matthew A. (1999) Statistics	Professor	B.A., University of California, Berkeley, 1994; M.A., University of California, Los Angeles, 1996; Ph.D., 1999.
Carr, Chris A. (1998) Accounting	Professor	B.A., University of Nebraska, 1987; M.A., University of California, Los Angeles, 1998; J.D., Santa Clara University, 1990.
Carrigan, Coleen M. (2014) Social Sciences	Associate Professor	B.A., College of the Holy Cross, 1996; M.A., University of Washington, 2009; Ph.D., University of Washington, 2013.
Carroll, Jennifer (2006) Chemistry and Biochemistry	Professor	B.S., Sonoma State University, 1996; Ph.D., University of California, Santa Cruz, 2001.
Carter, Amy (2007) Orfalea College of Business	Assistant Dean	B.A., Chico State University, 2000. M.A., California Polytechnic State University, San Luis Obispo, 2007.
Casassa, Luis Federico (2015) Wine and Viticulture	Associate Professor	B.S., Cuyo National University, Mendoza, Argentina, 2004; M.S., 2007; Ph.D. Washington State University, 2013.
Castro, Luis (2015) Food Science and Nutrition	Associate Professor	B.S., University of Costa Rica, 2004; Licentiate, University of Costa Rica, 2006; M.S., Washington State University, 2009; Ph.D., Washington State University, 2013.
Cerf, Douglas C. (1990) Accounting	Professor Emeritus (FERP)	B.S., University of California, Berkeley, 1978; M.A., University of California, Davis, 1987; Ph.D., 1991.
Chadwell, Charles (2003) College of Engineering, Civil and Environmental Engineering	Associate Dean and Professor	B.S., University of California, Berkeley, 1997; M.S., University of Berkeley, 1998; Ph.D., University of California, Berkeley, 2003. Registered Professional Engineer, California.
Chamberlain, David (2017) Accounting	Assistant Professor	J.D., University of Columbia, 1992, LL.M University of New York, 1993
Champney, Danielle (2013) Mathematics	Associate Professor	B.S., Bowling Green State University, 2007; M.A., University of California, Berkeley, 2010; Ph.D., 2013.
Chance, Beth L. (1999) Statistics	Professor	B.S., Harvey Mudd College, 1990; M.S., Ph.D., Cornell University, 1994.
Charalampidis, Stathis (2019) Mathematics	Assistant Professor	B.S., Aristotle University of Thessaloniki, 2007; M.S., 2009; Ph.D., 2013.
Chen, Sophia (2010) World Languages and Cultures	Professor	Ph.D., Florida State University, 2007.
Chen, John (2008) Mechanical Engineering	Professor	B.S., University of Virginia, 1984; M.S., Stanford University, 1987; Ph.D., 1991.
Chen, Leida (2014) Management, HR, and Information Systems	Professor and Area Chair	M.B.A., University of Central Arkansas, 1996; Ph.D., University of Memphis, 2000.
Cheuk, Tina (2019) School of Education	Assistant Professor	B.S., University of Chicago, 1999; M.A., University, 2007; Ph.D., Stanford University, 2019.
Chiu, Yi-wen (2014) Natural Resources Management and Environmental Sciences	Associate Professor	B.S., National Taiwan University, 1996; M.S., University of Minnesota, 2006; Ph.D., University of Minnesota, 2010.
Choboter, Paul F. (2005) Mathematics	Professor	B.Sc., Simon Fraser University, 1995; M.Sc., McGill University, 1997; Ph.D., University of Alberta, 2002.
Choudhury, Gour (2011) Food Science and Nutrition	Professor Emeritus (FERP)	B.S., University of Gauhati, India, 1972; M.S., University of Mysore, India, 1977; Ph.D., University of Alberta, Canada, 1987.
Christiansen, Jodi (2006) Physics	Professor	B.A., Harvey Mudd College, 1985; M.S., University of Wisconsin, Madison, 1988; Ph.D., 1993.
Clague, David (2007) Biomedical Engineering	Professor	B.S., University of California, Santa Barbara, 1987; M.S., University of California, Davis, 1993; Ph.D., 1997.
Clark, Robert D. (1998) Kinesiology	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1992; M.S., Louisiana State University, 1996; Ph.D., 1998.
Clay, Gary R. (1995) Landscape Architecture	Professor Emeritus (FERP)	B.L.A., Utah State University, 1974; M.L.A., University of Illinois, 1986; Ph.D., University of Arizona, 1996.

Cleary, Joseph (2018) Construction Management	Assistant Professor	B.S. Illinois State University, 1999; M.S. Illinois State University, 2010
Clement, Sandra L. (2011) Biological Sciences	Associate Professor	B.S., Doane College, 1995; Ph.D., Michigan State University, 2004.
Clements, John (2005) Computer Science	Professor	B.A., Princeton University, 1996; M.S., Rice University, 2001; Ph.D., Northeastern University, 2005.
Clifford, Dale T. (2014) Architecture	Associate Professor	B.Arch., Pratt Institute, 1993; M.S. Architectural Studies, Massachusetts Institute of Technology, 1999. Registered Architect, Arizona.
Cobb, Richard (2017) Natural Resources Management and Environmental Sciences	Associate Professor	B.S., Northern Arizona University, 1996; M.S., University of Maine, 2000; Ph.D., University of California Davis, 2010.
Cole, Matthew (2015) Economics	Associate Professor	B.S., University of Northern Iowa, 2001; M.S., University of Northern Iowa, 2003; Ph.D., University of Oregon, 2009.
Conway-Silva, Bethany A. (2015) Communication Studies	Associate Professor	B.A., University of New Mexico, 2007; M.A., University of Arizona, 2011; Ph.D., 2015.
Costanzo, Philip (2007) Chemistry and Biochemistry	Professor	B.S., Carnegie Mellon University, 2001; Ph.D., University of California, Davis, 2005.
Costello, Enrica Lovaglio (2002) Art and Design	Professor	M.A., University of California, Santa Barbara, 2001; M.F.A. equivalent, University of Studies of Genova, Italy, 1996.
Costello, Michael J. (1999) Wine and Viticulture	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1981; Ph.D., University of California, Berkeley, 1992. Pest Control Advisor. Pest Control Advisor.
Cravens, R.G. (2019) Political Science	Assistant Professor	B.A., Sewanee: The University of the South, 2010; M.A., University of Tennessee, 2014; Ph.D., University of Tennessee, 2017
Crockett, Robert (2000) Biomedical Engineering	Professor	B.S., University of California, Berkeley, 1989; M.B.A., Pepperdine University, 1992; Ph.D., University of Arizona, 1997.
Crutchfield, Stephen A. (2015) School of Education	Associate Professor	B.S., Missouri State University; 2005; M. Ed., The University of Kansas, 2010; Ph.D., The University of Kansas, 2014.
D'Avignon, India (2007) Music	Professor and Department Chair	B.M.E., Wittenberg University, 1974; M.A., The Ohio State University, 1980.
da Silva, Bruno (2017) Computer Science	Assistant Professor	B.S., Ruy Barbosa College, Brazil, 2005; M.S., Federal University of Rio Grande do Sul, Brazil, 2009; Ph.D., Federal University of Bahia, Brazil, 2015.
Dandekar, Hemalata (2009) City and Regional Planning	Professor Emeritus (FERP)	B.Arch., University of Bombay, India, 1967; M.Arch, University of Michigan, 1969; Ph.D., University of California, Los Angeles, 1978. Registered Architect, California.
Dang, Li (2007) Accounting	Professor and Area Chair	Ph.D., Drexel University, 2004.
Daniels, Denise H. (2003) Psychology and Child Development	Professor	B.A., University of California, Santa Barbara, 1982; M.A., Pacific Oaks College, 1983; Ph.D., University of California, Los Angeles, 1992.
Danowitz, Andrew R. (2014) Computer Engineering	Associate Professor	B.S., Harvey Mudd College, Claremont, 2008; M.S., Stanford University, 2010; Ph.D., Stanford University, 2014.
Dao, Linh (2020) Art and Design	Assistant Professor	B.F.A., Truman State University, Kirksville, Missouri, 2013; M.F.A., University of Texas at Arlington, 2017.
Davidson, Jean M. (2018) Biological Sciences	Assistant Professor	B.S., University of California, Davis, 2005; Ph.D., University of North Carolina, Chapel Hill, 2012.
Davis, Steven C. (1987) Kinesiology	Professor	B.S., University of California, Davis, 1979; M.S., San Diego State University, 1983; Ph.D., Pennsylvania State University, 1986.
Davis, Brennan (2014) Marketing	Professor	B.S. University of California, Los Angeles, 1992; M.B.A. University of Pennsylvania, 2003; Ph.D. University of California, Irvine, 2008.
Davol, Andrew I. (1999) Mechanical Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1987; M.S., University of California, San Diego, 1993; Ph.D., 1998. Registered Professional Engineer, California.
Day, Miran (2015) Landscape Architecture	Associate Professor	B.S.L.A., Chonnam National University, South Korea, 1994; M.L.A., University of Illinois, 2011. Registered Landscape Architect, Florida and South Korea.
de la Fuente, Javier (2013) Industrial Technology and Packaging	Associate Professor and Area Chair	B.S., University of Buenos Aires, Argentina, 1998; M.S., Michigan State University, 2006; Ph.D., Michigan State University, 2013.

De Lay, Ann M. (2008) Agricultural Education and Communication	Professor	B.S., California State University, Fresno, 1997; M.S., California Polytechnic State University, San Luis Obispo, 2002; Ph.D., University of Florida, 2008.
DeBruhl, Bruce E. (2015) Computer Science, Computer Engineering	Associate Professor	B.S. Kettering University, 2009; M.S. Carnegie Mellon University, 2013; Ph.D. 2015.
Decock, Charlotte L.M. (2017) Natural Resources Management and Environmental Sciences, Horticulture and Crop Science	Assistant Professor	B.S., UGENT, 2005; M.S., Ghent University, 2007; Ph.D., University of California Davis, 2012.
Deffo, Arnold (2018) Aerospace Engineering	Assistant Professor	B.S. Wichita State, 2013; M.S., California Institute of Technology, 2014; Ph.D., California Institute of Technology 2018
Deif, Ahmed (2014) Industrial Technology and Packaging	Associate Professor	B.S., American University, Cairo, 1999; M.A.Sc, University of Windsor, Canada, 2003; Ph.D., University of Windsor, Canada, 2006.
Deigert, Michael (2017) Architectural Engineering	Assistant Professor	B.S., California Polytechnic State University, San Luis Obispo, 1992; M.S., San Jose State University, 1995. Registered Civil Structural Engineer, California, Arizona. Registered Civil Engineer, Colorado.
Dekhtyar, Alexander (2007) Computer Science	Professor	Ph.D., University of Maryland College Park, 2000.
Del Rio Nascimento, Vicente (2001) City and Regional Planning	Professor Emeritus (FERP)	B.Arch., Federal University of Rio de Janeiro, 1978; Graduate Diploma in Urban and Regional Planning, State University of Rio de Janeiro, 1979; M.A., Oxford Polytechnic, 1981; Ph.D., University of São Paulo, 1991. Registered Architect, Brazil.
Delbridge, Timothy A. (2015) Agribusiness	Associate Professor	B.A., University of Wisconsin, 2003; M.S. University of Minnesota, 2011; Ph.D., 2015.
Den Hartog, Christopher (2006) Political Science	Professor	B.A., University of California, San Diego, 1996; Ph.D., 2004.
Den Otter, Ronald (2005) Political Science	Professor	B.A., University of California, Davis, 1989; J.D., University of Pennsylvania, 1992; Ph.D., University of California, Los Angeles, 2003.
Denbow, Jennifer (2015) Political Science	Associate Professor	B.S., University of Michigan, 2003; J.D., University of California, Berkeley, 2007; Ph.D., University of California, Berkeley, 2010.
DePiero, Fred (1996) Computer Engineering	Professor	B.S., Michigan State University, 1985; M.S., Michigan State University, 1987; Ph.D., University of Tennessee, 1996
Derelian, Doris (2004) Food Science and Nutrition	Professor Emeritus (FERP)	B.S., California State University, Fresno, 1968; M.S., University of California, Davis, 1975; Ph.D., University of California, Los Angeles, 1994; J.D., University of California, Davis, 2001. Registered Dietitian.
Derickson, Dennis (2005) Electrical Engineering	Professor	B.S., South Dakota State University, 1981; M.S., University of Wisconsin–Madison, 1988; Ph.D., University of California, Santa Barbara, 1992.
DeTurris, Dianne J. (1998) Aerospace Engineering	Professor	B.S., Georgia Institute of Technology, 1984; M.S., Pennsylvania State University, 1986; Ph.D., Virginia Polytechnic Institute and State University, 1992.
Dhillon, Anuraj (2018) Communication Studies	Assistant Professor	B.C.A., GND University, 2004; M.B.A., ICFAI University, 2006; Ph.D., University of Connecticut, 2018.
Dicus, Christopher A. (2001) Natural Resources Management and Environmental Sciences	Professor	B.S., Louisiana Tech University, 1992; M.S., Utah State University, 1995; Ph.D., Louisiana State University, 2000. Registered Professional Forester, California. Certified Senior Fire Ecologist.
Dimitrova, Elena (2019) Mathematics	Associate Professor	B.A., American University in Bulgaria, 2001; Ph.D. Virginia Tech, 2006.
Ding, Shunping (2018) Wine and Viticulture, Horticulture and Crop Science	Assistant Professor	B.S., Henan University, China, 2010; M.S. The University of Hong Kong, 2013; Ph.D., University of Wisconsin-Madison, 2018.
Disanto, Thomas L. (2003) Architecture	Professor	M.Arch., California State Polytechnic University, Pomona, 1989; B.Arch, 1997; Ecole D'Architecture De Paris, La Defense, 1999. Registered Architect, California.
Djassemi, Manocher (2003) Industrial Technology and Packaging	Professor Emeritus (FERP)	B.S., University of Science and Technology, Tehran, 1977; M.S., University of Wisconsin–Milwaukee, 1990; Ph.D., 1994.
Dobson, John (1990) Finance	Professor	B.A., University of Lancaster, England, 1979; M.A., University of South Carolina, 1981; Ph.D., 1988.

Dodson Peterson, Jean (2014) Wine and Viticulture	Associate Professor	B.S., University of California, Davis, 2009; M.S., 2012; Ph.D., 2014.
Doi, Jimmy A. (2003) Statistics	Professor	B.A., California State University, Northridge, 1995; M.S., North Carolina State University, 1998; Ph.D., 2003.
Dolan, Dale S. L. (2009) Electrical Engineering	Professor and Assistant Department Chair	B.S., University of Toronto, Ontario, Canada, 2003; M.S., 2005; Ph.D., 2008.
Donegan, Lorraine D. (2002) Graphic Communication	Professor Emeritus (FERP)	B.S., California Polytechnic State University, San Luis Obispo, 1997; M.A., 2001.
Dong, Kevin J. (2001) Architectural Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1986; M.S., University of California, Berkeley, 1988. Registered Structural Engineer and Professional Engineer, California.
Donig, Deb (2019) English	Assistant Professor	B.A., University of California, Davis, 2005; M.A., University of Massachusetts, Amherst, 2010; Ph.D., University of California, Los Angeles, 2017.
Doremus, Jaqueline (2015) Economics	Associate Professor	B.S., Stanford University, 2004; M.A., University of Michigan, 2010; Ph.D., University of Michigan 2015.
Drake, Aaron (2014) Aerospace Engineering	Professor	B.S., San Jose State; M.S., Stanford; Ph.D., Washington State University.
Duffy, Bernard K. (1988) Communication Studies	Professor Emeritus (FERP)	B.A., San Jose State College, 1970; M.A., 1971; Ph.D., University of Pittsburgh, 1976.
Durham, Garland B. (2014) Finance	Associate Professor	B.S., University of Kentucky, 1983; M.S., University of Illinois, 1985; Ph.D., University of North Carolina, 2001.
Eagon, Scott C. (2014) Chemistry and Biochemistry	Associate Professor	B.A., Whitman College, 2005; Ph.D., University of California Santa Cruz, 2010.
Easton, Robert W. (2011) Mathematics	Associate Professor	B.S., University of Michigan, 2002; Ph.D., Stanford University, 2007.
Echols, Robert (1999) Physics	Professor	B.S., University of California, Davis, 1992; M.S., 1994; M.S., University of California, Santa Cruz, 1996; Ph.D., 1999.
Eckhardt, Christian (2017) Computer Science	Assistant Professor	Ph. D., Vienna University of Technology, Austria, 2011.
Edwards, Mark S. (2007) Animal Science	Professor	B.A., Miami University, 1987; Ph.D., Michigan State University, 1995.
Edwards, Louise O.V. (2016) Physics	Associate Professor	B.S., University of Victoria, Canada, 2001; M.S., Saint Mary's University, Canada, 2003; Ph.D., Université Laval, Canada, 2007.
Eisty, Nasir (2020) Computer Science	Assistant Professor	B.S. Rajshahi University of Engineering and Technology, Rajshahi, Bangladesh, 2014; M.S., University of Alabama, Tuscaloosa, AL, USA, 2018; Ph. D., University of Alabama, Tuscaloosa, AL, USA, 2020
El Badawy, Amr (2018) Civil and Environmental Engineering	Assistant Professor	B.S., Mansoura University, 2001; M.S., 2005; Ph.D., University of Cincinnati, 2011.
Elghandour, Elthary (2000) Mechanical Engineering	Professor	B.S., Helwan University, Cairo, Egypt 1983; M.S. 1989; Ph.D., 1995.
Eller, Dan (2006) Journalism	Professor Emeritus (FERP)	B.S. California State University, Northridge, 1984; M.P.H., 1987; Ed.D., University of California, Santa Barbara, 2010.
Ellis, Allison M. (2016) Management, HR, and Information Systems	Associate Professor	B.A., University of California, Irvine, 2009; M.S., Portland State University, 2012; Ph.D., Portland State University, 2015.
Emberley, Richard (2017) Mechanical Engineering	Associate Professor	B.S., Worcester Polytechnic Institute, 2011; M.S., 2013; Ph.D., University of Queensland, Brisbane, Australia, 2017.
Emyan, Mariam (2007) College of Architecture and Environmental Design	Assistant Dean	B.S., Armenian Agrarian University, Armenia, 1997; M.A., Public Administration Academy, Armenia, 1999; M.B.A., California Polytechnic State University, San Luis Obispo, 2006.
Espinoza-Wade, Eric (2019) Mechanical Engineering	Assistant Professor	B.S. Massachusetts Institute of Technology, 2000; M.S., Massachusetts Institute of Technology, 2004; PhD, Massachusetts Institute of Technology, 2007
Esquivel, Ramon (2020) Theatre and Dance	Assistant Professor	B.A. Yale University 1999; M.A. Educational Theatre, New York University 2006; M.F.A. Creative Writing, University of British Columbia 2017.

Estes, Allen C. (2007) Architectural Engineering	Professor and Department Head	B.S., United States Military Academy, 1978; M.S., Stanford University, 1987; M.B.A., Long Island University, 1989; Ph.D., University of Colorado, 1997. Registered Civil Engineer, Virginia.
Estrada, Aaron R. (2012) Psychology and Child Development	Associate Professor	B.A., University of California, Santa Cruz, 2001; M.S., San Francisco State University, 2006; M.A., University of California, Santa Barbara, 2008; Ph.D., 2011.
Fagan, Kevin (2001) World Languages and Cultures	Professor Emeritus (FERP)	B.A., Gregorian University, Rome, 1972; M.A., 1977; M.A., Texas Tech University, 2000; Ph.D., University of Dallas, 1998; Ph.D. Texas Tech University, 2003.
Fang, Dongfeng (2019) Computer Science, Computer Engineering	Associate Professor	B.S., Harbin Institute of Technology, China, 2009; M.S., Shanghai University, China, 2014; Ph.D., University of Nebraska, 2019.
Faruque, Omar (1989) Landscape Architecture	Professor Emeritus (FERP)	B.S.L.A., Texas A M University, 1971; M. Arch., 1972. Registered Architect, Texas, and Landscape Architect, Texas and Indiana.
Faure, Pauline (2018) Aerospace Engineering	Assistant Professor	B.S., Institut National Polytechnique de Lorraine, 2008; M.S., Kyushu Institute of Technology; Ph.D., Kyushu Institute of Technology 2017
Feng, Yiming (2021) Food Science and Nutrition	Assistant Professor	B.S., University of Illinois, Urbana-Champaign, 2013; PhD, University of Illinois, Urbana-Champaign, 2018
Fernando, Raymond (2002) Chemistry and Biochemistry	Professor	B.S., University of Sri Jayewardenepura, Sri Lanka; Ph.D., North Dakota State University, Fargo, 1986.
Fernflores, Francisco (2000) Philosophy	Professor	B.Sc., University of Toronto, 1992; M.A., University of Western Ontario, 1993; Ph.D., 1998.
Fernflores, Rachel (2006) Philosophy	Professor	B.A., University of Regina, 1993; M.A., University of Saskatchewan, 1995; Ph.D., Queens University, 2006.
Fernsler, Jonathan (2006) Physics	Professor	B.S., College of William and Mary, 1996; M.S., University of Colorado, Boulder, 1999; Ph.D., 2004.
Fidopiastis, Pantelis M. (2006) Biological Sciences	Professor	B.A., California State University, Fullerton, 1992; M.A., 1995; Ph.D., University of Hawaii, Manoa, 2001.
Fiegel, Gregg L. (1995) Civil and Environmental Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1990; M.S., University of California, Davis, 1992; Ph.D., 1995. Registered Professional Engineer and Geotechnical Engineer, California.
Fiorenza, Giancarlo (2008) Art and Design	Professor	B.A., University of California, Santa Cruz, 1991; M.A., Johns Hopkins University, 1993; Ph.D., 2001.
Firpo, Christina E. (2006) History	Professor	B.A., The George Washington University, 2000; M.A., University of California, Los Angeles, 2002; Ph.D., 2007.
Fisher, Eric (2007) Economics	Professor Emeritus (FERP)	M.A., John Hopkins School of Advanced International Studies, 1979; Ph.D., University of California, Berkeley, 1985.
Fitzhenry, William (1997) English	Professor	B.A., State University of New York at Buffalo, 1984; M.A., University of Colorado, 1991; Ph.D., Duke University, 1997.
Fleischer, Amy S. (2018) College of Engineering	Dean	B.S.M.E., Villanova University, 1991; M.S.M.E., 1996; Ph.D., University of Minnesota, 2000
Flores, Carlos A. (2013) Economics	Professor	B.A., Monterey Institute of Technology, Mexico, 1998; M.A., UC Berkeley, 2003; Ph.D., UC Berkeley, 2005.
Floyd, Barry (1990) Management, HR, and Information Systems	Professor Emeritus (FERP)	B.S., Michigan State University, 1973; M.S., 1974; M.B.A., University of Michigan, 1983; Ph.D., 1985.
Flushman, Tanya R. (2012) School of Education	Professor	B.A., University of California, Santa Cruz, 1998; M.S., State University of New York, College at Buffalo, 2006; Ph.D., Vanderbilt University, 2012.
Fogle, Emily (2007) Chemistry and Biochemistry	Professor	B.A., Sonoma State University, 2000; Ph.D., University of California, Davis, 2005.
Folk, Elizabeth (2017) Art and Design	Assistant Professor	B.F.A., University of Colorado, Boulder, 2007; M.F.A., University of California, Santa Barbara, 2009.
Forster, Sophia (2008) English	Professor	B.A., York University, 1998; M.A., University of Victoria, 2001; Ph.D., State University of New York at Buffalo, 2008.
Fowler, Thomas , IV, FAIA (1995) Architecture	Professor	B.Arch., New York Institute of Technology/Old Westbury, 1984; M.Arch., Cornell University, 1994. Registered Architect, New York.

Foxen, Anya P. (2018) Philosophy, Women's, Gender and Queer Studies	Assistant Professor	B.A., Rutgers, 2008; M.A., UCSB; 2011 PhD, UCSB, 2015
Frame, Samuel (2007) Statistics	Professor	B.S., California Polytechnic State University, San Luis Obispo, 2001; M.S., University of California, Santa Barbara, 2004; Ph.D., 2007.
Francis, Clinton D. (2013) Biological Sciences	Associate Professor	B.S., Pacific University, 2002; M.A., University of Colorado 2007; Ph.D., 2010.
Frantz, Sara J. (2014) Art and Design	Associate Professor	B.S., University of Wisconsin-Madison, 2003; M.F.A., University of Texas, 2007.
Frantz, Derik K. (2014) Chemistry and Biochemistry	Associate Professor	B.S. 2005 Juniata College, 2005; M.Sc. University of Zurich, Switzerland, 2008; Dr. sc. nat. University of Zurich, Switzerland, 2012.
Freberg, Laura A. (1987) Psychology and Child Development	Professor	B.A., University of California, Los Angeles, 1974; M.A., 1975; Ph.D., 1979.
Freed, Tali (2001) Industrial and Manufacturing Engineering	Professor	B.Sc., Technion-Israel Institute of Technology, Israel, 1983; M.Sc., 1988; Ph.D., University of California, Berkeley, 1995. Registered Professional Engineer, California.
Fricker, Geoffrey Andrew (2018) Social Sciences		BS (Physical Geography, UCSB -2005), MA (Geography UCLA - 2009), PhD (Geography UCLA -2015)
Frye, Amanda (2020) Liberal Studies	Assistant Professor	B.A., Harvard University, 1991; Ed.M, Harvard University, 1994 2012; Ph.D., Stanford University, 2018.
Funston-Timms, Benjamin F. (2007) Social Sciences	Professor	B.A., University of New Mexico, 1997; M.A., Indiana University, 1999; Ph.D., 2007.
Galanti, Tera (2008) Art and Design	Associate Professor	B.F.A., California State University, Long Beach, 1986; M.F.A., 1995.
Galos, Joel (2022) Materials Engineering	Assistant Professor	B.S., Aerospace Engineering Mathematics, University of South Wales, Australia, 2012; M.A. Composite Materials, Imperial College, UK, 2013; Ph.D., Engineering, University of Cambridge, UK, 2017
Galvan-Mandujano, Martha Carolina (2018) World Languages and Cultures	Assistant Professor	B.A., Texas A M University, 2000; M.A., Texas A M University, 2007; Ph.D, University of Oklahoma, 2015.
Garcia, Antonio F. (2001) Physics	Professor	B.A., University of California, Los Angeles, 1988; B.S., San Jose State University, 1994; M.S., The University of New Mexico, 1996; Ph.D., University of California, Santa Barbara, 2001 .
Garcia, Julie A. (2007) Psychology and Child Development	Professor	B.A., California State University, San Bernardino, 1996; Ph.D., University of Michigan, Ann Arbor, 2005.
Garner, Lauren C. (2005) Horticulture and Crop Science	Professor	B.S., The College of William and Mary, 1992; M.S., Cornell University, 1996; Ph.D., University of California, Riverside, 2004.
Gaudi, Franklin (2019) BioResource and Agricultural Engineering	Assistant Professor	B.S., California Polytechnic State University, San Luis Obispo, 2002; M.S., California Polytechnic State University, 2003; D. Ed. University of Phoenix, 2014.
Gearhart, Richard O. (2006) Journalism	Associate Professor	B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S., California Polytechnic State University, San Luis Obispo, 2009.
Gharibyan, Hasmik (2000) Computer Science	Professor	M.S., Yerevan State University, Republic of Armenia, USSR, 1981; Ph.D., 1991.
Ghoddsi, Hamed (2020) Finance	Assistant Professor	Ph.D., Vienna Graduate School of Finance 2011, Post Doc, MIT, 2013
Giberti, Bruno (1994) Architecture, Academic Programs and Planning	Professor and Associate Vice Provost	B.S. Arch., California Polytechnic State University, San Luis Obispo, 1980; M.Arch., University of California, Berkeley, 1989; Ph.D., 1994; Registered Architect, California.
Gill, Samantha J. (1997) Natural Resources Management and Environmental Sciences, BioResource and Agricultural Engineering	Professor	B.S., Humboldt State University, 1991; M.S., 1993; Ph.D., University of California, Berkeley, 1997. Registered Professional Forester, California.
Gillen, Glen D. (2006) Physics	Professor	B.S., Denison University, 1994; M.S., Miami University, 1996; M.A.T., 1997; M.S., The Ohio State University, 2001; Ph.D., 2002.

Gillen, Katharina (2006) Physics	Professor	Vordiplom, Rheinische Friedrich-Wilhelms Universität Bonn, 1998; M.S., The Ohio State University, 2000; Ph.D., 2005.
Gillette, David (2001) English, Liberal Arts and Engineering Studies	Professor and LAES Co-Director	B.A., University of Iowa, 1985; M.A., University of New Mexico, 1992; Ph.D., 1995.
Glanz, Hunter S. (2014) Statistics	Associate Professor	B.S., California Polytechnic State University, San Luis Obispo, 2009; M.A., Boston University, 2012; Ph.D., 2013.
Glick, Mary M. (2012) Journalism	Associate Professor	B.A., State University of New York at Oswego, 1972; M.A., California State University, Fullerton, 1982.
Glysson, Scott (2017) Music	Associate Professor	B.M., George Mason University, 2007; M.M., University of Arizona, Tucson, 2012; D.M.A., University of Arizona, Tucson, 2014.
Goel, Rakesh K. (1997) College of Engineering, Civil and Environmental Engineering	Executive Associate Dean and Professor	B.Tech, Indian Institute of Technology, New Delhi, 1982; M.S., University of California, Berkeley, 1985; Ph.D., 1990. Registered Professional Engineer, California.
Goldenberg, Marni (2003) Experience Industry Management	Professor	B.S., California State University, Sacramento, 1995; M.S., Purdue University, 1997; Ph.D., University of Minnesota, 2002.
Goodman, Anya (2005) Chemistry and Biochemistry	Professor	B.S., Florida Atlanta University, 1996; Ph.D., Massachusetts Institute of Technology, 2003.
Gopalan, Giri (2020) Statistics	Assistant Professor	B.S., California Institute of Technology, 2010; A.M. Harvard University, 2014; Ph.D., University of Iceland, 2019.
Gorman, Larry R. (1997) Finance	Professor	B.S., Washington State University, 1985; M.B.A., Western Washington University, 1988; Ph.D., Northwestern University, 1998.
Gragson, Derek E. (1999) College of Science and Mathematics, Chemistry and Biochemistry	Associate Dean and Professor	B.S., California State University, Hayward 1991; M.S., 1995; Ph.D., University of Oregon, 1997.
Granger, Brian E. (2008) Physics	Professor	B.S., Westmont College, 1994; Ph.D., University of Colorado at Boulder, 2001.
Gray, Joey (2021) Experience Industry Management	Professor and Department Head	B.S., Averett University, Virginia 1996, M.P.R.T.M., Parks, Rec. and Tourism Mgmt.: Sport Management, N. Carolina State Univ., N. Carolina, 2000, Ph.D., Leisure Behavior: Sport Mgmt., Indiana Univ., Indiana, 2006
Greenbaum, Bruce (2015) Management, HR, and Information Systems	Associate Professor	B.S., University of Virginia, 1991; M.B.A., University of Michigan, 1996; Ph.D., University of Texas, 2013.
Greenwood, Jerusha B. (2006) Experience Industry Management	Professor	B.S., University of Utah, 1998; M.S., 2002; Ph.D., North Carolina State University, 2006.
Greenwood, P. Brian (2006) Experience Industry Management	Professor	B.A., University of North Carolina at Chapel Hill, 1996. M.S., North Carolina State University, 2001; Ph.D., 2007.
Greever, Cory J. (2016) Kinesiology	Associate Professor	B.S., Virginia Commonwealth University, 2010; M.S., James Madison University, 2012; Ph.D. University of Massachusetts, Amherst, 2016.
Greve, Adrienne I. (2006) City and Regional Planning	Professor	B.S., Cornell University, 1996; M.S., Colorado State University, Ft. Collins, 1999; Ph.D., University of Washington, Seattle, 2007.
Griffin, Lanny (1997) Biomedical Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1992; Ph.D., University of California, Davis, 1996.
Grossenbacher, Dena L. (2017) Biological Sciences	Assistant Professor	B.S., University of Washington, 1999; Ph.D., University of California, Davis, 2013.
Grundmeier, Todd A. (2004) Mathematics	Professor	B.S., University of New Hampshire, 1997; M.S., 2000; Ph.D., 2003.
Gu, Caixing (1998) Mathematics	Professor	B.S., Zhejiang University, 1982; M.S., China Textile University, 1986; Ph.D., Indiana University, 1994.
Guise, Megan (2009) School of Education	Professor	B.S., Millersville University, 2002; M.Ed., 2004; Ph.D., University of Pittsburgh, 2009.
Gutierrez, Thomas D. (2006) Physics	Professor	B.S., San José State University, 1991; M.S., 1994; Ph.D., University of California, Davis, 2000.
Haberland, Matthew D. (2018) BioResource and Agricultural Engineering	Assistant Professor	B.S., Cornell University, 2007; M.S. Mechanical Engineering, Cornell University, 2007; Ph.D., Massachusetts Institute of Technology, 2014.

Habib, Kenneth (2006) Music	Professor	B.A., University of California, Los Angeles, 1983; M.A., University of California, Santa Barbara, 1995; Ph.D., 2005.
Hackman, Christine L. (2015) Kinesiology	Associate Professor	B.S., Rowan University, 2010; M.A., University of Alabama, 2012; Ph.D., University of Alabama, 2015.
Hagen, John (2001) Chemistry and Biochemistry	Professor	B.S., University of Nevada, Las Vegas, 1992; Ph.D., Stanford University, 1996.
Hagobian, Todd A. (2009) Kinesiology	Professor	B.A., University of Southern California, 1991; M.A., San Francisco State University, 2002; Ph.D., University of Massachusetts at Amherst, 2007.
Hajrasouliha, Amir (2015) City and Regional Planning	Associate Professor	B.Arch., Shahid Beheshti University, 2004; M.Urbanism, University of Tehran, 2007; M. Urban Design, University of Michigan, 2011; Ph.D. Metropolitan Planning, Policy, and Design, University of Utah, 2015
Hall, Garrett J. (2002) Civil and Environmental Engineering	Professor	B.S., Worcester Polytechnic Institute, 1992; M.S., University of Washington, 1993; Ph.D., University of California, Berkeley, 2001. Registered Professional Engineer, California.
Hall, Kellie Green (1990) College of Science and Mathematics, Kinesiology	Associate Dean and Professor	B.S., Rocky Mountain College, 1977; M.S., Eastern Washington University, 1977; Ph.D., Louisiana State University, 1990.
Hamachi, Leslie (2020) Chemistry and Biochemistry	Assistant Professor	B.S., University of California, Berkeley; Ph.D., Columbia University, 2018.
Hamilton, Lynn (1996) Agribusiness	Professor	B.S., Ohio State University, 1988; M.S., University of Minnesota, 1995; Ph.D., 1996.
Hamilton, Margaret E. (2012) Mathematics	Professor	B.S., University of Chicago, 1989; M.A., University of California, Los Angeles, 1991; Ph.D., 1995.
Hamilton, Stephen (2004) Economics	Professor	B.A., University of California, Santa Barbara, 1991; M.S., University of California, Berkeley, 1994; Ph.D., 1996.
Hampsey, John C. (1992) English	Professor	B.A., Holy Cross College, 1976; Ph.D., Boston College, 1982.
Hanson, James L. (2005) Civil and Environmental Engineering	Professor	B.S., University of Wisconsin, Madison, 1990; M.S., University of Minnesota, Minneapolis, 1992; Ph.D., University of Wisconsin, Madison, 1996. Registered Professional Engineer, California and Wisconsin.
Harding, Trevor S. (2006) Materials Engineering	Professor and Department Chair	B.S., University of Michigan, 1995; M.S., 1997; Ph.D., 2000.
Hardy, Kristin (2011) Biological Sciences	Professor	B.S., Tulane University, 2003; Ph.D., University of North Carolina Wilmington, 2009.
Harsh, Matthew (2018) Interdisciplinary Studies in the Liberal Arts	Professor	B.S., Northwestern University; M.S., University of Edinburgh; Ph.D., University of Edinburgh
Hatch, Ryan (2014) English	Associate Professor	B.A., Kalamazoo College, 2004; M.A., State University of New York, 2008; Ph.D., State University of New York, 2013.
Hauck, Allan (2002) Construction Management	Professor Emeritus (FERP)	B.A., Kalamazoo College, 1973; M.Ed., Bowling Green State University, 1979; Ph.D., University of Maryland, 1990. Certified Professional Constructor (CPC).
Haungs, Michael L. (2003) Computer Science; Liberal Arts and Engineering Studies	Professor and LAES Co-Director	B.S., University of California, Berkeley, 1992; M.S., Clemson University, 1998; Ph.D., University of Davis, 2002.
Hawkins, Benjamin George (2012) Biomedical Engineering, Electrical Engineering	Associate Professor	B.S., California State University, Fresno, 2005; Ph.D., Cornell University, Ithaca, 2010.
Haynes, M. Taylor (2015) Chemistry and Biochemistry	Associate Professor	B.S., University of California, Irvine; M.S. University of Michigan; Ph.D. University of Michigan.
Hazelwood, Scott (2007) Biomedical Engineering	Professor	B.S., Harvey Mudd College, 1985; M.E., 1986; M.S., University of California, Davis, 1992; Ph.D., 1998.
Headrick, David H. (1998) Horticulture and Crop Science	Professor	B.S., California State Polytechnic University, Pomona, 1986; M.S., University of California, Riverside, 1988; Ph.D., 1992. Pest Control Advisor, California.
Healy, Brian P. (2017) Theatre and Dance	Associate Professor and Department Chair	B.A., Truman State University, 1996; M.F.A., University of Washington, 2007.

Heiss, Cindy (2020) Food Science and Nutrition	Associate Professor	B.S., Texas Christian University; M.S., Colorado State University; Ph.D., Texas Women's University
Helmbrecht, Brenda (2004) English	Professor	B.A., Truman State University, 1997; M.A., Miami University, 1999; Ph.D., 2004. Director of Writing.
Helms, Eleanor D. (2011) Philosophy	Professor	B.A., Wheaton College, 2002; M.A., Fordham University, 2007; Ph.D., 2011.
Hendricks-Bolen, Karin A. (2018) Theatre and Dance	Assistant Professor	B.A. University of Arizona, 2004; M.F.A., University of California, Irvine, 2009.
Hess, Jeffrey (2007) Marketing	Associate Professor and Area Chair	B.A., Biola University, 1986; M.B.A., Pepperdine, 1988; Ph.D., University of Colorado-Boulder, 1998.
Hewavitharana, Shashika (2019) Horticulture and Crop Science	Assistant Professor	B.S., University of Colombo, Sri Lanka, 2009; M.S., Washington State University, 2013; Ph.D., Washington State University, 2017.
Heying, Michael D. (2009) Chemistry and Biochemistry	Associate Professor	B.S. Alma College, Michigan 1999; M.S. Purdue University, 2002; Ph.D., Purdue University, 2005
Heylman, Christopher M. (2017) Biomedical Engineering	Assistant Professor	B.S., California Polytechnic State University, San Luis Obispo, 2007; Ph.D., Case Western Reserve University, 2013.
Hickman, Emily (2019) Accounting	Assistant Professor	B.S., University of Idaho, 2011; M.S., Gonzaga University, 2013; Ph.D., Washington State University, 2017.
Hill, Margarita M. (2005) Landscape Architecture	Professor Emeritus (FERP)	B.S.L.A., University of California, Davis, 1986; M.S.C.D., 1989.
Hill, Alessandro (2018) Industrial and Manufacturing Engineering	Assistant Professor	B.S. and M.S., University of Augsburg, Germany, 2006; Ph.D., University of Hamburg, Germany, 2016.
Hillers, Kenneth J. (2004) Biological Sciences	Professor and Department Chair	B.S., Western Washington University, 1990; Ph.D., University of Oregon, 1998.
Himelblau, Edward T. (2005) Biological Sciences	Professor	B.S., University of California San Diego, 1992; Ph.D., University of Wisconsin, 2000.
Hiremath, Nandeesh (2021) Aerospace Engineering	Assistant Professor	B.S Mechanical Engineer from India, M.S. 2015 and Ph.D. in Aerospace Engineering Georgia Institute of Technology 2018
Hoellwarth, Chance (1997) Physics	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S., University of California, Davis, 1994; Ph.D., 1997.
Holladay, Bret (2020) Statistics	Assistant Professor	B.S., California State University, Northridge, 2011; M.S., 2014; Ph.D., University of California, Santa Barbara, 2019.
Holtzapple, Robert (2008) Physics	Professor	B.A., University of California, Berkeley, 1988; M.S., Stanford University, 1991; Ph.D., 1996.
Hoover, Benjamin K. (2013) Horticulture and Crop Science	Associate Professor	B.S., Temple University, 2005; M.S., The Pennsylvania State University, 2007; Ph.D., 2012
Hopper, Matthew S. (2006) History	Professor	B.A., Pepperdine University, 1996; M.A., Temple University, 1998; M.A., University of California, Los Angeles, 2000; Ph.D., 2006.
Horney, Marc R. (2009) Animal Science	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1990; M.S., Oregon State University, 1992; Ph.D., University of Nebraska-Lincoln, 1999.
Howe, Patrick C. (2011) Journalism	Associate Professor	B.A., University of Minnesota, 1993; M.A., University of Missouri-Columbia, 2011.
Howes, Daniel J. (2011) BioResource and Agricultural Engineering	Professor	B.S., University of California, Davis, 1997; M.S., California Polytechnic State University, San Luis Obispo, 2001; Ph.D., University of California, Irvine, 2010. Registered Professional Engineer, California..
Hurley, Sean P. (2002) Agribusiness	Professor	B.A., University of San Francisco, 1994; Ph.D., Iowa State University, 2000.
Hurt, Shelley L. (2008) Political Science	Associate Professor	B.A., University of California, Berkeley, 1995; M.A., New School for Social Research, New York, 2001; Ph.D., 2010.
Huzzey, Juliana M. (2014) Animal Science	Associate Professor	B.S., University of British Columbia, 2003; M.S., University of British Columbia, 2007; Ph.D., Cornell University, 2012.
Hydock, Chris (2019) Marketing	Assistant Professor	B.A., University of Colorado, 2006; Ph.D., George Washington University, 2012.
Immoos, Chad E. (2004) Chemistry and Biochemistry	Professor	A.B., Occidental College, 1996; Ph.D., University of California, Irvine, 2002.

Iscold, Paulo (2018) Aerospace Engineering	Associate Professor	B.S., Universidade Federal de Minas Gerais, 1999; M.S., Universidade Federal de Minas Gerais 2001; Ph.D., Universidade Federal de Minas Gerais 2004
Isom, Denise A. (2008) Ethnic Studies	Professor and Department Chair	B.S., B.A., University of California, Davis, 1989; M.A., 1992; Ph.D., Loyola University, Chicago, 2003.
Jackson, Douglas (2008) Architecture	Professor	B.Arch., Virginia Polytechnic Institute and State University, 1993; M.Arch, Princeton University, 2000. Registered Architect, California.
Jackson, Lorraine D. (1992) Communication Studies	Associate Professor	B.A., University of Western Ontario, 1987; M.A., Pennsylvania State University, 1989; Ph.D., 1992.
Jackson, Thanayi (2019) History	Assistant Professor	B.A., University of California Santa Cruz, 2000, M.A., University of Maryland-College Park, 2002, Ph.D., University of Maryland, 2016
Jaggia, Sanjiv (2007) Economics	Professor	B.A., Panjab University, India, 1981; Ph.D., Indiana University, Bloomington, 1990.
James, Jonathan (2013) Economics	Associate Professor	B.A., UCLA, 2003; M.A., Duke University, 2007; Ph.D., Duke University, 2011.
James, Jeremy (2020) Natural Resources Management and Environmental Sciences	Professor and Department Head	B.S., California Polytechnic State University, San Luis Obispo, 1998; Ph.D., University of California, Davis, 2004.
Jankovitz, Kristine Z. (1996) Kinesiology	Professor and Department Chair	B.S., California Polytechnic State University, San Luis Obispo, 1984; M.S., 1989; Ph.D., University of Nebraska-Lincoln, 1995. Department Chair.
Jansen, Daniel (2003) Civil and Environmental Engineering	Professor	B.S., University of California, San Diego, 1988; Ph.D., Northwestern University, 1996. Registered Professional Engineer, California.
Janzen, David S. (2006) Computer Science	Professor	B.A., Tabor College, 1990; M.S., University of Kansas, 1993; Ph.D., 2006.
Jasbinsek, John J. (2008) Physics	Professor	B.S., California State Polytechnic University, Pomona, 1992; M.A., University of California, Santa Barbara, 1994; Ph.D., University of Wyoming, 2008.
Jeffery, Elizabeth (2017) Physics	Assistant Professor	B.S., Brigham Young University, 2003; M.S. University of Texas at Austin, 2005; Ph.D., University of Texas at Austin, 2009.
Jenkins, Ryan (2015) Philosophy	Associate Professor	B.A., Florida State University, 2009; Ph.D., University of Colorado, 2014.
Jensen, Jessica L. (2017) School of Education	Assistant Professor	B.A., University of Iowa, 2008; M.A., Viterbo University, La Crosse, 2010; Ph.D., University of Iowa, 2017.
Jin, Xiaomin (2004) Electrical Engineering	Professor	B.S., Tsinghua University, Beijing, China, 1992; M.S., 1996; Ph.D., University of Illinois at Urbana-Champaign, 2001.
Jipson, Jennifer (2005) Psychology and Child Development	Professor and Department Chair	B.A., Smith College, 1993; M.S., University of California, Santa Cruz, 1996; Ph.D., 2000.
Johnston, Scott C. (2008) Physics	Professor	B.S., Stanford University, 1999; M.S., 2000; Ph.D., University of California, Santa Barbara, 2006.
Johnston, Liz B. (2010) Social Sciences	Associate Professor	B.S., Winthrop College, SC, 1978; M.S.W., Smith College, 1984; Ph.D., Smith College, 2013.
Jones, Dane R. (1976) Chemistry and Biochemistry	Professor	B.A., University of Utah, 1969; Ph.D., Stanford University, 1974.
Jones, Eric (2012) Chemistry and Biochemistry	Associate Professor	B.S., Case Western Reserve University, Cleveland, 2000; Ph.D., 2006
Jones, R. Thomas (2003) Architecture	Professor Emeritus	B.Arch., Cornell University, 1969. AIA, Registered Architect, California.
Jones, Terry L. (1998) Social Sciences	Professor	B.A., University of California, Santa Cruz, 1978; M.A., Sonoma State University, 1982; M.A., University of California, Davis, 1989; Ph.D., 1995.
Jones, Barry (2001) Construction Management	Professor Emeritus (FERP)	M.Sc., University of Aston, U.K., 1980; Ph.D., University of Southampton, U.K., 1999. Chartered Builder; Fellow The Chartered Institute of Building (F.CIOB); Fellow American Society of Civil Engineers (F.ASCE), Senior Fulbright Scholar.
Jovanovic, Jasna (2005) Psychology and Child Development	Professor and Director of University Honors Program	B.S., University of Illinois, 1985; M.S., Pennsylvania State University, 1987; Ph.D. 1991.

Jung, Stephanie (2014) Food Science and Nutrition	Professor and Department Head	B.S., University of Sciences, Metz, France, 1995; M.S., National Polytechnic Institute of Lorraine, Nancy, France, 1996; Ph.D., National School for Engineers in Agricultural and Food Science, Nantes, France, 2000.
Karakka, Lilli (2021) Natural Resources Management and Environmental Sciences	Assistant Professor	B.S., University of Helsinki, 2011; M.Sc. University of Helsinki and Swedish University of Agricultural Sciences-dual degree 2012-13, D.Sc., University of Helsinki, 2018.
Kachlakev, Damian I. (2000) Civil and Environmental Engineering	Professor	B.S., University of Architecture, Civil Engineering and Geodesy, Sofia, Bulgaria, 1986 and 1988; M.S., 1988; Ph.D., Oregon State University, Corvallis, 1997. Registered Professional Engineer, Bulgaria.
Kaczorowski, Jessica (2017) Psychology and Child Development	Associate Professor	B.A., University of California, San Diego, 2005; M.A., University of North Carolina at Greensboro, 2008; Ph.D., 2012.
Kane, Steven (1994) School of Education	Professor Emeritus (FERP)	B.A., California State Polytechnic University, Pomona, 1985; M.A., University of California, Los Angeles, 1989; Ph.D., 1993. Licensed Psychologist, California.
Kang, Iksoon (2016) Animal Science	Professor	B.S., Kon-Kuk University, Seoul, Korea, 1988; M.S., California State University, Fresno, 1991; Ph.D., Texas A M University, 1996.
Kantorowski, Eric J. (2004) Chemistry and Biochemistry	Professor	B.S., California State University, Fullerton, 1993; Ph.D., University of California, Davis, 1998.
Kasper, Eric P. (1997) Civil and Environmental Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S., University of California, Davis, 1992; Ph.D., University of California, Berkeley, 1997. Registered Professional Engineer, California.
Kathuria, Ajay (2014) Industrial Technology and Packaging	Associate Professor	B.S., GJUST, India, 2002; M.S., Michigan State University, 2007; Ph.D., Michigan State University, 2013.
Kato, Goro C. (1981) Mathematics	FERP	B.S., Shizuoka University, Japan, 1972; M.A., West Virginia University, 1974; Ph.D., University of Rochester, 1979.
Katona, Thomas M. (2014) Biomedical Engineering	Associate Professor	B.S., Westmont College, 1996; M.S., University of California, Santa Barbara, 2000; Ph.D., University of California Santa Barbara, 2003; M.B.A., University of South Carolina, 2007.
Kauffmann, Krista J. (2012) English	Associate Professor	B.A., Goshen College, 1999; M.A., University of Wisconsin-Madison, 2001; Ph.D., 2009.
Kaul, Anton (2003) Mathematics	Professor	B.S., University of California, Davis, 1994; M.S., Oregon State University, 1996; Ph.D., 2000.
Kazerouni, Ayaan M. (2020) Computer Science	Assistant Professor	B.S., University of West Georgia, USA, 2015; Ph. D., Virginia Tech, 2020
Keadle, Sarah K. (2016) Kinesiology	Associate Professor	B.S., Lake Forest University, 2006; M.S., University of Massachusetts, Amherst, 2008; Ph.D., University of Massachusetts, Amherst, 2012; MPH, Harvard School of Public Health, 2013.
Kean, Andrew J. (2004) Mechanical Engineering	Professor	B.E., The Cooper Union, 1997; M.S., University of California, Berkeley, 1999; Ph.D., 2003.
Kearns, Timothy J. (1985) Computer Science	Associate Professor	B.A., Boston College, 1969; M.S., University of Notre Dame, 1970; Ph.D., 1976.
Keeling, Elena L. (1997) Biological Sciences	Professor	B.S., Yale University, 1989; Ph.D., University of California, San Francisco, 1996.
Keen, Aaron W. (2002) Computer Science	Professor	B.S., University of California, Davis, 1997; M.S., 2000; Ph.D., 2002.
Keese, James R. (2003) Social Sciences	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1987; M.A., American Graduate School of International Management, 1989; Ph.D., University of Arizona, 1996.
Keesey, Douglas (1988) English	Professor and Department Chair	B.A., University of California, Berkeley, 1982; M.A., 1984; Ph.D., Princeton University, 1988.
Keif, Malcolm G. (1989) Graphic Communication	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1986; M.A., California State University, Long Beach, 1989; Ph.D., University of Missouri, 1995.
Keim, Nathan C. (2014) Physics	Associate Professor	B.S., Haverford College, 2004; Ph.D., University of Chicago, 2010.
Keller, John M. (2006) Physics	Professor	B.S., Stanford University, 1991; M.A., 1992; M.S., University of Colorado, Boulder, 1999; Ph.D., University of Arizona, 2006.

Kelting, Scott D. (2007) Construction Management	Professor	B.S., California Polytechnic State University, San Luis Obispo, 2000; M.S., 2003; Ed.D., University of California Santa Barbara, 2011. Certified Green Professional (CGP), Certified Aging-in-Place Specialist (CAPS), LEED Accredited Professional (LEED AP).
Kelting, Mary (2012) Orfalea College of Business	Assistant Dean	B.A., University of Massachusetts Amherst, 1996; M.B.A., Pepperdine University, 2001.
Kennelly, Brian (2006) World Languages and Cultures	Professor	B.A., University of California, Davis, 1986; M.A., University of Virginia, 1989; Ph.D., New York University, 1996.
Khosmood, Foaad (2011) Computer Science, Computer Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1999; M.S., 2005; Ph.D., University of California, Santa Cruz, 2011.
Kingsbury, Kevin B. (1996) Chemistry and Biochemistry	Professor	B.S., College of William and Mary, 1986; Ph.D., Stanford University, 1993.
Kirby, David A. (2019) Interdisciplinary Studies in the Liberal Arts	Professor and Department Chair	B.S., University of Illinois-Champaign/Urbana; Ph.D., University of Maryland-College Park
Kirk, Colleen M. (2001) Mathematics	Professor	B.S., Stanford University, 1994; M.S., Southern Illinois University, Carbondale, 1995; Ph.D., Northwestern University, 1999.
Kiste, Alan L. (2011) Chemistry and Biochemistry	Professor	B.S., Calvin College, 1993; Ph.D., University of Michigan, 2009.
Kitts, Christopher L. (1995) Biological Sciences	Professor Emeritus (FERP)	B.Sc., University of Auckland, New Zealand, 1984; Ph.D., University of California, Santa Cruz, 1992.
Klay, Jennifer L. (2006) Physics	Professor	B.S., University of California, Los Angeles, 1994; M.S., University of California, Davis, 1998; Ph.D., 2001.
Kline, Andrew (2017) Construction Management	Assistant Professor	B.S., California Polytechnic State University, San Luis Obispo, 2011; M.B.A., Sam Houston State University, 2017; LEED Green Associate.
Klisch, Stephen M. (2001) Mechanical Engineering	Professor	B.S., University of Virginia, 1991; M.S., 1994; Ph.D., University of California, Berkeley, 1999.
Knight, Charles A. (2003) Biological Sciences	Professor	B.S., Western Washington University, 1996; Ph.D., Stanford University, 2002.
Kolegraff, Stacy (2009) Construction Management	Assistant Professor	B.S., California Polytechnic State University, San Luis Obispo, 2002; M.A. Management, University of Redlands School of Business 2008.
Kolkailah, Faysal (1984) Aerospace Engineering	Professor Emeritus (FERP)	BS in Aerospace Engineering from Cairo University (Egypt) in 1969, MS in Aerospace Engineering from University of Cincinnati (Ohio) in 1978 and my Ph.D in Mechanical Engineering from Louisiana State University, LSU, (Baton Rouge) in 1982.
Kolluru, Gita R. (2008) Biological Sciences	Professor	B.Sc., Queen's University, Kingston, Canada, 1991; M.A., University of California, Riverside, 1994; Ph.D., 1999.
Kolodziejski, Lauren R. (2014) Communication Studies	Associate Professor and Department Chair	B.A., B.S., Winthrop University, 2004; M.A., University of Colorado, Boulder, 2010; Ph.D., University of Washington, 2014.
Krifka, Laura (2018) Art and Design	Associate Professor	B.F.A., California Polytechnic State University, San Luis Obispo, 2008; M.F.A., University of California, Santa Barbara, 2010.
Kuhn-Choi, Don H. (2003) Architecture	Professor	A.B., Princeton University, 1988; M.Arch., Rice University, 1993; Ph.D., U.C. Berkeley, 2003.
Kurfess, Franz J. (2000) Computer Science	Professor	M.S., Technical University of Munich, 1984; Ph.D., 1990.
Kuriabova, Tatiana (2014) Physics	Associate Professor	Honors Diploma in Physics, Ivanovo State University, Ivanovo, Russia, 1996; M.S., University of California, Los Angeles, 2001; Ph.D., 2008.
La Frano, Michael (2016) Food Science and Nutrition	Associate Professor	B.S. Loma Linda University, 2007; Ph.D. University of California, Davis, 2012.
Lacanieta, Andrew (2019) Experience Industry Management	Assistant Professor	B.A., Brigham Young University, 2014; M.S., 2016; Ph.D., Texas A M University, 2018.
Laiho, Lily (2007) Biomedical Engineering	Professor and Department Chair	B.S., Stanford University, 1995; M.S., 1996; Ph.D., Massachusetts Institute of Technology, 2004.
Lambertz-Berndt, Megan M. (2015) Communication Studies	Associate Professor	B.A., Delaware State University, 2009; M.A., University of Nevada Las Vegas, 2011; Ph.D., University of Wisconsin-Milwaukee, 2016.

Lammert, Amy (2008) Food Science and Nutrition	Professor	B.S., Michigan State University, 1991; M.S., University of Illinois, 1993; Ph.D., 1997.
Lange, Karen F. (1989) Architecture	Professor	B.Arch., California Polytechnic State University, San Luis Obispo, 1980; M.Arch., Columbia University, 1982. Registered Architect, California.
Langner, Carrie A. (2008) Psychology and Child Development	Professor	B.A., University of Michigan, 1997; Ph.D., University of California, Berkeley, 2005.
Lappe, Martine Danielle (2018) Social Sciences	Assistant Professor	BA, University of California-San Diego; PhD, University of California-San Francisco.
Lathrop, Amanda A. (2009) Food Science and Nutrition	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1999; M.S., Purdue University, 2002; Ph.D., 2005.
Latner, Michael (2008) Political Science	Professor	B.A., California State University, Chico, 1995; M.A., University of California, Irvine, 2006; Ph.D., 2008.
Laursen, Peter T. (2007) Architectural Engineering	Professor	M.S., University of California, San Diego; Ph.D., University of Auckland, New Zealand, 2003. Registered Civil Engineer, California.
Laver, Gary D. (1998) Psychology and Child Development	Professor	B.A., University of California, Santa Cruz, 1983; M.A., Claremont Graduate University, 1987; Ph.D., 1992.
Lawson, John W. (2009) Architectural Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1983; M.S., Stanford University, 1986. Registered Structural Engineer and Civil Engineer, California, Arizona.
Lease, Terry (2019) Wine and Viticulture	Professor	B.S., Wake Forrest University, 1983; M.Tax Baylor University, 1985, PhD. University of Southern California 1996
Lecat, Benoit (2015) Wine and Viticulture	Professor and Department Head	M.S., Graduate School of Business Students, KULeuven, Belgium, 2000; Ph.D., FUCAM, branch of LOUVAIN School of Management, UCL Campus of Mons, Belgium, 2006. Level 4 DipWSET
Lee, Linda (2009) Psychology and Child Development	Professor	B.A., University of California, Los Angeles, 1999; M.Ed., Harvard Graduate School of Education, 2000; Ph.D., University of California, Los Angeles, 2007.
Lee, Jean L. (2014) Materials Engineering	Associate Professor	S.B., Massachusetts Institute of Technology, 1988; Ph.D. Cornell University, 1996.
Lee, Jess (2020) Social Sciences	Assistant Professor	B.A. in Gender Studies/2010/Mount Holyoke College;M.A. in Liberal Studies/2014/City University of New York Graduate Center;M.A. in Sociology/2017/University of California, Irvine;Ph.D. in Sociology/2020/ University of California, Irvine
Lehr, Corinne (2006) Chemistry and Biochemistry	Professor	B.Sc., University of Calgary, 1994; Ph.D., University of British Columbia, 2003.
Lehr, Jane L. (2007) Ethnic Studies, Women's, Gender and Queer Studies	Professor	B.A., University of Rochester, 1997; M.S., Virginia Polytechnic Institute and State University, 2002; Ph.D., Virginia Polytechnic Institute and State University, 2006.
Leithner, Anika (2006) Political Science	Professor and Department Chair	Vordiplom, Friedrich-Alexander-Universität Erlangen-Nuremberg, Germany, 1999; M.A., University of Colorado, 2002; Ph.D., 2006.
Lema, Sean C. (2011) Biological Sciences	Professor	B.S., University of California, Davis, 1999; M.S., 2001; Ph.D., 2004.
Lemieux, Patrick (2007) Mechanical Engineering	Professor	B.Sc.Eng., University of New Brunswick, Fredericton, Canada, 1991; M.Sc., Cranfield Institute of Technology, Bedford, England, 1992; Ph.D., California Institute of Technology, 1999.
Lepore, Jason (2007) Economics	Professor	B.A., University of California, Irvine, 2002; M.A., University of California, Davis, 2003; Ph.D., 2007.
Lertwachara, Kevin (2004) Management, HR, and Information Systems	Professor	B.S., King Monkut's Institute of Technology, Thonburi, Bangkok, Thailand, 1994; M.B.A., Westminster College, 1996; Ph.D., University of Connecticut, 2004.
Liddicoat, Albert (2002) Electrical Engineering	Professor	B.S. EL, Cal Poly, SLO, 1989; M.S. EE, Stanford University, 1997; M.S. IE Engineering Management, Stanford University 1999, Ph.D. EE, Sanford University, 2002.
Liese, Jeffrey E. (2008) Mathematics	Professor	B.S., California Polytechnic State University, San Luis Obispo, 2000; M.A., University of California, San Diego, 2004; Ph.D., 2008.
Lin, Patrick (2007) Philosophy	Professor	B.A., University of California, Berkeley, 1990; M.A., University of California, Santa Barbara, 1995; Ph.D. 1997.

Lin, Joyce T. (2013) Mathematics	Associate Professor	B.A., University of Virginia, 2004; Ph.D., University of North Carolina at Chapel Hill, 2009.
Lin, Kevin (2014) Experience Industry Management	Associate Professor	B.A., Beijing International Studies University, 2008; M.A., California State University, Chico; Ph.D., Pennsylvania State University, 2014.
Liu, Bo (2014) BioResource and Agricultural Engineering	Associate Professor	B.S., Northeastern University, China, 2009; M.S., Colorado State University, Pueblo, 2011; M.S., University of Missouri, Columbia, 2013; Ph.D., University of Missouri, Columbia, 2014.
Livingston, Peter A. (2016) BioResource and Agricultural Engineering	Professor and Department Head	B.S., University of Arizona, 1981; MS, Colorado State University, 1982; PhD, University of Arizona 2013. Registered Agricultural Engineer, AZ.
Liwanag, Heather (2015) Biological Sciences	Associate Professor	B.S., University of California, San Diego, 2001; Ph.D., University of California, Santa Cruz, 2008.
Lloyd-Moffett, Stephen (2005) Philosophy	Professor	B.A., Claremont McKenna College, 1994; M.Th., St. Vladimir's Orthodox Seminary, 2004; M.A., University of California, Santa Barbara, 2001; Ph.D., 2005.
Loberg, Molly J. (2007) History	Professor	B.A., Pacific Lutheran University, 1998; M.A., Princeton University, 2002; Ph.D., 2006.
LoCascio, James Gaspare (1981) Mechanical Engineering	Professor Emeritus (FERP)	B.S., Newark College of Engineering, 1970; M.S., University of California, Santa Barbara, 1971; Ph.D., 1988.
Lohmar, Bryan (2022) Agribusiness	Professor and Department Head	B.A., University of Minnesota, 1987; Ph.D., University of California, Davis, 2000.
London, Blair (1993) Materials Engineering	Professor Emeritus (FERP)	B.S., Drexel University, 1981; M.S., Stanford University, 1983; Ph.D., 1986.
Long, Todd (2004) Philosophy	Professor	B.A., University of Southern Mississippi, 1986; M.A., 1995; M.A., University of Wales, 2000; M.A., University of Rochester, 2002; Ph.D., 2003.
Lopus, Sara E. (2017) Social Sciences	Associate Professor	B.S., University of California, Berkeley, 2005; M.S., University of California, Davis, 2009; Ph.D., University of California, Berkeley, 2015.
Lowham, Elizabeth A. (2007) Political Science	Professor	B.A., Carleton College, 2001; M.A., University of Colorado, 2003; Ph.D., 2007.
Lucas, Michael Austin (1998) Architecture	Professor Emeritus	B.Arch., University of Cincinnati, 1979; M.Arch, Morgan State University, 1995. Registered Architect, Maryland.
Lund, Ulric J. (2001) Statistics	Professor	B.S., University of California, San Diego, 1990; M.S., University of California, Santa Barbara, 1993; Ph.D., 1998.
Lundquist, Tryg J. (2006) Civil and Environmental Engineering	Professor	B.A., University of California, Berkeley, 1989; M.S., 1992; Ph.D., 2006. Registered Civil Engineer, California.
Lupo, Christopher (2008) Computer Science	Professor and Department Chair	B.S., California State University, Fresno, 1997; M.S., University of California, Davis, 2007; Ph.D., 2008.
Lutz, Benjamin (2018) Mechanical Engineering	Assistant Professor	B.S., Virginia Tech, 2011; M.Eng., Virginia Tech, 2016; Ph.D., Virginia Tech, 2017
Lynch, Joseph (2001) Philosophy	Professor Emeritus (FERP)	B.A., Virginia Commonwealth University, 1982; M.A., Claremont Graduate School, 1985; Ph.D., 1989.
Ma , Ruoxi (2018) Graphic Communication	Assistant Professor	B.S., Qingdao University of Science of Technology, 2010; M.S., Xi'an University of Technology, 2012; Ph.D., Western Michigan University - Kalamazoo, 2018.
MacCarley, Arthur Carl (1988) Electrical Engineering	Professor	B.S., University of California, Los Angeles, 1976; M.S., 1978; Ph.D., Purdue University, 1987; Registered Professional Engineer, Colorado.
MacDougall, Neal A. (1997) Agribusiness	Professor	B.A., Williams College, 1984; Ph.D., University of California, Berkeley, 1999.
Macedo, Jose (2002) Industrial and Manufacturing Engineering	Professor Emeritus (FERP)	B.S., Catholic University of Peru, Peru, 1982; M.S., University of California, Berkeley, 1984; Ph.D., Lehigh University, 1991. Registered Professional Engineer, Texas.
Machamer, Joshua T. (2003) College of Liberal Arts	Associate Dean	B.A., Whittier College, 1993; M.F.A., Pennsylvania State University, 2000.
Mackin, Thomas J. (2005) Mechanical Engineering	Professor	B.S., The Pennsylvania State University, 1980; M.S., 1987; Ph.D., 1991.
Macro, Kenneth L. (2000) Graphic Communication	Professor	B.A., Pennsylvania State University, University Park, 1993; M.A., The University of Akron, 2000; Ph.D., Walden University, 2011.

Maddren, Jesse (1999) Mechanical Engineering	Professor Emeritus (FERP)	B.S., University of California, Santa Barbara, 1985; M.S., 1988; Ph.D., 1994. Registered Professional Engineer, California.
Mahadev, Sthanu (2016) Mechanical Engineering	Assistant Professor	B.S., Anna University, Chennai India, 2008, M.S., The University of Texas at Arlington, 2011, Ph.D., 2015.
Main, Kelly D. (2007) City and Regional Planning	Associate Professor	B.A., University of California, Davis, 1982; M.A., Brown University, 1983; Ph.D., University of California, Los Angeles, 2007.
Maitland, Padma (2019) Architecture	Assistant Professor	B.A., University of California, Berkeley, 2005; M.Arch., Princeton University, 2009; M.A., South and Southeast Asian Studies, 2016, Ph.D., Architectural History, Theory and Society, University of California, Berkeley, 2018.
Malama, Bwalya (2014) Natural Resources Management and Environmental Sciences	Associate Professor	B.S., University of Arizona, 1999; M.S., University of Arizona, 2001; Ph.D., University of Arizona, 2006.
Manjarin, Rodrigo (2015) Animal Science	Associate Professor	D.V.M., University of Leon, Spain, 2004; M.S., Michigan State University, 2008; Ph.D., 2011; Ph.D., University of Leon Veterinary School, 2013.
Marchbanks, Paul (2007) English	Professor	B.S., Centre College of Kentucky, 1993; M.A., University of North Carolina at Chapel Hill, 2000; Ph.D., 2006. Graduate Director.
Marijuan, Silvia (2015) World Languages and Cultures	Associate Professor	Licenciatura en Letras, University of Buenos Aires, 2009; M.S., Georgetown University, 2012; Ph.D., 2015.
Marlow (Buchanan), Colleen A. (2014) Physics	Associate Professor	B.S., California Polytechnic State University, San Luis Obispo, 1999; Ph.D., University of Oregon, 2005.
Marshall, David D. (2004) Aerospace Engineering	Professor and Department Chair	B.S., Worcester Polytechnic Institute, 1994; M.S., Georgia Institute of Technology, 1995; Ph.D., 2003.
Martinez, Andres W. (2010) Chemistry and Biochemistry	Professor	B.S., Stanford University, 2003; Ph.D., Harvard University, 2009.
Martinez, Charmaine (2006) Art and Design	Associate Professor	B.F.A., University of Notre Dame, 1993; M.F.A., University of Wisconsin-Madison, 2003.
Martinez, Nathaniel W. (2013) Biological Sciences	Associate Professor	B.S., University of California, Santa Cruz, 2002; Ph.D. Cornell University, 2010; M.D., 2012.
Martinez, Shanae A. (2020) English	Assistant Professor	B.A. University of California, Davis, 2008; M.A., University of Wisconsin-Milwaukee, 2012; Ph.D., University of Wisconsin-Milwaukee, 2019.
Mase, Tom (2007) Mechanical Engineering	Professor	B.S.M.E., Michigan State University, 1980; M.S.M.E., University of California, Berkeley, 1982; Ph.D., 1987.
Mastoridis, Themistoklis (2013) Physics	Associate Professor	B.S., Brandeis in Physics, 2003; M.S., Stanford University in Electrical Engineering, 2005; Ph.D. Stanford University in Electrical Engineering, 2010.
Maurice, Stefanee (2019) Kinesiology	Assistant Professor	B.A., University of California, Riverside, 2010; M.A., California State University, Northridge, 2013; M.A., West Virginia University, 2016; Ph.D., West Virginia University, 2019
Mayer, Hans (2019) Mechanical Engineering	Assistant Professor	B.S., California Polytechnic State University, San Luis Obispo, 2003; M.S., Carnegie Mellon University, Pittsburgh, 2005; Ph.D., University of California, Santa Barbara, 2016.
McCormick, Kathryn E. (2003) Art and Design	Professor	B.S., University of Cincinnati, 1996; M.S., 2001.
McCullough, Michael P. (2008) Agribusiness	Professor	B.S., Boise State University, 2003; M.S., Washington State University, 2007; Ph.D., 2008.
McDaniel, Cole C. (2005) Architectural Engineering	Professor	B.S., University of California, San Diego, 1996; M.S., 1997; Ph.D., 2002. Registered Civil Engineer, California.
McDonald, Ashley (2013) Chemistry and Biochemistry	Associate Professor	B.S., Mississippi College, 2004; Ph.D. Georgia Institute of Technology, 2009
McDonald, Margot K. (1992) Architecture	Professor and Department Head	B.A., B.S., University of California, Santa Barbara, 1980; M.Arch., University of Oregon, 1987. AIA, Registered Architect, Oregon. NCARB Certificate.
McDonald, Casey (2020) Journalism	Assistant Professor	B.S., Brigham Young University, Idaho, 2007; M.A., Brigham Young University, Utah, 2016; Ph.D, University of Florida, Gainesville, 2020.
McFarlane, Zach (2018) Animal Science	Assistant Professor	B.S., University of Arizona, 2013; M.S., University of Arizona, 2015; Ph.D., University of Tennessee, Knoxville, 2018.

McGaughey, Karen J. (2003) Statistics	Professor	B.A., Kansas State University, 1991; M.S., 1999; Ph.D., 2003.
McLamore, Alyson (1991) Music	Professor	B.A., University of California at Los Angeles, 1982; M.A., 1985; Ph.D., 1991.
Mealy, Bryan J. (2003) Computer Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1990; M.S., 1993; M.S., University of California, Santa Cruz, 1999; Ph.D., 2002.
Medina, Elsa (2000) Mathematics	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1994; M.S., 1996; Ph.D., University of Northern Colorado, 2000.
Medizade, Mason (1984) Mechanical Engineering	Professor Emeritus (FERP)	B.S., Abadan Institute of Technology, 1978; M.S., University of Southern California, 1980; Ph.D., 1984.
Mehiel, Eric A. (2004) College of Engineering, Aerospace Engineering	Associate Dean and Professor	B.S., University of California, Santa Barbara, 1998; M.S., University of Colorado, 2001; Ph.D., 2003.
Mello, Joseph D. (1998) Mechanical Engineering	Professor	B.S., California Polytechnic State University, 1983; M.S., 1989; Ph.D., University of California, Davis, 1996.
Mendes, Anthony A. (2004) Mathematics	Professor	B.S., University of California, Irvine, 2000; M.A., University of California, San Diego, 2001; Ph.D., 2004.
Metcalf, Lynn E. (1986) Industrial Technology and Packaging	Professor	B.A., University of Oregon, 1978; M.I.M., American Graduate School of International Management, 1981; Ph.D., University of South Carolina, 1986.
Mewes, Matthew (2014) Physics	Associate Professor	B.A., Concordia College, 1998; M.S., Indiana University 2004; Ph.D., 2004.
Meyers, Joan (2017) Social Sciences	Associate Professor	B.A., Cornell University, 1988; M.A., California State University, San Francisco, 1999; M.A., University of California, Davis, 2001; Ph.D., University of California, Davis, 2009.
Migler, Theresa (2018) Computer Science	Assistant Professor	B.S., Math, Cal Poly, 2004; M.S., Math, Cal Poly, 2007; M.S. CS, Oregon State, 2013; Ph.D. CS, Oregon State, 2014.
Mike, Moses (2021) Agricultural Education and Communication	Assistant Professor	B.S., University of the West Indies, Trinidad and Tobago, 2008; M.S., 2013; Ph.D., University of Florida, 2020
Miklowitz, Paul (1988) Philosophy	Professor Emeritus (FERP)	B.A., University of California, Santa Cruz, 1977; M.A., University of Chicago, 1979; M.Phil., Ph.D., Yale University, 1988.
Miller, Charles (Tad) R. (1987) Accounting	Professor Emeritus (FERP)	B.A., College of Wooster, 1970; M.B.A., University of Arizona, 1980; Ph.D., 1987. Certified Public Accountant.
Mitchell, David (2004) Physics, Liberal Studies	Professor	B.S., George Washington University, 1998; M.A., University of California, San Diego, 2001; Ph.D., 2004.
Mock, Rodney (2008) Accounting	Professor	J.D., University of Oregon School of Law, 2002; L.L.M., University of Washington School of Law, 2004.
Moelter, Matthew J. (1998) Physics	Professor	B.S., University of California, Irvine, 1981; Sc.M., Brown University, 1983; Ph.D., 1989.
Moore, Matthew J. (2006) Political Science	Professor	B.A., Eugene Lang College, 1997; Ph.D., Johns Hopkins University, 2004.
Moreno, J. Kelly (1991) Psychology and Child Development	Professor	B.S., University of California, Santa Barbara, 1980; M.S., University of Utah, 1985; Ph.D., 1988. Licensed Psychologist, California.
Morris, Andrew D. (2000) History	Professor	B.S., Harvey Mudd College, 1991; M.A., University of California, San Diego, 1996; Ph.D., 1998.
Moss, Robb E. S. (2006) Civil and Environmental Engineering	Professor	B.S., North Carolina State University, 1995; M.S., Utah State University, 1997; Ph.D., University of California, Berkeley, 2003. Registered Professional Engineer, California.
Mott, Jennifer (2014) Mechanical Engineering	Assistant Professor	B.S., California Polytechnic State University, 2005; M.S., University of Illinois at Urbana-Champaign, 2007; Ph.D., University of Illinois at Urbana-Champaign, 2012.
Muleta, Misgana (2008) Civil and Environmental Engineering	Professor and Department Chair	B.S., Arba Minch University, 1996; M.S., National University of Ireland, Galway, 1999; Ph.D., Southern Illinois University, Carbondale, 2003. Registered Professional Engineer, California.
Munoz-Christian, Karen (2007) World Languages and Cultures	Professor and Department Chair	B.S., Iowa State University, 1981; M.A., Wichita State University 1985; Ph.D., University of California, Irvine, 1994.

Murphy, Kate (2007) College of Liberal Arts, History	Associate Dean and Professor	B.A., University of Virginia, 2001; M.A. Johns Hopkins University, 2003; Ph.D., 2007
Murray, William R. (1999) Mechanical Engineering	Professor	B.S., University of Texas, Austin, 1975; M.S., 1976; Ph.D., Massachusetts Institute of Technology, 1988.
Mwangi, James (2003) Architectural Engineering	Associate Dean and Professor	B.Sc., University of Nairobi, Kenya, 1984; MSc., University of Lagos, Nigeria; Ph.D., University of California, Davis, 2001. Registered Structural Engineer and Professional Engineer, California.
Myers, Allison (2020) Art and Design	Assistant Professor	B.A., Webster University, Saint Louis, Missouri, 2007; M.A., The University of Texas at Austin, 2009; Ph.D., The University of Texas at Austin, 2018.
Nafisi, Ahmad (1983) Electrical Engineering	Professor	B.S., Arya Mehr University of Technology, Iran, 1975; M.S., University of Southern California, 1977; Ph.D., 1983.
Nation, Jasmine (2020) Liberal Studies	Assistant Professor	B.S. B.A., University of Arizona, 2009; M.A., Univeristy of California, Santa Barbara, 2017; Ph.D., University of California, Santa Barbara, 2019.
Navarro, Jenell R. (2012) Ethnic Studies	Associate Professor and Department Chair	B.A., Oklahoma Baptist University, 2001; M.A., Claremont Graduate University, 2007; Ph.D., 2011.
Navarro, Jose (2012) Ethnic Studies	Professor	B.A., University of California, Berkeley, 2002; M.A., University of Southern California, 2008; Ph.D., 2012.
Nazmi, Aydin (2009) Food Science and Nutrition	Professor	B.S., University of California, Davis, 1998; M.S., University of London, U.K.; 2004; Ph.D., Federal University of Pelotas, Brazil, 2007.
Neff, Grace Ann (1995) Chemistry and Biochemistry	Professor	B.S., New Mexico State University, 1989; Ph.D., University of Oregon, 1998.
Neill, Dawn (2008) College of Liberal Arts, Interdisciplinary Studies in the Liberal Arts	Professor	B.A., Louisiana State University, 1996; M.A., 1999; M.A., University of Washington, 2004; Ph.D., 2007.
Neill, Stern (2008) Marketing	Professor and Associate Dean	B.A., Louisiana State University, 1992; M.B.A., Southeastern Louisiana University, 1994; Ph.D., Louisiana State University, 2000.
Nelson, Jill (2008) Architectural Engineering	Associate Professor Emeritus (FERP)	B.S., University of Nevada, Reno, 1978; M.S., University of Washington, 1982. Registered Structural and Civil Engineer, California and Washington; LEED AP.
Nelson, Yarrow M. (1999) Civil and Environmental Engineering	Professor Emeritus (FERP)	B.S., University of California, Berkeley, 1979; M.S., Cornell University, 1992; Ph.D., 1997.
Nelson, Leslie R. (2018) Communication Studies	Assistant Professor	B.A., University of Nebraska, Lincoln, 2012; M.A., University of Missouri, 2014; Ph.D., 2018.
Neumann, Natasha (2019) School of Education	Assistant Professor	B.A., University of California, San Diego, 1997; M.A., Azusa Pacific University, Azusa, 2008; Ed.D., University of Southern California, Los Angeles, 2017.
Nico, Phillip L. (2000) Computer Science	Professor	B.A., University of California, Berkeley, 1991; M.S., University of California, Davis, 1994; Ph.D., 2000.
Niku, Saeed B. (1983) Mechanical Engineering	Professor Emeritus (FERP)	B.S., Tehran Polytechnic University, 1975; M.S., Stanford University, 1976; Ph.D., University of California, Davis, 1982. Registered Professional Engineer, California.
Noland, Jaymie J. (1999) Animal Science	Professor and Department Head	B.S., Colorado State University, 1981; D.V.M., Colorado State University, 1987.
Noori, Mohammad (2005) Mechanical Engineering	Professor	B.S., University of Illinois at Urbana-Champaign, 1977; M.S., Oklahoma State University, 1980; Ph.D., University of Virginia, 1984.
Nuttall, Brent (2003) Architectural Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1986; M.S., University of California, Berkeley, 1987. Registered Structural and Civil Engineer, California.
Nuworsoo, Cornelius K. (2005) City and Regional Planning	Professor	B.S., University of Science and Technology, Ghana, 1981; M.S., Morgan State University, 1986; MCP, University of California, Berkeley, 2002; Ph.D., 2004. American Institute of Certified Planners. Institute of Transportation Engineers.
O'Bryant, Camille P. (1999) College of Science and Mathematics, Kinesiology	Associate Dean and Professor	A.B., 1983; M.S., Smith College, 1986; PhD., The Ohio State University, 1996.

O'Hara, Christine E. (2008) Landscape Architecture	Professor	B.A., Stanford University, 1987; M.L.A. University of Washington, 2002. Certificate in Preservation Planning.
Oliver, John Y. (2007) Computer Engineering	Professor	B.S., Boston University, 1998; M.S., University of California, Davis, 2006; Ph.D., University of California, Davis, 2007
Olsen, Eric (2004) Industrial Technology and Packaging	Professor	B.S., University of Maine at Orono, 1979; M.B.A., Virginia Polytechnic Institute and State University, 1987; Ph.D., The Ohio State University, 2004.
Olsen, Clare (2011) Architecture	Professor	B.A., Brown University, 1997; M.Arch., University of California, Los Angeles, 2003. Registered Architect, New Jersey.
Orth, Joel J. (2003) History	Associate Professor	B.A., California Polytechnic State University, San Luis Obispo, 1996; M.A., Iowa State University, 1998; Ph.D., 2004.
Osborn, Brian (2016) Architecture	Associate Professor	B.L.A. California Polytechnic State University, San Luis Obispo, 2001; M.Arch, Pratt Institute, School of Architecture, Brooklyn, New York, 2008. Licensed Landscape Architect in the Commonwealth of Virginia, NCARB.
Oulton, Rebekah L. (2013) Civil and Environmental Engineering	Associate Professor	B.S., Harvey Mudd College, 1993; M.S., 1994; Ph.D., University of Iowa, 2013. Registered Professional Engineer, California. Leed Accredited Professional.
Oza, Javin P. (2016) Chemistry and Biochemistry	Associate Professor	B.S., University of California, Santa Barbara; Ph.D., University of California, Santa Barbara
Oñate-Madrado, Andrea (2016) History	Assistant Professor	B.A., New York University, 2003; M.A., Princeton University, 2011; Ph.D., 2016
Pal, Nirupam (1995) Civil and Environmental Engineering	Professor	B. Tech, Calcutta University, India, 1984; M. Tech, 1986; Ph.D., New Jersey Institute of Technology, 1993.
Palandoken, Hasan (2009) Chemistry and Biochemistry	Professor	B.S., California State University, Chico, 1993; M.S., University of California, Davis, 1997; Ph.D., 2006.
Pan, Jianbiao J. (2003) Industrial and Manufacturing Engineering	Professor	B.E., Xidian University, Xian, China, 1990; M.S., Tsinghua University, Beijing, China, 1996; Ph.D., Lehigh University, 2000. Certified Quality Engineer. Certified Reliability Engineer.
Pande, Anurag (2008) Civil and Environmental Engineering	Professor	B.Tech., Indian Institute of Technology, Bombay, 2002; M.S., University of Central Florida, 2003; Ph.D., 2005.
Pantoja, Maria (2016) Computer Science	Associate Professor	B.S., University of Valencia, Spain, 1992; M.S., California State University, East Bay, 2004; Ph.D. Santa Clara University, 2009.
Papathakis, Peggy C. (2006) Food Science and Nutrition	Professor Emeritus (FERP)	B.S., California Polytechnic State University, San Luis Obispo, 1977; M.S., University of California, Davis, 2000; Ph.D., 2005. Registered Dietitian.
Paquin, Dana (2008) Mathematics	Professor	B.S., Davidson College, 2002; Ph.D., Stanford University, 2007.
Park, Michael (2019) Journalism	Assistant Professor	B.A., University of California, Los Angeles, 1999; J.D., University of California, 2004; Ph.D., Annenberg School for Communication Journalism, 2014.
Parrotta, Kylie Lynn (2019) Social Sciences	Assistant Professor	BA Psychology - NC State 2002, MS Sociology - NC State 2006 , PhD Sociology - NC State 2015
Pascual, Christopher C. (2000) Mechanical Engineering	Professor	B.S., Cornell University, 1985; M.S., Georgia Institute of Technology, 1996; Ph.D., 1999. Registered Professional Engineer, California.
Pasulka, Alexis L. (2017) Biological Sciences	Assistant Professor	B.S., Arizona State University, 2005; M.S., University of California, San Diego, 2009. Ph.D., 2013.
Patel, Pratish A. (2013) Finance	Associate Professor	B.S., Georgia Institute of Technology, 2002; M.S., UC Berkeley, 2005; Ph.D., UC Berkeley, 2013.
Patton, Linda J. (1991) Mathematics	Professor	B.A., University of California, San Diego, 1985; M.A., 1987; Ph.D., 1991.
Pearse, Erin P.J. (2012) Mathematics	Professor	B.S., University of California, Riverside, 1998; M.S., 2001; Ph.D., 2006.
Perrine, John D. (2008) Biological Sciences	Professor	B.S., Vanderbilt University, 1991; M.S., Miami University, Ohio, 1995; Ph.D., University of California, Berkeley, 2005.
Peters, Jason (2015) English	Associate Professor	B.A., Rhode Island College, 1999; M.F.A., Emerson College, 2010; Ph.D., University of Rhode Island, 2015.
Peterson, Daniel G. (2003) Animal Science	Professor	B.S., University of California, Davis, 1999; Ph.D., Cornell University, 2003.

Peterson, Zachary (2013) Computer Science	Professor	B.S., Univ of CA, Santa Cruz, 2000; M.S., 2002; M.S., The Johns Hopkins University Information Security Institute, 2005; Ph.D., The Johns Hopkins University, 2006.
Peuker, Steffen (2014) Mechanical Engineering	Associate Professor	Dipl.-Ing. (FH), Mannheim University of Applied Sciences, Mannheim, Germany; M.S., University of Illinois at Urbana-Champaign, 2006; Ph.D., 2010.
Phelan, Suzanne (2008) Kinesiology	Professor	B.A./B.S., University of Colorado at Boulder, 1989; M.A., MCP Hahnemann University, 1999; Ph.D., 2001.
Phillips, Stephen J. (2005) Architecture	Professor	B.A.Arch., Yale, 1991; M.Arch., University of Pennsylvania Graduate School of Architecture, 1994; M.A., Princeton, 2003; Ph.D., 2008. Registered Architect., California.
Piburn, Patti (2006) Journalism	Assistant Professor	B.S., Arizona State University, Tempe, 1995; B.A., Arizona State University, Tempe, 1995; M.S., South Dakota State University, Brookings, 2013; Ph.D. ABD, Walter Cronkite School of Journalism Mass Communication, 2019.
Pierce, Todd J. (2005) English	Professor	B.A., Southern California College, 1988; M.A., Oregon State University, 1992; M.F.A., University of California, Irvine, 1995; Ph.D., Florida State University, 2003.
Pilkington, Wayne (2005) Electrical Engineering	Associate Professor	B.S., Lafayette College, 1981; M.S., Rochester Institute of Technology, 1989; M.S., University of Rochester, 1999; Ph.D., 2005.
Pilolla, Kari (2014) Food Science and Nutrition	Associate Professor	B.S., California State University, Fresno, 1998; M.S., San Diego State University, 2002; Ph.D., Oregon State University, 2013; Registered Dietitian.
Pokharel, Siroj (2018) Animal Science	Assistant Professor	B.S., University of Arizona, 2013; M.S., University of Arizona, 2015; Ph.D., University of Tennessee, Knoxville, 2018.
Ponitz, Jeffrey A. (2011) Architecture	Associate Professor	B.S., University of Michigan, 2002; M.Arch., 2004; M.Arch., University of Virginia, 2008. Registered Architect, Illinois.
Porumamila, Hemanth (2008) Mechanical Engineering	Associate Professor	B.E., BMS College of Engineering, Bangalore, India, 2000; M.S., Iowa State University, 2003; Ph.D., 2007.
Poshtan, Majid (2015) Electrical Engineering	Associate Professor	B.S., Tehran University-Tehran 1988; M.Sc., University of New Brunswick-Fredericton 1992; Ph.D., Tulane University, New Orleans 2000
Pouraghabagher, A. Reza (1979) Industrial and Manufacturing Engineering	Professor Emeritus (FERP)	B.S., University of Colorado, 1972; M.S., University of California, 1973; Ph.D. University of Iowa, 1977. Certified in Production and Inventory Management (CPIM).
Pressler, Yamina (2020) Natural Resources Management and Environmental Sciences	Assistant Professor	B.S., California Polytechnic State University, San Luis Obispo, 2013; Ph.D., Colorado State University, 2019.
Prodanov, Vladimir (2009) Electrical Engineering	Professor	M.S., State University of New York, Stony Brook, 1995; Ph.D., 1997.
Pulitano, Elvira (2006) Ethnic Studies	Professor	Laurea (B.A.), Università di Messina, Italy, 1993; University of New Mexico, 1997; Ph.D., 2002.
Qenani-Petrela, Eivis (2002) Agribusiness	Professor	B.S., University of Tirana, Albania, 1987; M.A., Washington State University, 1998; Ph.D., 2002.
Qu, Bing (2008) Civil and Environmental Engineering	Professor	B.S., Tongji University (China), 2001; M.S., 2004; Ph.D., State University of New York at Buffalo, 2008. Registered Professional Engineer, California.
Ragsdale, Joseph J. (2002) Landscape Architecture	Professor	B.A., University of California, Berkeley, 1991; M.L.A., University of Virginia, 2000. Registered Landscape Architect, California.
Rahim, Ashraf (2003) Civil and Environmental Engineering	Professor	B.S., University of Mansoura, Egypt, 1986; M.S., 1991; Ph.D., University of Mississippi, Oxford, 2001. Registered Professional Engineer, California.
Rahman, Shikha (2007) Civil and Environmental Engineering	Professor	B.S., Bangladesh University of Engineering and Technology (BUET), 1995; M.S., 1998; Ph.D., Georgia Institute of Technology, 2002. Registered Professional Engineer, Mississippi.
Rajakaruna, Nishanta (2017) Biological Sciences	Professor	B.S., College of the Atlantic, 1994; M.S., University of British Columbia, 1998; Ph.D., 2003.
Ramezani, Cyrus A. (1999) Finance	Professor	B.A., University of California, Santa Cruz, 1984; M.S., 1988; M.S., University of California, Berkeley, 1991; Ph.D., 1992.
Ramrakhiani, Sonia H. (2017) School of Education	Associate Professor	B.A., Psychology, St. Xavier's College in India, 2010; M.S., Clinical Mental Health Counseling, Syracuse University, 2013; Ph.D., Old Dominion University, 2017.

Rastad, Mahdi (2012) Finance	Associate Professor	M.S., University of Illinois Urbana Campus 2009; Ph.D., University of Illinois Urbana Campus, 2012.
Razi, Alpen (2015) Ethnic Studies	Assistant Professor	B.A., University of Toronto, 2008; M.A., 2009; Ph.D., 2015.
Reaves, Scott (2003) Food Science and Nutrition	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1991; Ph.D., University of Arizona, 1995.
Rees, Gordon L. (2015) Natural Resources Management and Environmental Sciences	Associate Professor	B.S., Brigham Young University, 2009; M.S., University of California, Davis, 2015; Ph.D., University of California, Davis, 2015.
Reich, Jonathan (2001) Architecture	Professor	B.A., University of Washington, Seattle, 1979; B.A.E.D., 1979; M.Arch., University of California, Berkeley, 1983. AIA, Registered Architect, California and Washington.
Rein, Steven (1998) Statistics	Associate Professor	B.A., University of California, Los Angeles, 1987; M.A., University of California, Berkeley, 1989; Ph.D., 1993.
Retsek, Dylan Q. (2003) Mathematics	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1996; M.A., Washington University, 1997; Ph.D., 2001.
Ribeiro, Bruno (2012) Graphic Communications	Associate Professor	B.S., Universidade do Estado do Rio de Janeiro, 2002; M.B.A, Fundação Getúlio Vargas, 2007; M.F.A., Ohio State University, 2012.
Richert, Benjamin P. (2003) Mathematics	Department Chair	B.S., Wheaton College, 1995; Ph.D., University of Illinois, Urbana-Champaign, 2000.
Ridgely, John R. (2001) Mechanical Engineering	Professor	B.S., University of California, Berkeley, 1986; M.S., 1988; Ph.D., 2001.
Riley, Kate J. (2003) Mathematics	Professor	B.S., South Dakota State University, 1980; M.S., Montana State University, 1992; Ph.D., 2003.
Rinzler, Paul (1997) Music	Professor Emeritus (FERP)	B.A., University of California, Santa Barbara, 1977; M.A., 1980; D.A., University of Northern Colorado, 1988.
Rios, Laura (2019) Physics	Assistant Professor	B.S., Oberlin College, 2012; Ph.D. UC Irvine, 2017
Ritter, Matthew K. (2003) Biological Sciences	Professor	B.S., University of California, Santa Barbara, 1996; Ph.D., University of California, San Diego, 2002.
Robbins, Marian E. (2004) Mathematics	Professor	B.A., Agnes Scott College, 1986; M.S., University of Virginia, 1989; Ph.D., 1992.
Roberts, Joni (2019) Kinesiology	Assistant Professor	B.A. Washington Adventist University, 2005; MAT, American University, 2009; DrPH, Loma Linda University, 2015
Rodgers, Julie Spencer (2012) Psychology and Child Development	Professor	B.Sc., Carleton University, 1993; B.A., 1995; M.S., San Francisco State University, 1998; Ph.D., University of California, Santa Barbara, 2005.
Ronan, Briana M. (2014) School of Education	Associate Professor	B.A., University of Texas, Austin, 2005; M.A., Universidad de Alcalá, Spain, 2008; M.A., Teachers College, Columbia University, 2010; Ed.D., Teachers College, Columbia University, 2014.
Rong, Xiaoying (2005) Graphic Communication	Professor	B.E., Beijing Institute of Printing, 1992; M.B.A., Beijing Institute of Technology, 1999; M.S., Western Michigan University, 2003; Ph.D., Western Michigan University, 2007.
Rosenthal, Mira (2016) English	Associate Professor	B.A., Reed College, 1996; M.F.A., University of Houston, Texas, 2005; Ph.D., Indiana University, 2011.
Ross, Kevin James (2012) Statistics	Associate Professor	B.S., University of North Carolina at Chapel Hill, 1997; M.S., 2005; Ph.D., 2006.
Rossmann, Allan J. (2001) Statistics	Professor	B.A., Geneva College, 1984; M.S., Carnegie Mellon University, 1986; Ph.D., 1989.
Roy, Soma (2008) Statistics	Professor	B.Sc., Delhi University, 2000; M.Sc., 2002; M.S., The Ohio State University, 2005; Ph.D., 2008.
Rucas, Stacey L. (2005) Social Sciences	Professor	B.A., University of Texas, Arlington, 1998; M.A., 2000; Ph.D., University of New Mexico, 2004.
Rudi Polloshka, Jeta (2017) Agribusiness	Assistant Professor	B.A., Berea College, 2010; M.S. Virginia Tech, 2012, University of Minnesota, Ph.D., 2016.
Russell, Craig H. (1982) Music	Professor Emeritus (FERP)	B.M., University of New Mexico, 1973; M.M., 1976; Ph.D., University of North Carolina, 1981.

Ruszczky, Steven (2017) English	Associate Professor	B.A., University of California, Santa Barbara, 2003; M.A., University of Auckland, 2007; Ph.D., State University of New York at Buffalo, 2014.
Ruttenberg, Benjamin I. (2013) Biological Sciences	Associate Professor	B.A., Tufts University, 1994; M.S., Yale University, 1999; Ph.D., University of California, Santa Barbara, 2006.
Ryalls, Emily D. (2017) Interdisciplinary Studies in the Liberal Arts	Associate Professor	B.A., James Madison University, 1997; M.A., The University of Alabama, 1999; Ph.D., University of South Florida, 2011.
Ryujin, Donald H. (1989) Psychology and Child Development	Professor	B.A., Stanford University, 1968; M.A., University of Michigan, 1972; Ph.D., 1983.
Sabbag, Anelise G. (2016) Statistics	Associate Professor	B.S., Universidade de Sao Paulo, 2009; M.A., University of Minnesota, 2013; Ph.D., 2016.
Sadek, Mohammad (2018) BioResource and Agricultural Engineering	Assistant Professor	B.S., Bangladesh Agricultural University, Bangladesh, 2005; M.S., Asian Institute of Technology, Thailand, 2008; Ph.D., University of Manitoba, Canada, 2013. Registered Professional Engineer, Canada.
Saghri, John A. (2000) Electrical Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1973; M.S., Oregon State University, 1975; Ph.D., Rensselaer Polytechnic Institute, 1979.
Saha, Koushik (2010) Industrial Technology and Packaging	Professor	B.S., G.B. Pant University, India, 1998; M.S., University of Florida, 2001; M.S., Michigan State University, 2005; Ph.D., Michigan State University, 2010
Saliklis, Edmond P. (2005) Architectural Engineering	Professor	B.S., University of Illinois, Chicago, 1984; M.S., Syracuse University, 1988; Ph.D., University of Wisconsin, Madison, 1992. Registered Civil Engineer, California.
Sanchez, Fernando Fabio (2011) World Languages and Cultures	Professor	B.A., Universidad La Salle, Mexico, 1995; M.A., University of Colorado, Boulder, 2000; Ph.D., 2006.
Sapper, Erik D. (2016) Chemistry and Biochemistry	Associate Professor	B.S., California Polytechnic State University, San Luis Obispo, 2007; M.S., California Polytechnic State University, 2007; Ph.D., North Dakota State University, 2013.
Sattler, Meredith J. (2014) Architecture	Assistant Professor	B.A. Studio Art, Vassar, 1995; M.Arch., M.Environmental Management, Yale, 2010.
Saunders, Karl F. (2004) Physics	Professor and Department Chair	B.S., Dublin City University, 1996; Ph.D., University of Oregon, 2001.
Schaffner, Andrew (1997) Statistics	Professor and Department Chair	B.S., California Polytechnic State University, San Luis Obispo, 1992; M.S., University of Washington, 1994; Ph.D., 1997.
Schinck-Mikel, Amelie (2009) Mathematics	Professor	B.Sc., Concordia University, 1999; M.Sc., 2001; Ph.D., University of North Carolina at Charlotte, 2009.
Schroeter, Christiane (2007) Agribusiness	Professor	B.S., Justus-Liebig University, 1997; M.S., 2001; M.S., Kansas State University, 2000; Ph.D., Purdue University, 2005.
Schuster, Peter J. (2003) Mechanical Engineering	Professor	B.A., Cornell University, 1991; M.S., Stanford University, 1992; Ph.D., Michigan Technological University, 2000.
Schwab, Keri (2013) Experience Industry Management	Associate Professor	B.A., James Madison University, 2000; M.A. and Ph.D., University of Utah, 2011.
Schwartz, Debora (1996) English	Associate Professor	A.B., Bryn Mawr College, 1982; M.A., Princeton University, 1986; Ph.D., 1994.
Schwartz, Peter V. (2000) Physics	Professor	B.S., Massachusetts Institute of Technology, 1986; M.S., Princeton University, 1993; Ph.D., 1998.
Schwartz, Gregory (2013) BioResource and Agricultural Engineering	Associate Professor	B.S., Cal Poly State University, San Luis Obispo, 1995; M.S., Clemson University, 1998; Ph.D., Clemson University, 2004.
Scott, Gregory E. (2011) Chemistry and Biochemistry	Professor	B.S., Davidson College, 2004; Ph.D., University of Illinois, Urbana-Champaign, 2011.
Scriven, Tal E. (1980) Philosophy	Professor Emeritus (FERP)	B.A., University of South Florida, 1976; M.A., 1977; Ph.D., University of Southern California, 1980.
Self, Brian P. (2006) Mechanical Engineering	Professor	B.S., Virginia Polytechnic Institute and State University, 1988; M.S., 1991; Ph.D., University of Utah, 1996.

Seng, John S. (2003) Computer Science, Computer Engineering	Professor	B.S., Northwestern University, 1997; M.S., University of California, San Diego, 1999; Ph.D., 2003.
Serrano-Careaga, Jesus (2020) Psychology and Child Development	Assistant Professor	B.A., University of Arizona, 2014; M.A., University of California, Los Angeles, 2016; Ph.D., 2020.
Settle, Allen K. (1970) Political Science	Professor Emeritus	B.A., University of California, Santa Barbara, 1966; M.A., 1967; Ph.D., 1970.
Shaban, Ali O. (1984) Electrical Engineering	Professor	B.S., University of Tripoli, 1974; M.S., University of Southern California, 1978; Ph.D., Oregon State University, 1985.
Shafran, Aric (2007) Economics	Professor and Area Chair	B.S., Cornell University, 1999; M.A., University of Colorado, 2003; Ph.D., 2007.
Shan, Yan (2016) Journalism	Associate Professor	B.A., Nanjing University of Science and Technology, 2009; M.A., University of Central Florida, 2011; Ph.D., University of Georgia, 2014.
Shani, Abraham (Rami) B. (1983) Management, HR, and Information Systems	Professor Emeritus (FERP)	B.A., University of Tel Aviv, 1972; M.A., 1978; Ph.D., Case Western Reserve University, 1981.
Shapiro, Jonathan (1998) Mathematics	Professor	B.A., University of California, Berkeley, 1988; Ph.D., 1995.
Sharpe, John P. (1995) Physics	Professor	B.Sc., Edinburgh University, 1985; Ph.D., 1989.
Shen, Sandy (2021) Experience Industry Management	Assistant Professor	B.Mgmt., Southeast Univ, China, 2010, M.Sc., Peking University, China, 2013, Ph.D. Univ. of Guelph, Canada, 2020
Sherman, Morgan P. (2008) Mathematics	Professor	B.A., Knox College, 1999; M.A., Columbia University, 2000; M.Phil., 2004; Ph.D., 2005.
Shields, Jennifer (2015) Architecture	Associate Professor	B.S. Arch, University of Virginia, 2000; M. Arch, University of Virginia, 2004. Registered Architect, North Carolina, NCARB Certificate.
Shin, Joongmin (2017) Industrial Technology and Packaging	Associate Professor	B.S., Food Science Technologies, Woosuk University South Korea 1997, M.S., School of Packaging, Michigan State University 2003, Ph.D., School of Packaging Michigan State University 2007.
Shollenberger, Kim A. (2002) Mechanical Engineering	Professor	B.S., Cornell University, 1989; M.S., University of California, Berkeley, 1991; Ph.D., 1994.
Sikalidis, Angelos (2018) Food Science and Nutrition	Associate Professor	BSc/MEng., Aristotle University of Thessaloniki, Greece, 2003; MS, University of California, Berkeley, 2004; MSc, University of California, Berkeley, 2006; PhD, Cornell University, 2010; Post-Doctorate, Harvard Medical School, 2013
Simonian, Lonny G. (2003) Construction Management	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1978; M.S., University of California, Berkeley, 1992. Registered Professional Engineer, Certified Project Management Professional.
Singh, Jagjit (Jay) (2003) Industrial Technology and Packaging	Professor	B.S., Poona University, Pune, India, 1992; M.S., Michigan State University, 1998; Ph.D., 2002.
Sistla, Seeta (2019) Natural Resources Management and Environmental Sciences	Assistant Professor	B.A., Swarthmore College, 2004; M.A., Brown University, 2007; Ph.D., University of California Santa Barbara, 2012.
Sklar, Jeffrey C. (2005) Statistics	Professor	B.A.S., University of California, Davis, 1995; M.A., University of California, Santa Barbara, 1998; Ph.D., 2003.
Slivovsky, Lynne A. (2003) Computer Engineering	Professor, Director of Computer Engineering	B.S., Purdue University, 1992; M.S., 1993; Ph.D., 2001.
Smilkstein, Tina (2009) Electrical Engineering	Associate Professor	B.S., Nazan University, Nagoya, Japan, 1989; M.S., University of California, Berkeley, 2003; Ph.D., University of California, Berkeley, 2007
Smith, Hugh M. (2000) Computer Engineering	Professor	B.S., Xavier University, 1985; M.S., Michigan State University, 1994; Ph.D., 1999.
Smith, Taylor F. (2014) Psychology and Child Development	Associate Professor	B.A., SUNY Geneseo, Geneseo, 2006; M.S. UNC at Greensboro, 2009; Ph.D., University of North Carolina at Greensboro, 2012; Professional Degree, Brown University/Alpert Med School/RIH, 2014.
Somoza-Norton, Andrea Fabiana (2015) School of Education	Associate Professor	B.A., University of Nevada, Reno, 1999; M.S., University of Nevada, Reno, 2004; Ed.D., University of Massachusetts, Lowell, 2012.

Sparks, Jacob (2020) Philosophy	Assistant Professor	B.S. Tufts University, 2005; M.A., Bowling Green State University, 2009; Ph.D., Bowling Green State University, 2018.
Sprayberry, Kim A. (2013) Animal Science	Professor	B.S., University of California, Davis, 1983; DVM, University of California, Davis, 1988; Diplomate, American College of Veterinary Internal Medicine, University of California, Davis, 1998.
Staley, Clinton A. (1988) Computer Science	Professor	B.A., Principia College, 1980; M.S., University of California, Santa Barbara, 1982; Ph.D., 1987.
Stanchev, Lubomir (2015) Computer Science	Professor	B.S., University of Sofia, 1998; M.S., 1998; Ph.D., University of Waterloo, 2005.
Stanko, Taryn (2014) Management, HR, and Information Systems	Associate Professor	B.A., University of California, Los Angeles; M.B.A., New York University; Ph.D., University of California, Irvine.
Stankus, Mark (1998) Mathematics	Professor	B.S., Rensselaer Polytechnic Institute, 1987; Ph.D., University of California, San Diego, 1993.
Stannard, Sandra (2001) Architecture	Professor	B.A., University of California, Berkeley, 1987; M.Arch., University of Washington, 1992. AIA, Registered Architect, California and Idaho.
Stanton, Diana L. (2000) Theatre and Dance	Professor	B.A., University of California, Irvine, 1994; M.F.A., University of Colorado, Boulder, 1997.
Stegner, Paul Dustin (2007) English	Professor	B.A., University of San Francisco, 2000; M.A., The Pennsylvania State University, 2002; Ph.D., 2007.
Steinmaus, Scott J. (1998) Horticulture and Crop Science	Professor and Department Head	B.S., University of California, Davis, 1984; Ph.D., University of California, Davis, 1995; Post-doctorate, University of California, Riverside, 1998. Pest Control Advisor, California.
Strand, Christy (2007) Biological Sciences	Professor	B.A., Concordia University 1992; Ph.D., Arizona State University, 2007.
Styles, Stuart W. (1984) BioResource and Agricultural Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1984; M.B.A., 1988; D.Eng., University of California, Davis, 2001. Registered Civil Engineer, California.
Sun, Dennis L. (2016) Statistics	Associate Professor	A.B., Harvard College, 2010; Ph.D., Stanford University, 2015.
Sungar, Nilgun (1989) Physics	Professor Emeritus (FERP)	B.S., Middle East Technical University, Turkey, 1979; Ph.D., University of Missouri, 1985.
Surfleet, Christopher Graham (2012) Natural Resources Management and Environmental Sciences	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1993; M.S. Oregon State University 1997; Ph.D. 2008. Certified Professional in Erosion and Sediment Control.
Swan, Benjamin G. (2010) Agricultural Education and Communication	Professor and Department Head	B.S., California Polytechnic State University, San Luis Obispo, 1997; M.S., 2001; Ph.D., The Ohio State University, 2005.
Sweatt, Lisa I. (2000) Psychology and Child Development	Associate Professor	B.S., University of California, Irvine, 1989; M.A., Ohio State University, 1992; Ph.D., Loyola University Chicago, 1999. Licensed Psychologist, California.
Sze, Lawrence (1998) Mathematics	Associate Professor	B.S., Louisiana State University, Baton Rouge, 1986; M.A., University of California, Los Angeles, 1989; Ph.D., Penn State University, 1998.
Szlavik, Robert (2006) Biomedical Engineering	Professor	B.Eng., McMaster University, 1991; M.Eng., 1994; Ph.D., 1999.
Talke, Stefan A. (2019) Civil and Environmental Engineering	Associate Professor	B.S., University of California, Berkeley, 1996; M.S., 2001; Ph.D., 2005.
Tanvir, Shams (2020) Civil and Environmental Engineering	Assistant Professor	B.S., Bangladesh University of Engineering Technology (BUET), 2009; M.S., 2013; Ph.D., North Carolina State University, 2018
Taufik, (1999) Electrical Engineering	Professor	B.S., Northern Arizona University, 1993; M.S. University of Illinois at Chicago, 1995; Dr. Eng., Cleveland State University, 1999.
Taylor, Emily N. (2005) Biological Sciences	Professor	B.A., University of California, Berkeley, 1998; Ph.D., Arizona State University, 2005.
Taylor, J. Kevin (1999) School of Education	Professor and Director	B.A., Newcastle and Sunderland Polytechnic, Newcastle, England, 1986; M.S., Central Washington University, 1990; Ph.D., University of South Carolina, 1994.
Tejani, James (2009) History	Associate Professor	B.A., University of California, San Diego, 1998; M.A., Columbia University, 2003; Ph.D., 2009.

Telesetsky, Anastasia (2020) Natural Resources Management and Environmental Sciences	Professor	B.A., Vanderbilt University, Nashville Tennessee, 1993; M.A., University of California, Santa Barbara, 1997; J.D., University of California, Berkeley, 2000; LLM, University of British Columbia, 2009
Teramoto Pedrotti, Jennifer (2003) College of Liberal Arts, Psychology and Child Development	Associate Dean and Professor	B.A., University of California, Davis, 1996; M.S., University of Kansas, 2000; Ph.D., 2003.
Teufel, Brady (2006) Journalism	Professor and Department Chair	B.A., University of California, Santa Cruz, 1997; M.A., University of Missouri, 2003.
Thatcher, Tracy (2005) Civil and Environmental Engineering	Professor	B.S., University of California, Davis, 1984; M.S., University of California, Berkeley, 1991; Ph.D., 1996. Registered Professional Engineer, California.
Theobald, Allison (2020) Statistics	Assistant Professor	B.B.A., B.S. Colorado Mesa University, 2014; M.S., Montana State University, 2016; Ph.D., 2020.
Theodoropoulos, Christine Olympia (2012) College of Architecture and Environmental Design	Dean	B.S., Princeton University, 1979; M.Arch., Yale University, 1985. AIA, Licensed Architect and Registered Professional Civil Engineer, California.
Thomas, Jafra (2019) Kinesiology	Assistant Professor	B.A., University of the Pacific, 2012, M.A., University of the Pacific, 2014, M.P.H., Oregon State University, 2017, Ph.D., Oregon State University, 2019
Thompson, Lizabeth T. (1993) Industrial and Manufacturing Engineering	Professor	B.S., California Polytechnic State University, San Luis Obispo, 1981; M.S., University of Southern California, 1986; M.B.A., 1986; Ph.D., University of California, Santa Barbara, 2007.
Thompson, John Jay (1998) World Languages and Cultures	Professor	B.A., University of California, Santa Barbara, 1986; M.A., Yale University, 1987; M.Phil., 1989; Ph.D., 1993.
Thompson, Richard P. (1990) Natural Resources Management and Environmental Sciences	Professor	B.S., Oklahoma State University, 1974; M.S., 1978; Ph.D., Texas AM University, 1990. Registered Professional Forester, California and Oklahoma.
Thorncroft, Glen E. (1998) Mechanical Engineering	Professor	BSE, University of Central Florida, 1988; MSME, 1991; Ph.D., University of Florida, 1997.
Toker, Umut (2015) Architecture	Professor	B. Arch., Middle East Technical Univ., Ankara, Turkey, 1996; MCP Urban Design, Middle East Technical University, Ankara Turkey, 1999; Ph.D., School of Architecture, College of Design, North Carolina State University, Raleigh, NC., 2003. Registered Architect in Turkey, International Union of Architects (UIA).
Tomanek, Lars (2005) Biological Sciences	Professor	B.S., University of Konstanz, Germany, 1995; M.S., 1995; Ph.D., Oregon State University, 1999.
Torres, Leo (2021) Aerospace Engineering	Associate Professor	B.S, M.S. and PHD (2001) in Electrical Engineering, Federal University of Minas Gerais in Brazil
Torres-Bustamente, Cesar (2010) Landscape Architecture	Professor	B.Arch., Universidad de las Américas, Puebla, 2000; M.L.A., RMIT University, 2005; Ph.D., 2009.
Trice, Tom R. (2002) History	Associate Professor and Department Chair	B.A., Louisiana College, 1981; M.A., Louisiana State University, 1987; Ph.D., University of Illinois, 1998.
Trudell, Carmen Gayle (2005) Architecture	Professor and Assistant Department Head	B.Arch., California Polytechnic State University, San Luis Obispo, 2001; M.S., Columbia University, 2006. M.S. Advanced Architectural Design, Columbia University, New York, NY, 2006. Registered Architect, California, New York, NCARB.
Tseng, Marilyn (2017) Kinesiology	Associate Professor	A.B., Stanford University, 1991; M.A., Stanford University, 1991; Ph.D. University of North Carolina, Chapel Hill, 1998.
Tubeileh, Ashraf (2015) Horticulture and Crop Science	Associate Professor	B.S., An-Najah National Univ., Nablus, Palestine, 1995; M.S., Université de Lorraine, Nancy, France, 1997; Ph.D., Université de Lorraine, Nancy, France, 2000.
Tully-Doyle, Ryan (2020) Mathematics	Assistant Professor	B.S. California Polytechnic State University, San Luis Obispo, 2001; Ph.D. University of California, San Diego, 2015
Turner, Clark S. (1999) Computer Science	Professor	B.S., Kings College, 1979; M.A., Pennsylvania State University, 1981; J.D., University of Maine, 1986; Ph.D., University of California, Irvine, 1999.
Twomey, Colleen Larkin (2011) Graphic Communication	Professor and Department Chair	B.S., Rochester Institute of Technology 1989; M.B.A., University of Delaware, 1997.
Vagnoni, David (2015) Animal Science	Associate Professor	B.S., Tulane University, 1986; M.S., Louisiana State University, 1989; Ph.D., University of Wisconsin, 1995.

Vakalis, Ignatios (2006) Computer Science	Professor	B.S., University of Patras, Greece, 1982; M.S., Western Michigan University, 1988; Ph.D., 1992.
Vasilaky, Kathryn N. (2017) Economics	Assistant Professor	B.A., Mathematics and Economics, Columbia University 2003, Cert. of Demography, Maryland Population Research Center 2010, Ph.D. University of Maryland 2011.
Vees, Dina (2016) Graphic Communication	Associate Professor	B.S., Carroll University, 2002; M.F.A., Full Sail University, 2013.
Velasquez, Gloria (1985) World Languages and Cultures	Professor Emeritus (FERP)	B.A., University of Northern Colorado, 1978; M.A., Stanford University, 1980; Ph.D., 1985.
Ventura, Alison K. (2014) Kinesiology	Associate Professor	B.S., University of California, Davis, 2003; M.S. Pennsylvania State University, 2005; Ph.D. Pennsylvania State University, 2008.
Ventura, Jonathan (2018) Computer Science	Associate Professor	B.S., University of California, Santa Barbara, 2005; M.S., University of California, Santa Barbara, 2010; Ph.D., University of California, Santa Barbara, 2012.
Verma, Priya O. (2011) Natural Resources Management and Environmental Sciences	Associate Professor	B.S., University of Massachusetts, Boston, 2000; M.A., University of California, Santa Barbara, 2004; Ph.D. 2011.
Vernon, J. Scott (1991) Agricultural Education and Communication	Professor Emeritus (FERP)	B.S., California Polytechnic State University, San Luis Obispo, 1983; M.S., 1985; Ph.D., Texas AM University, 1991.
Villablanca, Francis X. (1999) Biological Sciences	Professor Emeritus (FERP)	B.S., California Polytechnic State University, San Luis Obispo, 1987; Ph.D., University of California, Berkeley, 1993.
Vokos, Stamatis (2016) Physics	Professor	B.Sc., University of Kent at Canterbury, 1984; M.A., UC Berkeley, 1985; Ph.D., 1990.
Volpe, Richard (2014) Agribusiness	Associate Professor	B.S., University of Massachusetts, Amherst, 2003; M.S., 2005; Ph.D., University of California, Davis, 2010.
Vredevoe, Larisa K. (1999) Biological Sciences	Professor	B.S., University of California, Davis, 1992; Ph.D., 1998.
Waitinas, Catherine (2006) English	Professor	B.A./M.A., St. Bonaventure University, 1996; M.A., University of Illinois at Urbana-Champaign, 1999; Ph.D., 2006.
Waldorf, Daniel (1998) Industrial and Manufacturing Engineering	Professor and Department Chair	B.S., University of Illinois at Urbana-Champaign, 1989; M.S., 1991; Ph.D., 1996. Registered Professional Engineer, California.
Walker, John L. (2001) Statistics	Professor	B.S., University of Chicago, 1988; M.S., Cornell University, 1993; Ph.D., 1995.
Wallace, Robert (2020) Philosophy	Assistant Professor	B.A., Kenyon College, 2012; M.A., University of Arizona, 2016; PhD. University of Arizona, 2020.
Walter, Ryan K. (2014) Physics	Associate Professor	B.S., Cornell University, 2009; M.S., Stanford University, 2010; Ph.D., 2014.
Wang, Xuan (2014) Industrial and Manufacturing Engineering	Associate Professor	B.S., Tsinghua University, Beijing, 1997; M.S., Tsinghua University, Beijing, 2000; Ph.D., University of California, San Diego, 2006.
Wang, Cindy (2019) Marketing	Assistant Professor	B.A., Qingdao University, China, 2008; M.B.A. Oklahoma State University, 2010; Ph.D., University of Oregon, 2017.
Wang, Long (2020) Civil and Environmental Engineering	Assistant Professor	B.S., Dalian University of Technology, China 2014; M.S. University of California, Davis, 2015, M.S., 2016; Ph.D., University of California, San Diego, 2019.
Ward, Sandra M. (2016) Chemistry and Biochemistry	Associate Professor	B.S., University of Waterloo, 2007; Ph.D., University of Calgary, 2012.
Watts, David J. (2007) Landscape Architecture	Associate Professor	B.S.L.A., University of Wisconsin-Madison, 1980; M.S.L.A., 2006. Registered Landscape Architect, Wisconsin.
Watts, Katharine R. (2014) Chemistry and Biochemistry	Associate Professor	B.S., University of Texas, El Paso, 2006; Ph.D. University of California, Santa Cruz, 2011.
Weber, Paul A. (1999) Construction Management	Associate Professor	B.S., California Polytechnic State University, San Luis Obispo, 1981; B.Arch., 1983; M.B.A., 1992; Ph.D., Colorado State University, 2000. Registered Architect, California. Licensed Building Contractor (B), California.

Weber, TJ (2017) Marketing	Associate Professor	B.S., Northern Michigan University 2011, M.B.A., Marquette University 2013, Ph.D., Washington State University 2017
Wendt, Dean E. (2002) College of Science and Mathematics, Biological Sciences	Dean and Professor	B.S., California Polytechnic State University, San Luis Obispo, 1993; M.A., 1995; Ph.D., Harvard University, 1999.
Werner, James (2014) Art and Design	Associate Professor and Department Chair	B.A., San Diego State University, 1995; M.F.A., Kent Institute of Art and Design, UK, 2003; Ed.D.C.T., Columbia University Teachers College, 2007.
Westermann, Kimberly (2015) Accounting	Associate Professor	B.S., Cal Poly University, 2000; Ph.D., Bentley University, 2011.
Westphal, Russell (2008) Mechanical Engineering	Professor	B.S., Washington State University, 1978; M.S., Stanford University, 1979; Ph.D., 1983.
White, Crow (2013) Biological Sciences	Associate Professor	B.A., University of Oregon, 1997; M.S., University of Montana, 2002; Ph.D., University of California, Santa Barbara, 2008.
White, Matthew E. (2001) Mathematics	Associate Professor	B.S., Cornell University, 1990; M.S., California Polytechnic State University, San Luis Obispo, 1994; Ph.D., University of California, Santa Barbara, 2000.
White, Emily (2015) Architecture	Associate Professor	B.A. Barnard College, Columbia University, New York, NY, 1999; M.Arch, Southern California Institute of Architecture, 2006. Registered Architect, Washington.
White, Arthur (2019) Music	Assistant Professor	B.M., Emporia State University, 1997; M.M. West Virginia University, 2000; D.M.A., University of North Carolina at Greensboro, 2008
Whitt, Michael D. (2017) Biomedical Engineering	Assistant Professor	B.S., Purdue University, 1987; M.S., Rutgers University/UMDNJ, 1994; Ph.D. 1999; M.B.A., University of California, Los Angeles, 2006.
Widmann, James M. (2004) Mechanical Engineering	Professor and Department Chair	B.S., Michigan Technological University, 1987; M.S., Stanford University, 1988; Ph.D., Stanford University, 1995.
Wilkinson, Steven P. (2014) Chemistry and Biochemistry	Associate Professor	B.S., The College of William and Mary, 1995; Ph.D., Louisiana State University, 2005.
Williams, Jean M. (2000) Political Science	Professor	B.A., Pomona College, 1988; M.A., The Johns Hopkins University, 1996; Ph.D., 1998.
Williams, Amber D. (2017) Psychology and Child Development	Associate Professor	B.A., Rice University, 2010, M.S. University of Michigan, 2012, Ph.D., University of Texas, 2015.
Wilson, Stewart (2020) Natural Resources Management and Environmental Sciences	Assistant Professor	B.S., Humboldt State University, 2010; M.S., University of California, Davis, 2015; M.A., University of California, Davis, 2019; Ph.D., University of California, Davis, 2019.
Winstead, Candace R. (2005) Biological Sciences	Professor	B.A., Augustana College, 1991; Ph.D., Loyola University, 1999.
Wissel, Stephanie (2015) Physics	Assistant Professor	B.S., University of Dallas, 2004; S.M., University of Chicago, 2005; Ph.D., 2010.
Wolf, Marianne McGarry (1994) Agribusiness, Wine and Viticulture	Professor Emeritus (FERP)	B.S., The Johns Hopkins University, 1976; M.A., The Johns Hopkins University, 1977; Ph.D., The Johns Hopkins University, 1980
Wong, Jeffrey C. (2002) Horticulture and Crop Science	Professor	B.S., Saint Mary's College of California, 1994; M.S., University of Illinois at Champaign, 1999; Ph.D., 2002. The J. G. Boswell Foundation of Pasadena Endowed Chair.
Woo, Jeong (2019) Construction Management	Professor and Department Head	B.E., Kyung Won University, South Korea, 1996; M.S. Texas AM University, College Station, 2000; Ph.D., Texas AM University, College Station, 2005
Wood, Zoe J. (2003) Computer Science	Professor	B.A., University of California, Santa Cruz, 1992; B.S., 1997; M.S., California Institute of Technology, 2000; Ph.D., 2003.
Wood, Leah (2014) School of Education	Associate Professor	B.S., Davidson College, 2003; M.A.T., University of North Carolina, Charlotte, 2009; Ph.D., University of North Carolina, Charlotte, 2014.
Woodruff, Christopher J. (2018) Music	Assistant Professor	B.M.E., Louisiana State University, 1991; M.M., Northwestern University, 1996.
Wright, Ava (2020) Philosophy	Assistant Professor	B.A., Rice University, 1995; J.D., Georgia State University, 2000; M.A., Georgia State University, 2010; M.S., University of Georgia, 2018; Ph.D. University of Georgia, 2019.
Wroldsen, Jack (2019) Accounting	Assistant Professor	B.A., The University of Arizona, 1999; M.A., The University of Arizona, 2001; J.D., Duke University School of Law, 2006.
Wu, Xi (2005) Mechanical Engineering	Professor	M.S., Chong Qing University, 1991; Dr. Eng., Cleveland State University, 2005.

Xing, Siyuan (2019) Mechanical Engineering	Assistant Professor	B.S., Sichuan University, 2013; M.S., Southern Illinois University Edwardsville, 2016; Ph.D., Southern Illinois University Carbondale, 2019.
Yang, Tao H. (1987) Industrial and Manufacturing Engineering	Professor	B.S., Tunghai University, Taiwan, 1978; M.S., San Jose State University, 1982; Ph.D., Arizona State University, 1987.
Yang, Hocheol (2020) Graphic Communication	Assistant Professor	Ph.D., Media and Communication, Temple University; M.A., Applied Communication Theory and Methodology, Cleveland State University; M.A., Journalism and Communication Studies, Kwangwoon University; B.A., Digital Media, Kwangwoon University
Yeh, Grace I. (2007) Ethnic Studies, Communication Studies	Professor	B.A., Duke University, 1995; M.A., Georgetown University, 2000; M.A., University of California, Los Angeles, 2003; Ph.D., 2007.
Yep, Alejandra (2014) Biological Sciences	Associate Professor	B.S./M.S., University of Buenos Aires, 1999; Ph.D., 2004.
Yeung, Po Sai Marie (2006) Biological Sciences	Professor	B.Sc., The Chinese University of Hong Kong, 1995; M.S., California Polytechnic State University, San Luis Obispo, 2001; Ph.D., Cornell University, 2004.
Yeung, Vincent (2013) Animal Science	Associate Professor	B.Sc. (Hon.), The Chinese University of Hong Kong, 1996; M.Sc., California Polytechnic State University, San Luis Obispo, 1999; Ph.D., Cornell University, 2003.
Yin, Bingqing (Miranda) (2021) Marketing	Assistant Professor	Ph.D., University of Kansas 2019, M.S. Business Administration Washburn University 2011, B.S. Wuhan University of Science and Technology 2009
Yip, Christopher L. (1988) Architecture	Professor Emeritus	B.A., University of California, Berkeley, 1971; M. Arch., 1977; Ph.D., 1985.
York, Jonathan (2008) Industrial Technology and Packaging	Associate Professor (FERP)	B.A., Yale University, 1973; M.A., Michigan State University, 1976; Ph.D., 1979.
Yoshinobu, Stan (2009) Mathematics	Professor	B.A., University of California, San Diego, 1995; M.A., University of California, Los Angeles, 1997; Ph.D., 2000.
Yost, Jennifer M. (2014) Biological Sciences	Associate Professor	B.S., California Polytechnic State University, 2005; M.S., 2007; Ph.D., University of California, Santa Cruz.
Yu, Xiao-Hua (Helen) (2000) Electrical Engineering	Professor	B.S., TianJin University, People's Republic of China, 1988; M.S., Temple University, 1992; Ph.D., University of California, Irvine, 1998.
Zambrano, Eduardo (2007) Economics	Professor	B.A., Universidad Católica Andrés Bello, Venezuela, 1993; M.A., Cornell University, 1998; Ph.D., Cornell University, 1999.
Zhan, Yongcheng (2019) Management, HR, and Information Systems	Assistant Professor	Ph.D., University of Arizona 2019
Zhang, Ning (2007) Political Science	Professor	B.A., Peking University, Beijing, China, 1999; Ph.D., University of California, Santa Barbara, 2007.
Zhang, Shanju (2011) Chemistry and Biochemistry	Professor	B.S., Jilin University, People's Republic of China, 1993; Ph.D., 1998.
Zhang, Xiaozheng (Jane) (2003) Electrical Engineering	Professor	Diplom, University of Erlangen-Nuremberg, Germany, 1997; Ph.D., Georgia Institute of Technology, 2002.
Zhang, Chuancai (2021) Accounting	Assistant Professor	Ph.D., University of Kentucky 2021, Ph.D., Xiamen University 2016, M.A. Dongbei University of Finance and Economics 2012, B.A. Shandong Agricultural University 2009
Zigler, David F. (2016) Chemistry and Biochemistry	Associate Professor	B.S., Eastern Illinois University; Ph.D., Virginia Tech.
Zoerb, Matthew C. (2015) Chemistry and Biochemistry	Associate Professor	B.S., UT Chattanooga, 2006; Ph.D., University of California, Berkeley, 2012.
Zoller, David J. (2015) Philosophy	Associate Professor	B.A. Xavier University, 2003; M.A., Fordham University, 2006; Ph.D., 2008.

THE CSU SYSTEM

Welcome to the California State University (CSU) - the nation's largest comprehensive university with 23 unique campuses and seven off-campus centers serving approximately 477,000 students and employing more than 56,000 faculty and staff.

Each year, the university awards more than 133,000 degrees. CSU graduates are serving as leaders in the industries that drive California's economy, including business, agriculture, entertainment, engineering, teaching, hospitality and healthcare. To learn more visit the California State University website (<https://www.calstate.edu/>).

A Tradition of Excellence for More than Six Decades

Since 1961, the CSU has provided an affordable, accessible and high-quality education to 4 million living alumni throughout California. While each campus is unique based on its curricular specialties, location and campus culture, every CSU is distinguished for the quality of its educational programs. All campuses are fully accredited, provide a high-quality broad liberal educational program and offer opportunities for students to engage in campus life through the Associated Students, Inc., clubs and service learning. Through leading-edge programs, superior teaching and extensive workforce training opportunities, CSU students graduate with the critical thinking skills, industry knowledge and hands-on experience necessary for employment and career advancement.

Facts

- Today, one of every 20 Americans with a college degree is a CSU graduate.
- 1 of every 10 employees in California is a CSU graduate.
- The CSU awards about half of the bachelor's degrees earned in California.
- The CSU awards 36% of California's undergraduate nursing degrees.
- The CSU prepares more of California's teachers, pre-school through grade 12, than any other institution. Nearly four percent of the nation's teachers graduate from the CSU.
- In 2020, CSU students earned nearly 25,000 business degrees and more than 9,000 engineering degrees.
- The CSU offers more than 170 fully online and 140 hybrid degree programs and concentrations.
- The CSU's online concurrent enrollment program gives students the ability to enroll in courses offered by other campuses in the CSU.
- Over a recent four-year period, the CSU has issued nearly 50,000 professional development certificates in education, health services, business and technology, leisure and hospitality, manufacturing, international trade and many other industries.
- CSU Centers for Community Engagement and Service Learning make available nearly 2300 service learning courses.
- 38,000 CSU students participated in service-learning, contributing 728,000 hours of service in 2020-21.

Governance

The CSU is governed by the Board of Trustees, most of whom are appointed by the governor and serve with faculty and student representatives. The CSU chancellor is the chief executive officer, reporting to the board. The campus presidents serve as the campus-level chief executive officers. The trustees, chancellor and presidents develop university-wide educational policy. The presidents, in consultation with

the CSU Academic Senate and other campus stakeholder groups, render and implement local policy decisions.

CSU Historical Milestones

The individual California State Colleges were established as a system with a Board of Trustees and a chancellor in 1960 by the Donahoe Higher Education Act. In 1972, the system was designated as the California State University and Colleges, and in 1982 the system became the California State University. Today, the CSU is comprised of 23 campuses, including comprehensive and polytechnic universities and, since July 1995, the California State University Maritime Academy, a specialized campus.

The oldest campus—San José State University—was founded in 1857 and became the first institution of public higher education in California. The newest—California State University Channel Islands—opened in fall 2002, with freshmen arriving in fall 2003. And in 2022, the Humboldt campus became Cal Poly Humboldt, joining San Luis Obispo and Pomona as that state's third public polytechnical university.

In 1963, the CSU's Academic Senate was established to act as the official voice of CSU faculty in university wide matters. Also, the California State College Student Presidents Association— which was later renamed the California State Student Association (CSSA), was founded to represent each campus student association on issues affecting students.

Through its many decades of service, the CSU has continued to adapt to address societal changes, student needs and workforce trends. While the CSU's core mission has always focused on providing high-quality, affordable bachelor's and master's degree programs, over time the university has added a wide range of services and programs to support student success – from adding health centers and special programs for veterans to building student residential facilities to provide a comprehensive educational experience.

In 2010, in an effort to accommodate community college transfer students, the CSU, in concert with the California Community Colleges (CCC), launched the Associate Degree for Transfer (ADT), which guarantees CCC transfer students with an ADT admission to the CSU with junior status. The ADT has since proven to be the most effective path to a CSU for community college transfer students.

Always adapting to changes in technology and societal trends to support student learning and degree completion, the CSU launched CSU Fully Online, which enables CSU students to complete online courses at other CSU campuses, expanding enrollment opportunities and providing more educational opportunities for students who may prefer an online format to a traditional classroom setting.

The CSU marked a significant educational milestone when it broadened its degree offerings to include doctoral degrees. The CSU independently offers Doctor of Education (Ed.D.), Doctor of Physical Therapy (DPT), Doctor of Audiology (AuD) and Doctor of Nursing Practice (DNP) degree programs. Additionally, the CSU was recently authorized to offer the independent Doctor of Occupational Therapy (OTD). A limited number of other doctoral degrees are offered jointly with the University of California and private institutions in California.

The CSU strives to continually develop innovative programs, services and opportunities that will give students the tools they need to meet their full potential. In 2016, the university launched Graduation Initiative 2025, a bold plan to support students, increase the number of California's graduates earning high-quality degrees and eliminate achievement and

equity gaps for all students. Through this initiative, the CSU is ensuring that all students have the opportunity to graduate according to their personal goals, positively impacting their lives, families and communities.

By providing an accessible, hands-on education that prepares graduates for career success, the CSU has created a network of alumni that is so extensive and renowned that it spans across the globe. With the graduation of the Class of 2021, more than 4 million CSU alumni are making a difference in the lives of the people of California and the world.

Trustees of the California State University

Ex Officio Trustees

The Honorable Gavin Newsom
Governor of California

The Honorable Eleni Kounalakis
Lieutenant Governor of California

The Honorable Anthony Rendon
Speaker of the Assembly

The Honorable Tony Thurmond
State Superintendent of Public Instruction

Dr. Jolene Koester Interim Chancellor, California State University

Officers of the Trustees

The Honorable Gavin Newsom – President
Lillian Kimbell – Chair
Wenda Fong – Vice Chair
Andrew Jones – Secretary
Steve Relyea – Treasurer

Appointed Trustees

Appointments are for a term of eight years, except student, alumni, and faculty trustees, whose terms are for two years. Terms expire in the year in parentheses. Names are listed alphabetically.

- Larry L. Adamson (2022)
- Diego Arambula (2028)
- Jane W. Carney (2022)
- Jack B. Clarke Jr. (2027)
- Adam Day (2023)
- Douglas Faigin (2025)
- Christopher J. Steinhauser (2026)
- Jean P. Firstenberg (2026)
- Wenda Fong (2024)
- Lillian Kimbell (2024)
- Maria Linares (2023)
- Julia I. Lopez (2028)
- John "Jack" McGrory (2023)
- Anna Ortiz-Morfit (2025)
- Krystal Raynes (2022)
- Yammilette Rodriguez (2029)
- Romey Sabalius (2023)
- Lateefah Simon (2027)

Correspondence with Trustees should be sent to:

c/o Trustees Secretariat

The California State University
401 Golden Shore
Long Beach, CA 90802-4210

Office of the Chancellor

The California State University
401 Golden Shore
Long Beach, California 90802-4210
Phone: 562.951.4000

Name	Title
Dr. Jolene Koester	Interim Chancellor
Mr. Steve Relyea	Executive Vice Chancellor and Chief Financial Officer
Dr. Sylvia A. Alva	Executive Vice Chancellor, Academic and Student Affairs
Mr. Andrew Jones	Executive Vice Chancellor, General Counsel
Ms. Evelyn Nazario	Vice Chancellor, Human Resources
Mr. Vlad Marinescu	Vice Chancellor and Chief Audit Officer

Campuses—The California State University

California State University, Bakersfield

9001 Stockdale Highway, Bakersfield, CA 93311-1022
Dr. Lynnette Zelezny, President
661.654.2782
CSU Bakersfield Website (<https://www.csub.edu/>)

California State University, Channel Islands

One University Drive, Camarillo, CA 93012
Dr. Richard Yao, President
805.437.8400
CSU Channel Islands Website (<https://www.csuci.edu/>)

California State University, Chico

400 West First Street, Chico, CA 95929
Dr. Gayle E. Hutchinson, President
530.898.4636
Chico State Website (<https://www.csuchico.edu/>)

California State University, Dominguez Hills

1000 East Victoria Street, Carson, CA 90747
Dr. Thomas A. Parham, President
310.243.3696
CSU Dominguez Hills Website (<https://www.csudh.edu/>)

California State University, East Bay

25800 Carlos Bee Boulevard, Hayward, CA 94542
Dr. Cathy A. Sandeen, President
510.885.3000
Cal State East Bay Website (<https://www.csueastbay.edu/>)

California State University, Fresno

5241 North Maple Avenue, Fresno, CA 93740
Dr. Saul Jimenez-Sandoval, President
559.278.4240
CSU Fresno Website (<http://www.csufresno.edu/>)

California State University, Fullerton

800 N. State College Boulevard, Fullerton, CA 92831-3599

Mr. Framroze Virjee, President
657.278.2011
Cal State Fullerton Website (<http://www.fullerton.edu/>)

California State Polytechnic University, Humboldt
1 Harpst Street, Arcata, CA 95521-8299
Dr. Tom Jackson, Jr., President
707.826.3011
Cal Poly Humboldt Website (<https://www.humboldt.edu/>)

California State University, Long Beach
1250 Bellflower Boulevard, Long Beach, CA 90840-0115
Dr. Jane Close Conoley, President
562.985.4111
Cal State Long Beach Website (<https://www.csulb.edu/>)

California State University, Los Angeles
5151 State University Drive, Los Angeles, CA 90032
Dr. William A. Covino, President
323.343.3000
Cal State LA Website (<https://www.calstatela.edu/>)

California State University Maritime Academy
200 Maritime Academy Drive, Vallejo, CA 94590
Rear Admiral Thomas A. Cropper, President
707.654.1000
Cal Maritime Website (<https://www.csum.edu/>)

California State University, Monterey Bay
100 Campus Center, Seaside, CA 93955-8001
Dr. Eduardo M. Ochoa, President
831.582.3000
CSU Monterey Bay Website (<https://csumb.edu/>)

California State University, Northridge
18111 Nordhoff Street, Northridge, CA 91330
Dr. Ericka D. Beck, President
818.677.1200
CSUN Website (<https://www.csun.edu/>)

California State Polytechnic University, Pomona
3801 West Temple Avenue, Pomona, CA 91768
Dr. Soraya M. Coley, President
909.869.7659
Cal Poly Pomona Website (<https://www.cpp.edu/>)

California State University, Sacramento
6000 J Street, Sacramento, CA 95819
Dr. Robert S. Nelson, President
916.278.6011
Sacramento State Website (<https://www.csus.edu/>)

California State University, San Bernardino
5500 University Parkway, San Bernardino, CA 92407-2318
Dr. Tomás D. Morales, President
909.537.5000
Cal State San Bernardino Website (<https://www.csusb.edu/>)

San Diego State University
5500 Campanile Drive, San Diego, CA 92182
Dr. Adela de la Torre, President
619.594.5200
San Diego State Website (<https://www.sdsu.edu/>)

San Francisco State University

1600 Holloway Avenue, San Francisco, CA 94132
Dr. Lynn Mahoney, President
415.338.1111
San Francisco State Website (<https://www.sfsu.edu/>)

San José State University
One Washington Square, San Jose, CA 95192-0001
Dr. Stephen Perez*, President
408.924.1000
San José State Website (<https://www.sjsu.edu/>)

California Polytechnic State University, San Luis Obispo
One Grand Avenue
San Luis Obispo, CA 93407
Dr. Jeffrey D. Armstrong, President
805.756.1111
Cal Poly San Luis Obispo Website (<https://www.calpoly.edu/>)

California State University, San Marcos
333 South Twin Oaks Valley Road
San Marcos, CA 92096-0001
Dr. Ellen J. Neufeldt, President
760.750.4000
CSU San Marcos Website (<https://www.csusm.edu/>)

Sonoma State University
1801 East Cotati Avenue, Rohnert Park, CA 94928
Dr. Judy K. Sakaki, President
707.664.2880
Sonoma State Website (<http://www.sonoma.edu/>)

California State University, Stanislaus
One University Circle, Turlock, CA 95382
Dr. Ellen N. Junn, President
209.667.3122
Stanislaus State Website (<https://www.csustan.edu/>)

Average Support Cost per Full-time Equivalent Student Sources of Funds

The total support cost per full-time equivalent student (FTES) includes the expenditures for current operations, including payments made to students in the form of financial aid, and all fully reimbursed programs contained in state appropriations. The average support cost is determined by dividing the total cost by the number of FTES. The total CSU 2021/22 budget amounts were \$4,228,282,000 from state General Fund (GF) appropriations, before a \$(4.4) million CalPERS retirement adjustment, \$2,509,668,000 from gross tuition revenue, and \$653,724,000 from other fee revenues for a total of \$7,391,674,000. The 2021/22 resident FTES target is 374,246 and the nonresident FTES based on past-year actual is 19,430 for a total of 393,676 FTES. The GF appropriation is applicable to resident students only whereas fee revenues are collected from resident and nonresident students. FTES is derived by dividing the total student credit units attempted by a fixed amount depending on academic level (e.g., 30 for a semester campus and 45 for a quarter campus, the figures that define a full-time undergraduate or postbaccalaureate student's academic load).

2020/21

	Amount	Average Cost Per FTES	%
State Appropriation (GF)*	4,228,282,000	11,298	57.2
Gross Tuition Revenue**	2,509,668,000	6,374	34
Other Fees Revenue**	6653,724,000	1,661	8.8
Total Support Cost	7,391,674,000	19,333	100

* Represents state GF appropriation in the Budget Act of 2021/22; GF is divisible by resident students only (374,246 FTES).

** Represents CSU Operating Fund, gross tuition and other fees revenue amounts submitted in campus August 2020/21 final budgets. Revenues are divisible by resident and nonresident students (393,676 FTES).

The 2021/22 average support cost per FTES based on GF appropriation and net tuition fee revenue only is \$17,672 and when including all three sources as indicated below is \$19,333, which includes all fee revenue (e.g. tuition fees, application fees, and other campus mandatory fees) in the CSU Operating Fund. Of this amount, the average net tuition and other fee revenue per FTES is \$8,035.

The average CSU 2021/22 academic year, resident, undergraduate student basic tuition and other mandatory fees required to apply to, enroll in, or attend the university is \$7,439 (\$5,742 tuition fee plus \$1,621 average campus-based fees). However, the costs paid by individual students will vary depending on campus, program, and whether a student is part-time, full-time, resident, or nonresident.

Campus Smoking Policy

Please view the revised smoking policy for the Cal Poly campus at the Campus Administrative Policies website (<https://policy.calpoly.edu/cap/100/cap-170/>).

Career Placement

The Career Services office 805.756.2501 may furnish, upon request, information about the employment of students who graduate from programs or courses of study preparing students for a particular career field. Any such data provided must be in a form that does not allow for the identification of any individual student. This information includes data concerning the average starting salary and the percentage of previously enrolled students who obtained employment or continued into graduate or professional schools. The information may include data collected from either graduates of the campus or graduates of all campuses in the California State University.

Civil and Criminal Penalties for Violation of Federal Copyrights Law

Anyone who is found to be liable for copyright infringement may be liable for either the owner's actual damages along with any profits of the infringer or statutory damages of up to \$30,000 per work infringed. In the case of a willful infringement, a court may award up to \$150,000 per work infringed. (See 17 U.S.C. §504.) Courts also have discretion to award costs and attorneys' fees to the prevailing party. (See 17 U.S.C. §505.) Under certain circumstances, willful copyright infringement may

also result in criminal penalties, including imprisonment and fines. (See 17 U.S.C. §506 and 18 U.S.C. §2319.)

Determination of Residency for Tuition Purposes

University requirements for establishing residency for tuition purposes are independent from requirements for establishing residency for other purposes, such as for tax purposes, or other state or institutional residency. These regulations were promulgated not to determine whether a student is a resident or nonresident of California, but rather to determine whether a student qualifies to pay university fees at the in-state or out-of-state rate. A resident for tuition purposes is someone who meets the requirements set forth in the Uniform Student Residency Requirements. These laws governing residency for tuition purposes at the California State University are California Education Code sections 68000-68086, 68120- 68133, and 89705-89707.5, and California Code of Regulations, Title 5, Subchapter 5, Article 4, sections 41900- 41915. This material can be viewed by accessing the California State University Office of General Counsel website (<https://www.calstate.edu/csu-system/administration/general-counsel/>).

Each campus's Admissions Office is responsible for determining the residency status of that campus's new and returning students based, as applicable, on the student's Application for Admission, Residency Questionnaire, and, as necessary, other information the student furnishes. A student who fails to provide sufficient information to establish resident status will be classified a nonresident.

Residency Requirements

Initial Determination: Eligible Immigration Status, Physical Presence and Intent

A student seeking to pay in-state tuition at a California State University campus as a first-time freshman, transfer, or as a post-baccalaureate/graduate student must have an eligible immigration status to establish residency (see Immigration Information (<https://www.calstate.edu/apply/california-residency-for-tuition-purposes/Pages/classification-determination-of-residency.aspx#immigration-information>)), meet physical presence by the Residence Determination Date, and demonstrate intent to indefinitely remain in the State of California for more than one year immediately preceding the Residence Determination Date. If the student is under the age of 19 (with limited exceptions), the student's residence status is derived from that of the parent or from that of the legal guardian.

Requirements for Residency for Tuition Purposes

Physical Presence: The student or parent/guardian must be physically present in California for more than one year immediately preceding the Residence Determination Date in which enrollment is contemplated. For example, if a student plans to attend the CSU for the Fall 2022 academic term, and the Residence Determination Date for that term is September 20, 2022, the student must establish physical presence in California no later than September 19, 2021.

Intent: California law stipulates the burden of proof rests with the student, and merely living in California for a year does not support a claim for residency for tuition purposes. The student, or in some cases a parent or legal guardian, must demonstrate intent to remain indefinitely in the state for more than one year immediately preceding the Residence Determination Date (RDD) (<https://www.calstate.edu/apply/california-residency-for-tuition-purposes/Pages/classification-determination-of->

residency.aspx) and sever all residential ties with the former state or country of residence. If the student is under the age of 19, the student's residence status is derived from that of the parent or legal guardian unless an exception applies. There must be sufficient documentation to demonstrate that intent was established more than one year (a minimum of one year and one day) before the RDD.

Documents must include the student's name, the student's California address, and a date at least one year and one day prior or on the RDD for the term. For students under the age of 19, documents must be in the parent or legal guardian's name unless an exception applies. Also, a parent or legal guardian's immigration status does not preclude a student from establishing residency; therefore, the parent or legal guardian is not required to provide any immigration documents to demonstrate intent.

Evidence demonstrating intent to remain in the State of California indefinitely may vary from case to case, but will include, and is not necessarily limited to, the absence of residential ties to any other state, California voter registration and history of actually voting in California elections, maintaining California vehicle registration and driver's license, maintaining active California bank accounts, filing California income tax returns and listing a California address on federal tax returns, owning residential property or occupying or renting a residence where permanent belongings are kept, maintaining active memberships in California professional or social organizations, and maintaining a permanent military address and home of record in California.

Immigration Information

A student seeking to pay in-state tuition at a California State University campus as a first-time freshman, transfer, or as a post-baccalaureate/graduate student must have an eligible immigration status (<https://www.calstate.edu/apply/california-residency-for-tuition-purposes/Documents/Immigration-Statuses.pdf>) to establish residency. Therefore, the student must be a United States citizen, a permanent resident (Green Card holder), or hold an eligible visa status (see list). If a student does not qualify as a California resident, the student may be eligible for certain exceptions and exemptions (<https://www.calstate.edu/apply/california-residency-for-tuition-purposes/Pages/exceptions-exemptions.aspx>).

Nonimmigrant Statuses and Other Categories that are Eligible to Establish California Residency for Tuition Purposes

The Immigration and Nationality Act allows individuals in certain nonimmigrant statuses to establish permanent residency in the United States. Therefore, they are entitled to establish California residency for tuition purposes. For a complete list of eligible visas and other eligible categories, review the Nonimmigrant list. Students must hold an eligible visa status at least one year before the Residence Determination Date (<https://www.calstate.edu/apply/california-residency-for-tuition-purposes/Pages/classification-determination-of-residency.aspx>) to be eligible to establish California residency for tuition purposes.

Students in the category of Deferred Action for Childhood Arrivals (DACA) or Temporary Protected Status (TPS) are also eligible to establish residency for tuition purposes. Also, students who are adjusting their immigration status, such as asylum, may qualify for residency depending on where they are in the application process.

Most nonimmigrant visa holders, such as an F-1 or J-1 visa holder, are not eligible to establish California residency for tuition purposes. Students with a visa or without an immigration status should contact the campus Admissions Office.

Exceptions

Exceptions to the general residency requirements are contained in California Education Code sections 68070-68086 and California Code of Regulations, Title 5, Subchapter 5, Article 4, sections 41906-41906.6, 41910. Whether an exception applies to a particular student can only be determined after the submission of an application for admission and, as necessary, additional supporting documentation. Because neither the campus nor the Chancellor's Office staff may give legal advice, applicants are strongly urged to review the material for themselves and consult with a legal advisor.

Residency determination dates are set each term, They are:

Term	Date
Fall	September 20
Winter	January 5
Spring	April 1
Summer	July 1

Reclassification - Financial Independence (only applies to continuing students)

A student classified as a nonresident for a prior term may seek reclassification in any subsequent term; however, reclassification requires that, in addition to satisfying the requirements of physical presence and intent to remain indefinitely in the state, the student must also satisfy the requirement of financial independence as outlined in Title 5 CCR § 41905.5. To do so, the student must contact the appropriate person in the campus admissions office and complete a Residency Questionnaire Form and provide supporting documents.

41905.5. Residence Reclassification - Financial Independence Requirement

- Any nonresident student requesting reclassification to resident for tuition purposes must demonstrate financial independence
- Student has not and will not be claimed as an exemption for state and federal tax purposes by his/her parent in the calendar year the reclassification application is made and in any of the three calendar years prior to the reclassification application
- Student has not and will not receive more than seven hundred fifty dollars (\$750) per year in financial assistance from his/her parent in the calendar year the reclassification application is made and in any of the three calendar years prior to the reclassification application
- Student has not lived and will not live for more than six weeks in the home of his/her parent during the calendar year the reclassification application is made and in any of the three calendar years prior to the reclassification application
- Note: Students who receive a government scholarship and/or financial assistance should be viewed the same as state and federal financial aid, and athletics grants-is-aid; and should not be counted as parental support.
- Effective Fall 2020 academic term, if the student meets at least one of the following criteria, the student does not have to meet the financial independence requirement. Student must provide the campus admissions office supporting documents (e.g. state income tax returns, court documents, marriage certificate, military order form) that demonstrate they meet the criteria.
- Dependent on a parent who has California residence for more than one year immediately preceding the residence determination date;

- Enrolled in a graduate or post#baccalaureate program, regardless of age;
- Turned 24 years of age by the residence determination date;
- Married or registered domestic partner as of the residence determination date;
- Active duty members serving in the U.S Armed Forces
- Veteran of the U.S. Armed Forces
- Legal dependent other than spouse or registered domestic partner
- Former ward of the court, foster youth or both parents are deceased
- Declared by a court to be an emancipated minor
- Unaccompanied youth who is homeless or at risk of becoming homeless

Residency Appeals

A student classified as a nonresident may appeal a final campus decision within 30 days of notification by the campus. Appeals will be accepted only if at least one of the following criteria applies:

1. The decisions was based on:
 - a. a significant error of fact by the campus;
 - b. a significant procedural error by the campus; or
 - c. an incorrect application of the law which, if corrected would require that the student be reclassified as a California resident; and/or or
2. Significant new information, not previously known or available to the student, became available after the date of the campus decision classifying the student as a nonresident and based on the new information, the classification as a nonresident is incorrect.

Instructions to submit an appeal and additional information can be found on the California Residency for Tuition Purposes Website (<https://www2.calstate.edu/apply/california-residency-for-tuition-purposes/>).

Appeals via email, fax and U.S. mail will not be accepted. A student with a documented disability who is requesting an accommodation to submit an appeal through the CSU website (<https://www2.calstate.edu/>) should contact Student Affairs and Enrollment Management at residencyappeals@calstate.edu.

The Chancellor's Office will either decide the appeal or send the matter back to the campus for further review.

A student incorrectly classified as a resident or incorrectly granted an exception from nonresident tuition is subject to reclassification as a nonresident or withdrawal of the exception and subject to payment of nonresident tuition in arrears. If incorrect classification results from false or concealed facts, the student may also be subject to discipline pursuant to Section 41301 of Title 5 of the California Code of Regulations. A student previously classified as a resident or previously granted an exception is required to immediately notify the Admissions Office if the student has reason to believe that the student no longer qualifies as a resident or no longer meets the criteria for an exception.

Changes may have been made in the rate of nonresident tuition and in the statutes and regulations governing residency for tuition purposes in California between the time this information is published and the relevant residency determination date. Students are urged to review the statutes and regulations stated above.

Higher Education Act (HEA)

Under the Higher Education Act of 1965 (HEA) and its many amendments, Cal Poly is required to make certain disclosures and institutional information "readily available" to prospective and enrolled students, employees, the general public and the department of education on an annual basis (20 U.S.C. Section 1092(a)). For additional information, please contact the Dean of Students Office at 805.756.0327.

PRIVACY RIGHTS OF STUDENTS IN EDUCATION RECORDS

The federal Family Educational Rights and Privacy Act of 1974 (20 U.S.C. 1232g) (FERPA) and regulations adopted thereunder (34 C.F.R. 99) set out requirements designed to protect students' privacy in their educational records maintained by the campus. The statute and regulations govern access to certain student records maintained by the campus and the release of those records. FERPA provides that the campus must give students access to most records directly related to the student, and must also provide opportunity for a hearing to correct the records if the student claims they are inaccurate, misleading, or otherwise inappropriate. The right to a hearing under this law does not include any right to challenge the appropriateness of a grade determined by the instructor. FERPA generally requires the campus obtain a student's written consent before releasing personally identifiable data pertaining to the student. The campus has adopted a set of policies and procedures governing implementation of FERPA and the regulations. Copies of these policies and procedures may be obtained at Office of Academic Records or the Educational Equity Services Office. Among the information included in the campus statement of policies and procedures is: (1) the student records maintained and the information they contain; (2) the campus official responsible for maintaining each record; (3) the location of access lists indicating persons requesting or receiving information from the record; (4) policies for reviewing and expunging records; (5) student access rights to their records; (6) procedure for challenging the content of student records; and (7) the student's right to file a complaint with the Department of Education. The Department of Education has established an office and review board to investigate complaints and adjudicate violations. The designated office is: Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, D.C. 20202-5920.

FERPA authorizes the campus to release "directory information" pertaining to students. "Directory information" may include the student's name, address, telephone listing, electronic mail address, photograph, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, grade level, enrollment status, degrees, honors, and awards received, and the most recent previous educational agency or institution the student attended. The campus may release this "directory information" at any time unless the campus has received prior written objection from the student specifying the information the student requests not be released. Written objections must be sent to University Registrar.

The campus is authorized to provide access to student records to campus officials and employees who have legitimate educational interests in such access. These persons have responsibilities in the campus's academic, administrative or service functions and have reason for accessing student records associated with their campus or other related academic responsibilities. Student records will be disclosed to the CSU Chancellor's Office to conduct research, to analyze trends, or to provide other administrative services. Student records may also be

disclosed to other persons or organizations under certain conditions (e.g., as part of the accreditation or program evaluation; in response to a court order or subpoena; in connection with financial aid; or to other institutions to which the student is transferring).

Completion/Graduation Rates

Information concerning completion, graduation rates and student body diversity at Cal Poly may be found at the Institutional Research website (https://ir.calpoly.edu/content/publications_reports/index/).

Equity in Athletics Disclosure Act (EADA)

http://ir.calpoly.edu/content/publications_reports/ret_grad/index (http://ir.calpoly.edu/content/publications_reports/ret_grad/index/)

The Equity in Athletics Disclosure Act requires co-educational institutions of postsecondary education that participate in a Title IV, federal student financial assistance program, and have an intercollegiate athletic program, to prepare an annual report to the Department of Education on athletic participation, staffing, and revenues and expenses, by men's and women's teams.

In compliance with this requirement, information contained in the current report for Cal Poly San Luis Obispo is available on the US Department of Education's web site at <http://ope.ed.gov/athletics> (<http://ope.ed.gov/athletics/>) (select "Get data for one institution"). Alternatively, a link is also available to this and other publications through Cal Poly's Institutional Planning & Analysis web site (see link at top of this section). A paper copy of the report is available upon request.

Campus Security Report (Clery Act)

<http://afd.calpoly.edu/police/>

Crime statistics for Cal Poly are provided for all prospective and current students, faculty and staff on the website, along with critical updates and prevention advisories. These statistics are reported monthly to the Federal and State Departments of Justice as well as annually to the Office of the Chancellor of the CSU. Crime statistics are published to inform the campus community and to meet mandated reporting requirements. A printed copy of the Campus Security Report is available by request at the University Police Department.

Student Activities

Information concerning student activities may be found at the Cal Poly Student Affairs website <http://www.studentaffairs.calpoly.edu/get-involved> (<http://www.studentaffairs.calpoly.edu/get-involved/>); 805.756.5903.

Availability of Institutional and Financial Assistance Information

Student Financial Assistance. Director, Financial Aid, Admin. 212; 805.756.2927

1. A description of the federal, state, institutional, local, and private student financial assistance programs available to students who enroll at Cal Poly;
2. For each aid program, a description of procedures and forms by which students apply for assistance, student eligibility requirements, criteria for selecting recipients from the group of eligible applicants, and criteria for determining the amount of a student's award;
3. A description of the rights and responsibilities of students receiving financial assistance, including federal Title IV student assistance

programs, and criteria for continued student eligibility under each program;

4. The satisfactory academic progress standards that students must maintain for the purpose of receiving financial assistance and criteria by which a student who has failed to maintain satisfactory progress may reestablish eligibility for financial assistance;
5. The method by which financial assistance disbursements will be made to students and the frequency of those disbursements;
6. The way the school provides for Pell-eligible students to obtain or purchase required books and supplies by the seventh day of a payment period and how the student may opt out;
7. The terms of any loan received as part of the student's financial aid package, a sample loan repayment schedule, and the necessity for repaying loans;
8. The general conditions and terms applicable to any employment provided as part of the student's financial aid package;
9. The terms and conditions of the loans students receive under the Direct Loan and Perkins Loan Programs;
10. The exit counseling information the school provides and collects for student borrowers; and
11. Contact information for ombuds offices available for disputes concerning federal, institutional and private loans.

Return of Federal Title IV student assistance funds. Director, Financial Aid, Admin. 212; 805.756.2927.

Cost of Attending Cal Poly. Director, Financial Aid, Admin. 212; 805.756.2927: fees and tuition (where applicable); the estimated costs of books and supplies; estimates of typical student room, board, and transportation costs; and, if requested, additional costs for specific programs.

Refund Policies. Assistant Director, Student Financial Services, Admin. 211; 805.756.1428: return of unearned tuition and fees or other refundable portions of institutional charges.

Facilities and Services available to Students with Disabilities. Director, Disability Resource Center, Student Services Bldg. 124; 805.756.1395.

Reporting Criminal Actions or Other Emergencies. University Police, Building 74; 805.756.2281.

Annual Fire Safety Report. Facility Services, Bldg. 80; 805.756.6662.

Prevention of Drug and Alcohol Abuse and Rehabilitation Programs. Office of the Vice President for Student Affairs, Admin. 209; 805.756.1521.

Grievance Procedures for Students. The Dean of Students Office, Bldg 124, Rm 125; 805.756.0327.

Teacher Certification Examinations, pass rates, teacher preparation programs. School of Education, Bldg 2, Rm 120; 805.756.2126.

Programs Leading to Licensure and Credentialing

Admission into programs leading to licensure and credentialing does not guarantee that students will obtain a license or credential. Licensure and credentialing requirements are set by agencies that are not controlled by or affiliated with the CSU and requirements can change at any time. For example, licensure or credentialing requirements can include evidence of the right to work in the United States (e.g., social security

number or tax payer identification number) or successfully passing a criminal background check. Students are responsible for determining whether they can meet licensure or credentialing requirements. The CSU will not refund tuition, fees, or any associated costs, to students who determine subsequent to admission that they cannot meet licensure or credentialing requirements. Information concerning licensure and credentialing requirements are available from the Office of the Registrar, Admin. 222; 805.756.2531.

The California State University has not determined whether its programs meet other states' educational or professional requirements for licensure and certification. Students enrolled in a California State University program who are planning to pursue licensure or certification in other states are responsible for determining whether they will meet their state's requirements for licensure or certification. This disclosure is made pursuant to 34 CFR §668.43(a)(5)(v)(C).

Military Selective Service Act

The federal Military Selective Service Act (the "Act") requires most males residing in the United States to present themselves for registration with the Selective Service System within thirty days of their eighteenth birthday. Most males between the ages of 18 and 25 must be registered.

Selective Service registration forms are available at any U.S. Post Office, and many high schools have a staff member or teacher appointed as a Selective Service Registrar. For more information on the Selective Service System and to initiate the registration process, visit the official Selective Service System website (<https://www.sss.gov/>).

Student Complaint Procedure (Complaints Regarding the CSU)

The California State University takes very seriously complaints and concerns regarding the institution. If you have a complaint regarding the CSU, you may present your complaint as follows:

(1) If your complaint concerns CSU's compliance with academic program quality and accrediting standards, you may present your complaint on the Western Association of Schools and Colleges (WASC) website (<https://www.acswasc.org/acs-wasc-complaint-process/>). WASC is the agency that accredits the CSU's academic program.

(2) If your complaint concerns an alleged violation by CSU of any law that prohibits discrimination, harassment or retaliation based on a protected status (such as age, disability, gender (or sex), gender identity, gender expression, nationality, race or ethnicity (including color, caste, or ancestry), religion or veteran or military status), you may present your complaint as described in Section XVI (Nondiscrimination Policy).

(3) If your complaint concerns an alleged violation by the CSU of other state law, including laws prohibiting fraud and false advertising, you may present your claim complaint to the campus president or designee at (Jessica Darin, Chief of Staff, darin@calpoly.edu). See Procedure for Student Complaints—Executive Order No. 1063 for details regarding the complaint requirements and complaint process.

(4) Other complaints regarding the CSU may be presented to the campus dean of students [or other appropriate administrator], who will provide guidance on the appropriate campus process for addressing your particular issue.

If you believe that your complaint warrants further attention after you have exhausted all the steps outlined by the campus, or by WASC, you

may file an appeal with the Assistant Vice Chancellor, Academic and Student Affairs (or designee) at the CSU Chancellor's Office.

This procedure should not be construed to limit any right that you may have to take legal action to resolve your complaint.

Student Conduct

Inappropriate conduct by students or by applicants for admission is subject to discipline as provided in Sections 41301 through 41304 of Title 5, *California Code of Regulations*. These sections are:

41301. Standards for Student Conduct.

1. Campus Community Values

The University is committed to maintaining a safe and healthy living and learning environment for students, faculty, and staff. Each member of the campus community should choose behaviors that contribute toward this end. Students are expected to be good citizens and to engage in responsible behaviors that reflect well upon their university, to be civil to one another and to others in the campus community, and contribute positively to student and university life.

2. Grounds for Student Discipline

Student behavior that is not consistent with the Student Conduct Code is addressed through an educational process that is designed to promote safety and good citizenship and, when necessary, impose appropriate consequences. The following are the grounds upon which student discipline can be based:

- a. Dishonesty, including:
 - i. Cheating, plagiarism, or other forms of academic dishonesty that are intended to gain unfair academic advantage.
 - ii. Furnishing false information to a University official, faculty member, or campus office.
 - iii. Forgery, alteration, or misuse of a University document, key, or identification instrument.
 - iv. Misrepresenting one's self to be an authorized agent of the University or one of its auxiliaries.
- b. Unauthorized entry into, presence in, use of, or misuse of University property.
- c. Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.
- d. Participating in an activity that substantially and materially disrupts the normal operations of the University, or infringes on the rights of members of the University community.
- e. Willful, material and substantial obstruction of the free flow of pedestrian or other traffic, on or leading to campus property or an off-campus University related activity.
- f. Disorderly, lewd, indecent, or obscene behavior at a University related activity, or directed toward a member of the University community.
- g. Conduct that threatens or endangers the health or safety of any person within or related to the University community, including physical abuse, threats, intimidation, harassment, or sexual misconduct.
- h. Hazing, or conspiracy to haze. Hazing is defined as any method of initiation or pre-initiation into a student organization or student body, whether or not the organization or body is officially recognized by an educational institution, which is likely to cause serious bodily injury to any former, current, or prospective student of any school, community college, college, university or other educational institution in this state (Penal Code 245.6), and

in addition, any act likely to cause physical harm, personal degradation or disgrace resulting in physical or mental harm, to any former, current, or prospective student of any school, community college, university, or other educational institution. The term “hazing” does not include customary athletic events or school sanction events.

Neither the express or implied consent of a victim of hazing, nor the lack of active participation in a particular hazing incident is a defense. Apathy or acquiescence in the presence of hazing is not a neutral act, and is also a violation of this section.

- i. Use, possession, manufacture, or distribution of illegal drugs or drug-related paraphernalia, (except as expressly permitted by law and University regulations) or the misuse of legal pharmaceutical drugs.
- j. Use, possession, manufacture, or distribution of alcoholic beverages (except as expressly permitted by law and University regulations), or public intoxication while on campus or at a University related activity.
- k. Theft of property or services from the University community, or misappropriation of University resources.
- l. Unauthorized destruction, or damage to University property or other property in the University community.
- m. Possession or misuse of firearms or guns, replicas, ammunition, explosives, fireworks, knives, other weapons, or dangerous chemicals (without the prior authorization of the campus president) on campus or at a University related activity.
- n. Unauthorized recording, dissemination, or publication of academic presentations (including handwritten notes) for a commercial purpose.
- o. Misuse of computer facilities or resources, including:
 - i. Unauthorized entry into a file, for any purpose.
 - ii. Unauthorized transfer of a file.
 - iii. Use of another’s identification or password.
 - iv. Use of computing facilities, campus network, or other resources to interfere with the work of another member of the University community.
 - v. Use of computing facilities and resources to send obscene or intimidating and abusive messages.
 - vi. Use of computing facilities and resources to interfere with normal University operations.
 - vii. Use of computing facilities and resources in violation of copyright laws.
 - viii. Violation of a campus computer use policy.
- p. Violation of any published University policy, rule, regulation or presidential order.
- q. Failure to comply with directions of, or interference with, any University official or any public safety officer while acting in the performance of his/her duties.
- r. Any act chargeable as a violation of a federal, state, or local law that poses a substantial threat to the safety or well-being of members of the University community, to property within the University community or poses a significant threat of disruption or interference with University operations.
- s. Violation of the Student Conduct Procedures, including:
 - i. Falsification, distortion, or misrepresentation of information related to a student discipline matter.
 - ii. Disruption or interference with the orderly progress of a student discipline proceeding.

- iii. Initiation of a student discipline proceeding in bad faith.
- iv. Attempting to discourage another from participating in the student discipline matter.
- v. Attempting to influence the impartiality of any participant in a student discipline matter.
- vi. Verbal or physical harassment or intimidation of any participant in a student discipline matter.
- vii. Failure to comply with the sanction(s) imposed under a student discipline proceeding.
- t. Encouraging, permitting, or assisting another to do any act that could subject him or her to discipline.

3. Procedures for Enforcing this Code

The Chancellor shall adopt procedures to ensure students are afforded appropriate notice and an opportunity to be heard before the University imposes any sanction for a violation of the Student Conduct Code. **[Note:** At the time of publication, such procedures are set forth in California State University Executive Order 1098 (Revised June 23, 2015), available at <http://calstate.edu/eo/EO-1098-rev-6-23-15.html>.]

4. Application of this Code

Sanctions for the conduct listed above can be imposed on applicants, enrolled students, students between academic terms, graduates awaiting degrees, and students who withdraw from school while a disciplinary matter is pending. Conduct that threatens the safety or security of the campus community, or substantially disrupts the functions or operation of the University is within the jurisdiction of this Article regardless of whether it occurs on or off campus. Nothing in this Code may conflict with Education Code section 66301 that prohibits disciplinary action against students based on behavior protected by the First Amendment.

41302. Disposition of Fees: Campus Emergency; Interim Suspension.

The President of the campus may place on probation, suspend, or expel a student for one or more of the causes enumerated in Section 41301. No fees or tuition paid by or for such student for the semester, quarter, or summer session in which he or she is suspended or expelled shall be refunded. If the student is readmitted before the close of the semester, quarter, or summer session in which he or she is suspended, no additional tuition or fees shall be required of the student on account of the suspension.

During periods of campus emergency, as determined by the President of the individual campus, the President may, after consultation with the Chancellor, place into immediate effect any emergency regulations, procedures, and other measures deemed necessary or appropriate to meet the emergency, safe-guard persons and property, and maintain educational activities.

The president may immediately impose an interim suspension in all cases in which there is reasonable cause to believe that such an immediate suspension is required in order to protect lives or property and to insure the maintenance of order. A student so placed on interim suspension shall be given prompt notice of charges and the opportunity for a hearing within 10 days of the imposition of interim suspension. During the period of interim suspension, the student shall not, without prior written permission of the president or designated representative, enter any campus of the California State University other than to attend the hearing. Violation of any condition of interim suspension shall be grounds for expulsion.

Use of Social Security Number

Applicants are required to include their correct social security numbers in designated places on applications for admission pursuant to the authority contained in Section 41201, Title 5, *California Code of Regulations*, and Section 6109 of the Internal Revenue Code (26 U.S.C. 6109). The University uses the social security number to identify students and their records including identification for purposes of financial aid eligibility and disbursement and the repayment of financial aid and other debts payable to the institution. Also, the Internal Revenue Service (IRS) requires the University to file information returns that include the student's social security number and other information such as the amount paid for qualified tuition, related expenses, and interest on educational loans. This information is used by the IRS to help determine whether a student, or a person claiming a student as a dependent, may take a credit or deduction to reduce federal income taxes.

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AERO Courses

AERO 121. Aerospace Fundamentals. 2 units

Term Typically Offered: F

Introduction to the engineering profession including the aeronautical and aerospace fields. Engineering approach to problem-solving and analysis of data obtained from experiments. Basic nomenclature and design criteria used in the aerospace industry. Applications to basic problems in the field. 1 lecture, 1 laboratory.

AERO 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

AERO 215. Introduction to Aerospace Design. 2 units

Term Typically Offered: F, W

Prerequisite: AERO 121 and MATH 143. Recommended: IME 144.

Introduction to problem solving techniques and team-centered design projects in aerospace engineering. Primary emphasis on the solutions of design problems in aerospace engineering using computers. 2 laboratories.

AERO 220. Aerospace Systems Engineering and Integration. 1 unit

Term Typically Offered: W, SP

Prerequisite: AERO 121.

Project-based study of fundamental systems engineering concepts including sub-system interface requirements, verification and validation, modeling/analysis/design, and implementation of complex aerospace systems. 1 laboratory.

AERO 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

AERO 299. Aerospace Thermodynamics. 4 units

Term Typically Offered: SP

Prerequisite: ME 212. Corequisite: AERO 300. Recommended: AERO 215.

Basics of thermodynamics, energy, systems and control volume analysis. First law, second law, phase change and energy analysis for aerospace-relevant applications. Entropy and exergy, cycle analysis (Rankine, Brayton, turbojets and turbofans). Not open to students with credit in AERO 301. 3 lectures, 1 laboratory.

AERO 300. Aerospace Engineering Analysis. 5 units

Term Typically Offered: SP

Prerequisite: AERO 215, MATH 244, ME 211, and PHYS 133.

Analytical and numerical methods for aerospace engineering problems. Topics include vector calculus, linear algebra, ordinary and partial differential equations, and Fourier transforms. Computer tools and numerical methods as applied to problems in aerodynamics, structures, stability and control and astronautics. 4 lectures, 1 laboratory.

AERO 302. Aerospace Fluid Mechanics. 4 units

Term Typically Offered: F

Prerequisite: ME 212. Corequisite: AERO 300. Recommended: AERO 215; and AERO 299 or AERO 301.

Properties of fluids, statics, mass/energy/momentum for aeronautical applications, external aerodynamics (lift and drag), dimensional analysis for scale testing, introduction to differential analysis and Navier-Stokes equations, basics of laminar and turbulent boundary layers. 3 lectures, 1 laboratory.

AERO 303. Aerospace Gas Dynamics and Heat Transfer. 4 units

Term Typically Offered: W

Prerequisite: AERO 299 or AERO 301; and AERO 302.

Basics of heat transfer and approaches to problem solving, steady heat conduction, convection (forced and natural), heat exchanger design, shock waves and compressible flow in nozzles and diffusers (normal, oblique, expansion waves), thermal radiation and applications. 3 lectures, 1 laboratory.

AERO 306. Aerodynamics and Flight Performance. 4 units

Term Typically Offered: F

Prerequisite: AERO 215; AERO 299 or AERO 301. Concurrent: AERO 302.

Introduction to theoretical aerodynamics. Primary emphasis in the subsonic region, including compressibility effects. Basic aerodynamic theory: Airfoil theory, wing theory, lift and drag. Team-centered aerodynamic design. Flight performance. 4 lectures.

AERO 307. Experimental Aerodynamics. 2 units

Term Typically Offered: SP

Prerequisite: AERO 302, AERO 306, ENGL 149.

Wind tunnel testing of basic aerodynamic properties of airfoils, finite wings, aircraft or spacecraft models, and vehicle flight performance. Emphasis on both static and dynamic responses of aircraft. Various measurement techniques, data reduction schemes, and analysis methods. 2 laboratories.

AERO 310. Air and Space. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs); and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Technological developments of modern aircraft and spacecraft through physics of flight equations, mission analysis, propulsion, structures, materials, and control systems for civil and military aircraft/spacecraft. Synthesis of current and future aerospace technologies through emerging ethical considerations, and global impact. 4 lectures. Course may be offered in classroom-based or online format. Crosslisted as AERO/HNRS 310. Fulfills GE Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

AERO 320. Fundamentals of Dynamics and Control. 4 units

Term Typically Offered: F

Prerequisite: AERO 300 and ME 212.

Introduction to six degree of freedom rigid body dynamic and kinematic equations of motion, including coordinate transformations, Euler angles and quaternions for aerospace vehicles. Linearization and dynamic system theory and stability. Introduction to linear control theory, controller design and analysis. 4 lectures.

AERO 321. Experimental Sensors, Actuators and Control. 1 unit

Term Typically Offered: F

Prerequisite: AERO 300. Recommended: EE 201 and EE 251.

Experiments in translational and rotational dynamics, structural, thermal, and flow control. Comparison of modeling/simulation results to experimental data. Role of actuators, sensors, noise, feedback, and supporting instrumentation hardware and software. Introduction to technical communication. 1 laboratory.

AERO 331. Aerospace Structural Analysis I. 4 units

Term Typically Offered: W

Prerequisite: AERO 300, CE 207 or CE 208, and ME 212.

Deflection analysis. Principles of fictitious displacement, virtual work, and unit load method. Energy methods: Castigliano's theorem, Maxwell-Betti reciprocal theorem, minimum principles, Rayleigh-Ritz's method and Galerkin's method. Stress analysis of aircraft and spacecraft components. 4 lectures.

AERO 350. Fundamentals of Systems Engineering. 2 units

Term Typically Offered: W, SP

Prerequisite: AERO 220.

Systems engineering principles and methods applied to the design of aerospace systems. System-level requirements, user needs and stakeholder constraints, component-level requirements, and requirements breakdown structure. Project planning and tracking. Trade studies for design decision making. 2 lectures.

AERO 351. Introduction to Orbital Mechanics. 4 units

Term Typically Offered: F

Prerequisite: AERO 300 and ME 212.

Motion of a body in a central field. Keplerian Orbits. Orbital maneuvers. Interplanetary trajectories. 4 lectures.

AERO 354. Space Environment Laboratory. 2 units

Term Typically Offered: SP

Prerequisite: AERO 353 or AERO 355; and ENGL 149.

Laboratory examples of the effects of the space environment on a spacecraft and design considerations. Topics include the launch, vacuum, particulate, plasma, and radiation environments. All topics are applied to how the environment affects spacecraft design considerations. Not open to students with credit in AERO 356. 2 laboratories.

AERO 355. Space Environments I. 3 units

Term Typically Offered: W

Prerequisite: AERO 300.

Effects of the space environment on a spacecraft and design considerations. Lecture and laboratory topics include the launch, vacuum, neutral and particulate environments. Not open to students with credit in AERO 353 or AERO 354. 2 lectures, 1 laboratory.

AERO 356. Space Environments II. 3 units

Term Typically Offered: SP

Prerequisite: AERO 299 or AERO 301; and AERO 355.

Effects of the space environment on a spacecraft and design considerations. Lecture and laboratory topics include the radiation, plasma, and thermal environments and the synergistic effects. Not open to students with credit in AERO 353 or AERO 354. 2 lectures, 1 laboratory.

AERO 360. Creative Problem Solving in Engineering Design. 2 units

Term Typically Offered: W

Prerequisite: PSY 350.

The creative problem solving process for an engineering design team. How to explore context and causes as part of defining a design problem; the principles of brainstorming, synthesis, and judgment. Role of iteration, implementation, and communication. Importance of a diverse view, including: customers, products, processes, systems, ethics, and professional responsibility. Team-based applications to case studies and real-world engineering design problems. 2 laboratories.

AERO 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units.

AERO 401. Propulsion Systems. 5 units

Term Typically Offered: F

Prerequisite: AERO 303, CHEM 124.

Power plant types, components, characteristics, and requirements. Principles of thrust and energy utilization. Thermodynamic processes and performance of turboprop, turboshaft, turbofan, turbojet, ramjet, and rocket engines. 4 lectures, 1 laboratory.

AERO 402. Spacecraft Propulsion Systems. 5 units

Term Typically Offered: F

Prerequisite: AERO 303; AERO 353 or AERO 355; and CHEM 124.

Effects of the propulsion subsystem on spacecraft design. Introduction to air breathing propulsion systems. Topics include basic rocket performance, monopropellant thrusters, bipropellant thrusters, electric thrusters, thruster placement, plumbing, tank sizing and design, system layout, component design, and systems integration. 4 lectures, 1 laboratory.

AERO 405. Supersonic and Hypersonic Aerodynamics. 4 units

Term Typically Offered: SP

Prerequisite: AERO 303; AERO 306 or AERO 353 or AERO 355.

Review of gas dynamics, shock-wave and boundary-layer interaction, aerodynamic design. 2-dimensional supersonic flows around thin airfoil; finite wing in supersonic flow. Local surface inclination methods for high-speed flight, boundary-layer and aerodynamic heating, viscous interactions. 4 lectures.

AERO 406. Applied Computational Fluid Dynamics. 4 units

Term Typically Offered: F

Prerequisite: AERO 302 and AERO 306.

Application of Computational Fluid Dynamics to study a range of problems relating to applications in aerospace and automotive engineering. Grid generation, sources of errors in CFD studies, boundary conditions, 2D and 3D external flows, and turbulence modeling. 2 lectures, 2 laboratories.

AERO 407. Reentry Aerodynamics. 4 units

Term Typically Offered: W

Prerequisite: AERO 303.

Near planet environments. Transition from orbital to aero-dynamic motion. Aerodynamic heating and effects on design. 4 lectures.

AERO 408. Plasma Applications in Aerospace. 4 units

Term Typically Offered: F

Prerequisite: PHYS 123 or PHYS 133 and senior standing, or graduate standing.

Plasma applications in aerospace technology and operations including hypersonics, space weather, shielding, stealth, communications, power, and aerodynamics. Computational modelling of plasma and plasma theory. 4 lectures.

AERO 409. Flight Test. 4 units

Term Typically Offered: W

Prerequisite: AERO 306. Concurrent: AERO 320.

Overview of flight tests, test equations, and supporting facilities. Principles of team-centered flight testing with applications to performance, stability and control, and avionics systems testing. Test planning, instrumentation, data analysis and reports. 2 lectures, 2 laboratories.

AERO 420. Aircraft Dynamics and Control. 4 units

Term Typically Offered: W

Prerequisite: AERO 306 and AERO 320.

Newton's 6-degree-of-freedom equations of motion applied to aerospace vehicles. Stability and control derivatives, reference frames, steady-state and perturbed dynamic analyses applied to aerospace vehicles. Stability and control design principles applied to transfer functions, state-space, and modal system dynamics. 4 lectures.

AERO 421. Spacecraft Attitude Dynamics and Control. 4 units

Term Typically Offered: SP

Prerequisite: AERO 320 and AERO 351.

Introduction to spacecraft attitude dynamics and control. Momentum exchange devices and bang-bang thruster control. Attitude determination (GPS), maneuvers and station keeping. Fundamentals of guidance and navigation systems. Analysis and design of control systems for aerospace vehicles. 4 lectures.

AERO 425. Aircraft Performance. 4 units

Term Typically Offered: F

Prerequisite: ME 212, AERO 306, AERO 300.

Fundamentals of propeller and jet aircraft performance. Steady and accelerated flight. Equations of motion. Level flight, gliding, climbing, driftdown. Takeoff and landing. Federal Aviation Regulations (FARs). Range and endurance. Payload-range diagram. Maneuvering. V-n diagram. Turning and pull-ups. Stall and spin behavior. Energy methods. 4 lectures.

AERO 431. Aerospace Structural Analysis II. 4 units

Term Typically Offered: SP

Prerequisite: AERO 331.

Basic equations of elasticity with applications to typical aerospace structures. Concepts studied include analysis of aircraft and aerospace structures; airworthiness and airframe loads; structural constraints; elementary aeroelasticity; structural instability; introduction to modern fatigue; fracture mechanics; and composite structures analysis. 4 lectures.

AERO 432. Advanced Composite Structures Analysis. 4 units

Term Typically Offered: F

Prerequisite: AERO 331.

Review of isotropic material behavior. Behavior of unidirectional fiber composites. Properties of short-fiber composites and orthotropic lamina. Analysis of laminated composites. Stresses and strains of composites. Strength and hygrothermal behavior of composite materials. 3 lectures, 1 laboratory.

AERO 433. Experimental Stress Analysis. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: AERO 331, AERO 431.

Employing the knowledge of stress analysis and aerospace structural analysis in an individual and group design project dealing with aerospace structures. 1 laboratory.

AERO 434. Aerospace Structural Analysis III. 4 units

Term Typically Offered: F

Prerequisite: AERO 431.

Analysis and design applications for aircraft and spacecraft structures. Stress concentrations, fatigue, and fracture mechanics. Structural dynamics. Framed structures, plates and shells. Composite applications. 4 lectures.

AERO 435. Aerospace Numerical Analysis. 4 units

Term Typically Offered: F

Prerequisite: AERO 300, AERO 331.

Taylor series. Finite difference calculus. Interpolation and extrapolation. Finite difference method. Basic equations of elasticity. Global stiffness matrix. Rayleigh-Ritz method. Galerkin method. Bernoulli-Euler beam element. Finite element formulation. Dynamic analysis. 3 lectures, 1 laboratory.

AERO 443. Aircraft Design I. 3 units

Term Typically Offered: F

Prerequisite: IME 144; AERO 215; AERO 306; AERO 350; AERO 405; AERO 420; and AERO 431. Concurrent: AERO 401.

System and conceptual design of an aircraft using design and calculation techniques developed in previous aerospace engineering courses. Determination of system requirements and design of a flight vehicle, including its structures and systems. Preparation of necessary drawings, briefings, and reports. Field trip required. 3 laboratories.

AERO 444. Aircraft Design II. 3 units

Term Typically Offered: W

Prerequisite: AERO 443.

Preliminary layout of a typical aircraft vehicle using design and calculation techniques developed in previous aerospace engineering courses. Design of a flight vehicle, including its structures and systems. Preparation of necessary drawings and a report. Field trip required. 3 laboratories.

AERO 445. Aircraft Design III. 3 units

Term Typically Offered: SP

Prerequisite: AERO 444.

Preliminary layout of a typical aircraft vehicle using design and calculation techniques developed in previous aerospace engineering courses. Design of a flight vehicle, including its structures and systems. Preparation of necessary drawings and a report. Field trip required. 3 laboratories.

AERO 446. Spacecraft Electrical and Electric Systems. 4 units

Term Typically Offered: SP

Prerequisite: AERO 353 or AERO 355; ME 212; EE 201 and EE 251.

Basic satellite types and their applications. Major subsystems of a satellite system including ground support and launch systems. Interactions between subsystems and their effects on the overall system design. Detailed analysis of key subsystems on a spacecraft with special emphasis on power and communications subsystems. 4 lectures.

AERO 447. Spacecraft Design I. 3 units

Term Typically Offered: F

Prerequisite: IME 144; AERO 215; AERO 303; AERO 350; AERO 351; AERO 420 or AERO 421; AERO 431; and AERO 446. Concurrent: AERO 402.

Recommended: AERO 353 or AERO 355.

System and conceptual design of a space vehicle using design and calculations techniques in previous aerospace engineering courses. Determination of system requirements and design of a spacecraft or system of spacecraft. Preparation of necessary drawings, briefings and reports. Field trip required. 3 laboratories.

AERO 448. Spacecraft Design II. 3 units

Term Typically Offered: W

Prerequisite: AERO 447.

Preliminary layout of typical space vehicle using design and calculation techniques developed in previous aerospace engineering courses. Design of selected components and preparation of necessary drawings. 3 laboratories. Field trip required.

AERO 449. Spacecraft Design III. 3 units

Term Typically Offered: SP

Prerequisite: AERO 448.

Preliminary layout of typical space vehicle using design and calculation techniques developed in previous aerospace engineering courses. Design of selected components and preparation of necessary drawings. Field trip required. 3 laboratories.

AERO 450. Introduction to Aerospace Systems Engineering. 4 units

Term Typically Offered: W

Prerequisite: Senior standing or graduate standing.

Aerospace systems and subsystems. Systems integration. Development of system requirements. Analysis, modeling and simulation of complex systems. Project management. Cost analysis. Optimization and trade studies. 4 lectures.

AERO 452. Spaceflight Dynamics II. 4 units

Term Typically Offered: F

Prerequisite: AERO 351.

Relative orbital motion and rendezvous, linearization of the equations of motion. Clohessy-Wiltshire equations. Two-impulse rendezvous. Asphericity of the earth, aerodynamic drag, solar radiation pressure, and n-body perturbations on an orbit. Encke, Cowell, and Variation of Parameters solution techniques. Speciality orbit due to perturbations such as low thrust trajectories, sun-synchronous, and molynia orbits. 4 lectures.

AERO 455. Introduction to Human Spaceflight. 4 units

Term Typically Offered: SP

Prerequisite: AERO 443 or AERO 447 or graduate standing.

Recommended: AERO 351; AERO 353 or AERO 355 and AERO 356.

Requirements and considerations for human spaceflight design and operations. Effects of the spaceflight environment on the human body and countermeasures to mitigate those effects. Designing a spacecraft for the human payload focusing on space operations. 4 lectures.

AERO 460. Aerospace Engineering Professional Preparation. 1 unit

Term Typically Offered: F

Prerequisite: Senior standing.

Topics on professional development for student success including resume building and career prospecting, current events in the aerospace industry, graduate studies, engineering ethics, intellectual property, non-disclosure agreements, teamwork, and innovation and entrepreneurship. 1 lecture.

AERO 465. Aerospace Systems Senior Laboratory. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: AERO 303, AERO 320, AERO 431 and senior standing.

Culminating laboratory based experience. Experiments require the integration of the many disciplines in Aerospace Engineering. The successful completion of each experiment requires synthesis and integration of the fundamental concepts of the engineering sciences. Experimentation in the areas of aeroelasticity, active vibration control, inertial navigation, thermal control, hardware-in-the-loop simulation, and momentum exchange. 1 laboratory.

AERO 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

AERO 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

AERO 493. Cooperative Education Experience. 2 units

Term Typically Offered: F,W,SPSU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units.

AERO 494. Cooperative Education Experience. 6 units

Term Typically Offered: F,W,SPSU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units.

AERO 495. Cooperative Education Experience. 12 units

Term Typically Offered: F,W,SPSU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

AERO 500. Individual Study. 1-4 units

Term Typically Offered: F,W,SPSU

Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 12 units.

AERO 513. Applications of Remotely Piloted Aircraft Systems. 4 units

Term Typically Offered: F

Prerequisite: AERO 306 or AERO 351 or graduate standing.

Engineering development and analysis of Remotely Piloted Aircraft Systems (RPAS) as airborne tools for societal benefit. Use of RPAS for military, public service, and commercial purposes. Characterization of missions and applications. Development of system requirements and concepts of operation. Evaluation of relative merits and limitations of RPAS. 4 lectures.

AERO 515. Continuum Mechanics. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor.

Vectors and tensors stress analysis. Analysis of deformation. Velocity fields and compatibility conditions. Constitutive equations. Isotropy. Mechanical properties of real fluids and solids. Field equations and boundary conditions in fluid mechanics problems and applications in elasticity. Active remodeling of structures. 4 seminars.

AERO 522. Boundary-Layer Theory. 4 units

Term Typically Offered: SP

Prerequisite: AERO 302 or graduate standing.

Concept of boundary-layer. Boundary-layer equations, similarity transformation, integral and differential methods for steady, two-dimensional laminar and turbulent boundary layers. 4 lectures.

AERO 525. Computational Fluid Dynamics. 4 units

Term Typically Offered: W

Prerequisite: AERO 303 or graduate standing.

Classification of partial differential equations. Numerical methods applicable to the solution of elliptic, parabolic, and hyperbolic partial differential equations. Consideration of accuracy and stability of numerical methods. Application to the fundamental equations of fluid dynamics, grid generation, turbulence modeling. 4 lectures.

AERO 526. Spacecraft Thermal/Fluid Control. 4 units

Term Typically Offered: W

Prerequisite: AERO 299 or AERO 301; AERO 302; AERO 303; or graduate standing.

Satellite thermal/fluid control hardware. Governing equations for flow and heat transfer. Surface tension and liquid/vapor interface. Heat transfer by free convection, forced convection and radiation in low-gravity environment. Heat pipes. Capillary-pumped loops. Cryogenic systems. Fluid management in space. 4 lectures.

AERO 532. Advanced Aerospace Composite Design. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing or consent of instructor.

Behavior of composite materials. Bending, buckling, and vibration of laminated plates. Fatigue and fracture mechanics analysis of composite structures. Optimum design of composite pressure vessels. 2 seminars, 2 laboratories.

AERO 533. Finite Elements for Aerospace Structural Analysis. 4 units

Term Typically Offered: SP

Prerequisite: AERO 431.

Overview of theoretical and applied methods of finite element analysis for aerospace structures including composite and light weight structures. Topics include basic equations of elasticity, solutions of linear systems of equations transformation, global stiffness matrix, Bernoulli-Euler element, plane stress triangles, finite element formulation, isoparametric elements, alternative formulation, eigenvalue problems and dynamic analysis. 3 lectures, 1 laboratory.

AERO 534. Aerospace Structural Dynamics Analysis. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing.

Structural dynamics and aeroelasticity of flight vehicles. Vibration and forced response of continuous structures. Introduction to unsteady aerodynamic analysis methods. Normal-Mode Method and Modal Analysis. Framed structures and rigid body structures. Airworthiness and aeroelasticity. Random Vibrations. 3 lectures, 1 laboratory.

AERO 535. Advanced Aerospace Structural Analysis. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor.

Types of failure. Theories of failure. Stability of structures. Advanced flight vehicle and fracture mechanics analysis and design. Fundamentals and applications of modern fatigue analysis in the aerospace industry. 3 lectures, 1 laboratory.

AERO 540. Elements of Rocket Propulsion. 4 units

Term Typically Offered: W

Prerequisite: AERO 303, AERO 401 or 402; or graduate standing.

Thrust and impulse equations, propellant composition and mixture ratios, nozzle expansion ratios, solid and liquid propellant combustion, internal ballistics, thermo-chemical computations, chemical kinetics, and combustion instability, nozzle design and exhaust plumes. 4 seminars.

AERO 541. Air Breathing Propulsion. 4 units

Term Typically Offered: SP

Prerequisite: AERO 401 or graduate standing.

Aerothermodynamics of propulsion systems, power plant selection and design, on-off design performance, component characterization, component design, component matching, optimization, and introduction to power plant and airframe integration systems for aircraft. 4 seminars.

AERO 548. Complexity in Engineered Systems. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing.

Relates systems engineering to complexity in the design and development of modern large engineered systems, with emphasis on aerospace applications. Covers methods currently available to address complexity, including systems thinking, model based systems engineering and life cycle governance. 4 lectures.

AERO 549. Systems Engineering Applications. 4 units

Term Typically Offered: W

Prerequisite: AERO 450 or graduate standing.

Systems engineering principles and methods. Program planning, scheduling and budgeting, risk management, and design strategies to meet system/mission requirements. Quality function development and quality control concepts. Proposal development, evaluation, and selection. Not open to students with credit in AERO/IME 510 or AERO/IME 511. 4 lectures.

AERO 553. Advanced Control Theory. 4 units

Term Typically Offered: W

Prerequisite: AERO 320 or graduate standing.

Advanced control theory techniques. Analytical and computational methods applied to dynamic systems. State space system representation, solutions to dynamic systems, non-linear and linear stability analysis, full-state and output feedback, controllability and observability and advanced control topics (LQR/LQG, Kalman Filters, Adaptive Control, etc.). 4 lectures.

AERO 557. Advanced Orbital Mechanics. 4 units

Term Typically Offered: W

Prerequisite: AERO 351 or graduate standing.

Initial orbit determination using angles only methods. Various Solutions to Lambert's Problem. Orbit and transfer optimization, libration points, halo orbits, and secondary orbit perturbations. 4 lectures.

AERO 560. Advanced Spacecraft Dynamics and Control. 4 units

Term Typically Offered: W

Prerequisite: AERO 421 or graduate standing.

Attitude determination and control of rigid spacecraft via reaction wheels, control moment gyros and thrusters. Modeling, analysis and control of flexible spacecraft. Non-linear stability theory as applied to spacecraft. 4 lectures.

AERO 561. Vehicle Integration and Testing. 2 units

Term Typically Offered: F

Prerequisite: AERO 350 or AERO 446, or graduate standing.

Space vehicle integration requirements and procedures. Clean room requirements and operations. Quality control and inspection. Qualification and acceptance testing requirements. Test equipment. Vibration and shock testing. Space environment and thermal-vac testing. Development of test procedures. 1 lecture, 1 laboratory.

AERO 562. Space Operations. 2 units

Term Typically Offered: F

Prerequisite: AERO 350 or AERO 446, or graduate standing.

Launch operations and vehicle integration with launch vehicle. In-orbit operations and maneuvers. Spacecraft tracking. Telemetry and command. Ground systems. Failure detection and identification. Emergency operations. 1 lecture, 1 laboratory.

AERO 565. Advanced Topics in Aircraft Design. 4 units

Term Typically Offered: SP

Prerequisite: AERO 445 or graduate standing.

Application of advanced analytic engineering methods to aircraft design problems. Analysis and synthesis of advanced topics related to design of aircraft. 4 lectures.

AERO 566. Advanced Topics in Spacecraft Design. 4 units

Term Typically Offered: F

Prerequisite: AERO 449 or graduate standing.

Application of advanced engineering tools to the design of space vehicles. System architecture and mission design. Concept of operations. Requirements development and flow down. System and subsystems trade studies and preliminary design. 4 lectures.

AERO 568. Aerodynamic Research and Development I. 4 units

Term Typically Offered: W

Prerequisite: AERO 302 and AERO 406.

Immersive team-based approach to an aerodynamic research and development cycle. Theoretical work, preliminary design based upon computational fluid dynamics, and model manufacture. Advanced techniques in multi-variable wind tunnel tests. Validation of numerical work using correlation techniques. Field trip may be required. Total credit limited to 8 units. 2 lectures, 2 laboratories.

AERO 569. Aerodynamic Research and Development II. 4 units

Term Typically Offered: SP

Prerequisite: AERO 568.

Continuation of AERO 568. Single or multi-variable design optimization cycle based upon computational fluid dynamics. Numerical and experimental experimentation, high-fidelity validation and correlation of testing data, and archival-quality technical reporting of aerodynamic data and analysis. Total credit limited to 8 units. 2 lectures, 2 laboratories.

AERO 570. Selected Advanced Topics. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

AERO 571. Selected Advanced Topics Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

AERO 593. Cooperative Education Experience. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

AERO 594. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

AERO 595. Cooperative Education Experience. 12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only.

AERO 599. Thesis (Design Project). 1-9 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing.

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis.

Agribusiness (AGB)

undefined

AGB Courses

AGB 101. Introduction to Agribusiness. 4 units

Term Typically Offered: F

Prerequisite: AGB major and freshman standing.

Orientation to the agribusiness sector of agriculture. An overview of the breadth, size, scope and management aspects of the agricultural business complex. Agribusiness students are required to complete this within the first year of the major. 4 lectures.

AGB 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit can only be used to satisfy free electives. Credit/No Credit grading only.

AGB 202. Introduction to Sales. 4 units

Term Typically Offered: F, W, SP

Development of professional business-to-business selling principles within the supply chain, including an introduction to understanding the sales process from different buying and selling perspectives, communication techniques, and basic sales competency. 4 lectures.

AGB 212. Agricultural Economics. 4 units

Term Typically Offered: F, W, SP

Theoretical development of factors affecting demand and supply for food and fiber and for agricultural inputs. Methods of selecting optimal levels of agricultural production and consumption variables. Evaluation of market structure and price formulation for agricultural products and resources. Course may be offered in classroom-based or online format. 4 lectures.

AGB 214. Agribusiness Financial Accounting. 4 units

Term Typically Offered: F, W, SP

Principles of financial accounting for the agriculture and food industry. Introduction of basic concepts and standards underlying financial accounting systems. Emphasizes the construction of the financial accounting statements and the impact of business transactions on information presented to interested stakeholders. Not open to students with credit in BUS 214. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 activity.

AGB 260. Agribusiness Data Literacy. 4 units

Term Typically Offered: F, W, SP

Using data and analysis in making decisions related to agribusiness. Developing basic and intermediate spreadsheet skills necessary to organize, analyze, and summarize information. Development of data management and analysis as tools to assist in agribusiness problem-solving. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

AGB 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

AGB 301. Food and Fiber Marketing. 4 units

Term Typically Offered: F, W, SP

Prerequisite: AGB 212 or ECON 221.

Food and fiber marketing, examining commodity, industrial, and consumer product marketing from a managerial viewpoint. A global perspective in understanding consumer needs and developing the knowledge of economic, political, social and environmental factors that affect food and fiber marketing systems. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

AGB 304. Innovation and Entrepreneurship in Agriculture. 4 units

Term Typically Offered: F

Prerequisite: AGB 212, ECON 201, or ECON 221.

Innovation and entrepreneurship with application to the Food and Agriculture sector. Identification of opportunities, value proposition, Business Model Canvas (BMC), product market fit and market sizing, minimum viable product, and identification of target market consumers. Field trip may be required. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

AGB 308. Introduction to Agribusiness Finance. 4 units

Term Typically Offered: F, W, SP

Prerequisite: AGB 214 and AGB 260.

Concepts and analytical methods related to agricultural finance. Focus on applied spreadsheet analysis of financial statements, time value of money, risk and return, portfolio theory, and capital budgeting within the context of financial institutions specific to agriculture. Not open to students with credit in AGB 310. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

AGB 309. Advanced Sales Techniques. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 202.

Expansion of basic sales principles and skills, focusing on prospecting, sales styles, pipelining, forecasting, and product planning. 4 lectures.

AGB 310. Agribusiness Credit and Finance. 4 units

Term Typically Offered: F, W, SP

Prerequisite: AGB 214 or BUS 212 or BUS 214.

Financing California's agricultural industry. Sources of credit and types of loans used by agribusinesses. Costs of credit. Financial analysis of agricultural borrowers. Future and present value techniques used in evaluating agricultural investments. Agricultural financial management. Financial capital markets and leasing. Not open to Agricultural Business majors. Not open to students with credit in AGB 308. 4 lectures.

AGB 311. Intermediate Agribusiness Finance. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 260 and AGB 310; or AGB 308.

Financial tools applied to the agribusiness industry, focusing on unique risks in agriculture. Risk and return in the production and processing sectors, working capital management, cash flows and financial statement forecasting for agribusiness firms, using spreadsheet analysis. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

AGB 312. Agricultural Policy. 4 units

Term Typically Offered: F, W, SP

Prerequisite: AGB 212 and ECON 222.

Agricultural policy objectives and formulation, resource allocation and production adjustments. Survey of State and Federal agricultural policies as they influence the planning and practices of agribusiness. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

AGB 313. Agriculture Economic Analysis. 4 units

Term Typically Offered: F, W, SP

Prerequisite: AGB 212 and MATH 221.

Advanced agricultural microeconomics with emphasis on mathematical problem solving; production and cost functions, single and multiple input allocation, agricultural output combinations, agricultural market structures, and economies of size. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

AGB 318. Global Agricultural Marketing and Trade. 4 units

Term Typically Offered: SP

Prerequisite: AGB 301.

Analysis of international marketing opportunities for agricultural products. Strategies for enhancing the performance of U.S. agricultural exports/ imports. Impact of government trade policies and regulations, distribution systems, and the changing consumer. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

AGB 322. Principles of Agribusiness Management. 4 units

Term Typically Offered: F

Prerequisite: AGB 212 and AGB 214.

Organization and operation of agribusinesses. Identification of factors affecting profitability. Evaluation of the business for increased efficiency and profit. Application of budgeting to representative firms and independent analysis of an agribusiness. 3 lectures, 1 activity.

AGB 323. Decision Making with Agribusiness Accounting Information. 4 units

Term Typically Offered: F, W, SP

Prerequisite: AGB 214.

Decision making using agribusiness accounting information. Focus on setting and monitoring objectives, analysis, forecasting and budgeting, business ethics, and decision making. Topics covered within the food supply chain. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 activity.

AGB 326. Rural Property Appraisal. 4 units

Term Typically Offered: W

Prerequisite: AGB 308 or AGB 310.

Methods of rural appraisal, including farms, ranches and other rural properties, use of county records, appraisal practice on different types of rural properties, discussions with professional appraisers. 3 lectures, 1 activity.

AGB 327. Agribusiness Data Analysis. 4 units

Term Typically Offered: F, W, SP

Prerequisite: STAT 251 and AGB 260.

Methods in agricultural business data analysis, including multiple regression analysis, analysis of variance, and time series analysis. Applications include agricultural price forecasting and estimation of the determinants of food and fiber demand. 3 lectures, 1 activity.

AGB 328. Decision Tools for Agribusiness. 4 units

Term Typically Offered: F, W, SP

Prerequisite: STAT 251 and AGB 260.

Development of agribusiness modeling techniques that are applied to solving a diverse and unique set of resource allocation issues encountered throughout the agricultural and food retail sectors. Techniques include linear programming, decision analysis, and computer simulations. Course may be offered in classroom-based or online format. 3 lectures, 1 activity.

AGB 335. Agricultural Lending. 4 units

Term Typically Offered: W

Prerequisite: AGB 308 or AGB 310; and AGB 323.

Structure and performance of the agricultural lending industry. Advanced agricultural loan analysis and risk assessment. Agricultural loan documentation, securitization of farm loans, and farm bankruptcy. Exploration of interest rate impacts on agricultural lending. 4 lectures. Formerly AGB 410.

AGB 339. Internship in Agribusiness. 1-12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Consent of internship instructor.

Selected students will spend up to 12 weeks with an approved agricultural firm engaged in production or related agribusiness. Time will be spent applying and developing agribusiness functional and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 6 units. Credit/No Credit grading only.

AGB 369. Agricultural Personnel Management. 4 units

Term Typically Offered: F, W, SP

Prerequisite: AGB 212 or ECON 201 or ECON 221; and junior standing.

Standard topics of California agricultural personnel management: recruitment; appraisal and performance evaluation; compensation; training and development; discipline; safety and health; labor relations; and immigration policy. Systemic approach to aspects of managing human capital, and how to implement human resource policies. Not open to students with credit in AGB 401. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

AGB 370. World Food Economy. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 312 and AGB 313.

International agricultural production, economics, and distribution. Comparative and competitive advantage in world agriculture. Food security issues and regional analysis of agriculture policies. The future of agriculture from a global perspective. 4 lectures.

AGB 400. Special Problems. 1-2 units

Term Typically Offered: TBD

Prerequisite: Consent of department head or instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AGB 404. Food Retail Management. 4 units

Term Typically Offered: W, SP

Prerequisite: AGB 301.

Uses and techniques in management of perishable and non-perishable food commodities at the retail level. Issues in traditional versus new models of retail with emphasis on the marketing mix. Introduction to vendor, category and shelf management. 4 lectures.

AGB 405. Agribusiness Marketing Research Methods. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 301 and AGB 327.

Agricultural marketing research data collection and analysis. Emphasis on food sector market segmentation, product positioning, new product testing, sales forecasting, and marketing plan development through secondary and primary data sources. Experimental research design and implementation. 4 lectures.

AGB 406. Agribusiness Marketing Planning. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 301; and AGB 327 or AGB 328.

Development of agribusiness marketing plans in self-managed teams. Emphasis on developing presentation skills. Integration of marketing mix, particularly promotional elements in developing agribusiness marketing strategy emphasized. 4 lectures.

AGB 411. Agribusiness Risk Management. 4 units

Term Typically Offered: F

Prerequisite: AGB 301; AGB 308; and AGB 327 or AGB 328.

Risk management strategies and tools applied to the agribusiness industry, focusing on risks in agriculture. Forward contracting, futures and options, swaps, crop insurance, trading and hedging strategies, and their applications to agribusiness problems. 4 lectures.

AGB 412. Advanced Agricultural Policy. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 312.

Agricultural resource allocation issues with emphasis on policies that impact the production of food and fiber and inputs used in their production. Special topics in agricultural resource allocation stressing issues and policies emphasizing economic externalities. 4 lectures.

AGB 422. Transportation and Logistics in Global Agribusiness. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 328.

Scope and elements of the agribusiness logistics system including supply and distribution channels, transportation, inventory, warehousing, packaging, and order processing. 4 lectures.

AGB 425. Agribusiness Supply Chain Management. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 323; and AGB 327 or AGB 328.

Focus on the development and application of decision models in food supply chains with emphasis on demand forecasting, aggregate planning, inventory management (cycle and food safety), supply network design, transportation, coordination and sourcing. 4 lectures.

AGB 427. Advanced Agribusiness Data Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 327 or AGB 328 or graduate standing and consent of instructor.

Advanced topics in agricultural business data analysis. Topics include advanced agricultural price analysis, advanced linear programming in agribusiness, and advanced agricultural business operations analysis. The Class Schedule will list topic selected. 4 lectures.

AGB 440. Field Studies in Agribusiness. 2 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Visitation to selected agribusinesses. Organization, operation, services and problems considered. Can only be taken once for credit in the major.

AGB 445. Produce Marketing. 4 units

Term Typically Offered: TBD

Prerequisite: Senior standing and AGB 301.

Directed group study of fresh fruit and vegetable sales and marketing. Analysis of marketing from the perspective of the Grower Shipper, Specialty Produce Marketer, Terminal Market Wholesaler, Food Broker, Food Service Supplier, Retailer and International Marketing. Field trip required. 2 lectures, 2 seminars.

AGB 450. Agribusiness Strategy Formulation. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 323; and AGB 327 or AGB 328.

Development of strategy for agribusinesses where an uncontrollable environment makes output and results highly unpredictable; emphasis on the total enterprise. Case analysis. 4 lectures.

AGB 452. Agricultural Market Structure and Strategy. 4 units

Term Typically Offered: TBD

Prerequisite: AGB 313.

Development of skills for quantity and price determination in a noncompetitive setting. Emphasis on examining the agribusiness industry structures that exist and their effects on decision-making. The use of game theory demonstrated as a strategy formulation tool. 4 lectures.

AGB 462. Senior Project - Applied Agribusiness Problems. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing; Agricultural Business major; AGB 301; AGB 308 or AGB 310; AGB 312; AGB 313; AGB 323; and AGB 327 or AGB 328.

Selection and analysis of agribusiness problems and opportunities in directed group-based projects. Exploration of problems which agribusiness graduate students may encounter in marketing, finance, management and production in the food and fiber industry. Formal report and presentation required. 4 lectures.

AGB 463. Senior Project - Agribusiness Consulting. 4 units

Term Typically Offered: TBD

Prerequisite: Senior standing; Agricultural Business major; AGB 301; AGB 308 or AGB 310; AGB 312; AGB 313; AGB 323; and AGB 327 or AGB 328.

Client-centered course where self-managed teams develop solutions to agribusiness problems. Exploration of problems typical to those which agribusiness graduates may encounter in marketing, finance, management and production in the food and fiber industry. Formal report and presentation to client required. 4 lectures.

AGB 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: SP

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

Agricultural Communication (AGC)

undefined

AGC Courses

AGC 102. Orientation to Agricultural Communication & Agricultural Science. 2 units

Term Typically Offered: F

Orientation to the communication sector of agriculture. Overview of professional opportunities and skills needed for success in agricultural communication and related agricultural disciplines. Preparation of news releases and short writing and video, and development of a planned program of study. 2 lectures.

AGC 200. Special Problems in Agricultural Communication. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head.

Individual investigation, research, studies or surveys of selected problems in Agricultural Communication/Agricultural Education. Total credit limited to 8 units, with a maximum of 4 units per quarter.

AGC 205. Agricultural Communications. 4 units

Term Typically Offered: F, W

Survey of agricultural communication, history of the discipline, practice of multimedia writing for agriculture, food, and environmental sciences outlets. Gathering and analysis of related scientific and technical information and translation for public audiences. Role of under-represented groups in agriculture. Field trip required. 3 lectures, 1 activity. Replaces JOUR 205.

AGC 207. Software Applications for Agricultural Publications. 2 units

Term Typically Offered: W

Emphasis on software applications in agricultural communications, including basic Adobe Creative Suite techniques of InDesign and Lightroom, MS Word and Excel. Best practices in electronic delivery and print. Adobe Premiere video, blog template usage and cloud collaboration for professional agricultural communications. 1 lecture, 1 activity.

AGC 225. Digital Communication in Agriculture and Science. 4 units

Term Typically Offered: W

Prerequisite: AGC 207.

Development of digital multimedia skills (audio and video) and techniques to produce content focusing on agriculture, science and technology topics. Emphasis on creating compelling digital stories to communicate critical agriculture and science issues. 2 lectures, 2 activities.

AGC 254. Introduction to Agricultural Leadership. 2 units

Term Typically Offered: SP

Orientation to leadership development in agriculture and related settings. Principles and techniques for developing leadership skills, including exploration of personal characteristics, technical skills, interpersonal influence, commitment, goals, and power necessary for effective leaders. Issues facing leaders in agriculture. 2 lectures. Formerly AG 254.

AGC 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

AGC 290. Agricultural Communication Enterprise. 3 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: AGC 205, JOUR 203, or JOUR 205.

Application of communication skills for strategic and integrated communication projects related to food production, agriculture and environmental sciences topics. Emphasis on multimedia and brand journalism approaches, interviewing, using information sources, and translating agriculture, technology, and science information for public audiences. Total credit limited to 6 units. Credit/No Credit grading only. 2 lectures, 1 laboratory.

AGC 301. New Media Communication Strategies in Agriculture. 4 units

Term Typically Offered: W

Prerequisite: Junior standing. Recommended: JOUR 203, JOUR 205.

Exploration and implementation of emerging new media communication strategies and technologies to convey information on important issues in agriculture to a global audience. Focus on food and farming dialogues currently populating conversations about production agriculture. Adaptation of different writing styles based on requirements of the various new media channels. Analysis of metrics to measure level of engagement with desired audience. 3 lectures, 1 laboratory.

AGC 314. California Fairgrounds and Expositions. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs); and completion of one lower division GE Area C. Replaced AGB 314.

Scope and elements of fairs and expositions through public outreach, education, management, funding, interim events, government regulations, and industry relations. Practical application of fair management instruction includes hosting a major event or project of the Western Fairs Association (WFA). Field trip may be required. 4 lectures.

AGC 318. Fairgrounds and Facility Management. 4 units

Term Typically Offered: W

Prerequisite: AGC 314.

Fundamentals of the year-round operation of a fairgrounds facility to include budget management, vendor contracts, entertainment schedules, rental opportunities, master planning, and maintenance. Principles and procedures in planning, organizing, operating, and evaluating fairgrounds and facilities. Field trip required. 2 lectures, 2 activities.

AGC 339. Internship in Agricultural Communications. 1-12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Consent of internship instructor.

Selected Agricultural Communication students will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 6 units. Credit/No Credit grading only.

AGC 400. Advanced Special Problems in Agricultural Communication. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head.

Individual investigation, research, studies or surveys of selected problems in Agricultural Communication/Agricultural Education. Total credit limited to 8 units, with a maximum of 4 units per quarter.

AGC 404. Foundations of Agricultural Leadership. 3 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs); and junior standing. Replaced AGED 404.

Introduction to theory and practical application of leadership in agriculture. Emphasis on identifying strategies for self-improvement and personal development. Study of contemporary leaders, professionalism, and leadership actions. 2 lectures, 1 activity.

AGC 407. Agricultural Publications. 4 units

Term Typically Offered: W

Prerequisite: JOUR 205 and AGC 207.

Integration of writing, editing, and layout skills in producing agricultural publications. Emphasis on using computer applications in designing publications. Total credit limited to 8 units. 2 lectures, 2 activities.

AGC 412. Advanced Agricultural Leadership Development Practicum. 3 units

Term Typically Offered: SP

Prerequisite: Junior standing and consent of instructor.

Leadership team facilitates a campus event under the direction of the Agricultural Education and Communication Department. Team identifies goals, recruits students, organizes committees, addresses tasks, and conducts the event. Practical application of problem solving, critical thinking, communication and collaboration skills. Total credit limited to 6 units. 3 seminars. Formerly AGED 412.

AGC 425. Multimedia Storytelling in Agriculture and Science. 4 units

Term Typically Offered: F

Prerequisite: AGC 225. Recommended: COMS 395, JOUR 203, JOUR 205, and JOUR 312.

Examines digital and multimedia communication methods of complex agricultural, food, and environmental sciences topics. Exploration and implementation of practices translating science issues to public audiences. Focuses on current campus-related scientific research endeavors using principles of digital storytelling and content creation. 2 lectures, 2 activities.

AGC 426. Presentation Methods in Agricultural Communication. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs); and junior standing.

Development, delivery and evaluation of effective means of communication by use of a variety of presentation methods and the use of technology for effective communication. 2 lectures, 2 activities.

AGC 452. Current Trends and Issues in Agricultural Communication. 4 units

Term Typically Offered: F, SP

Prerequisite: Senior standing.

Presentations by experts from government, industry, and professional organizations. Focus on trends and issues that impact agriculture, in particular agricultural communication. Exploration of solutions to problems facing agricultural communication. Field trip required. 4 seminars.

AGC 454. Agricultural Leadership - Self Assessment & Reflection. 2 units

Term Typically Offered: SP

Prerequisite: AGC 404 and senior standing.

Culminating leadership experience. Appraise strengths and areas of personal growth, analyze effective strategies in leading others, examine collegiate experiences, and construct a leadership philosophy integrating the research-based leadership theory, skills and traits explored. 1 lecture, 1 activity. Formerly AG 454.

AGC 460. Research Methodology in Agricultural Communication and Agricultural Science. 1 unit

Term Typically Offered: F, SP

Prerequisite: Junior standing.

Introduction to the research process and topic selection as it relates to the design and development of the senior project within the Agricultural Communication and the Agricultural Sciences majors. 1 lecture. Formerly AGED 460.

AGC 461. Senior Project I. 1 unit

Term Typically Offered: F, SP

Prerequisite: AGED 460.

Empirical application of the scientific method as it relates to the selection of a project. Projects typical of problems that graduates must solve in their field of employment. 1 seminar.

AGC 462. Senior Project II. 1 unit

Term Typically Offered: F, SP
Prerequisite: AGC 461.

Completion of a project begun in AGC 461. Projects typical of problems that graduates must solve in their field of employment. Project results are presented in a formal report. 1 seminar.

AGC 463. Senior Project. 3 units

Term Typically Offered: F, SP
Prerequisite: Senior standing. Corequisite: AG 452 or AGC 452.

Research, selection, and completion of projects addressing practical or scholarly research problems graduates may encounter in their fields of employment. Project results presented in a formal written report and oral presentation. 3 seminars.

AGC 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

AGC 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

AGC 475. Crisis Communication in Food and Agriculture. 4 units

Term Typically Offered: SP
Prerequisite: Junior standing. Recommended: Completion of GE Area A with grades of C- or better.

Examine agriculture, food, and environmental crises and emphasize effective communication of complex science. Crisis communication theory and issues management strategies. Explore how effective communication can prevent and/or decrease negative effects, and how digital tools can aid in crisis solutions. 3 lectures, 1 activity.

AGC 490. Agricultural Communications Enterprise Management. 3 units

Term Typically Offered: TBD
Prerequisite: Junior standing, AGC 205, AGC 207, and AGC 301.
Recommended: JOUR 312.

Advanced application of communication strategies for managing client projects. Creation of communication campaigns and projects focusing on topics in agriculture, food, and environmental sciences. Emphasis on multimedia production of content and materials to communicate complex issues in the discipline. 1 lecture, 2 activities.

AGC 500. Individual Study In Agricultural Communication. 1-3 units

Term Typically Offered: F, W, SP
Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

Advanced independent study planned and completed under the direction of a member of the Agricultural Education and Communication faculty. Total credit limited to 6 units.

AGC 570. Selected Topics in Agricultural Communication. 1-4 units

Term Typically Offered: TBD
Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

AGC 571. Selected Advanced Laboratory in Agricultural Communication. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

AGC 580. Special Problems in Agricultural Communication. 1-3 units

Term Typically Offered: TBD
Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

Individual study of modern issues and problems conducted through research, planning and development. Field problems and in-service study in agricultural industry encouraged. Final written report required. Total credit limited to 9 units with not more than 3 units in any one quarter.

Agricultural Education (AGED)

undefined

AGED Courses

AGED 200. Special Problems in Agricultural Education. 1-4 units

Term Typically Offered: F, W, SP
Prerequisite: Consent of department head.

Individual investigation, research, studies or surveys of selected problems in Agricultural Communication/Agricultural Education. Total credit limited to 8 units, with a maximum of 4 units per quarter.

AGED 220. Agricultural Youth Conferences. 2 units

Term Typically Offered: W
CR/NC
Prerequisite: Consent of instructor.

Problems encountered and practices applied during the conduct of the annual FFA State Convention. Methods, procedures and materials adapted for use by the student in developing the committee system to produce conferences, conventions and workshops of all kinds and sizes. Total credit limited to 6 units. Credit/No Credit grading only. 2 activities.

AGED 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

AGED 303. Agricultural Youth Leadership Development. 4 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Historical, philosophical and social foundations of agricultural education as it relates to the development of youth leadership skills through classroom/laboratory instruction, project-based learning, and involvement in student organizations. Application of integral components in developing a total program of agricultural education. Field trip required. Course may be offered in classroom-based or online format. 2 lectures, 2 activities.

AGED 339. Internship in Agricultural Education. 1-12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Consent of internship instructor.

Selected Agricultural Education students will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 6 units. Credit/No Credit grading only.

AGED 350. Early Field Experience in Agriculture Education. 2 units

Term Typically Offered: F, SP

Prerequisite: Junior standing.

Observation of the practices and techniques utilized by agriculture teachers in conducting organized instruction in high school classrooms, shops, school farms, and laboratories. Discussion of activities and programs unique to teaching agriculture in California secondary schools. Participation in public schools requires mandated fingerprint clearance. Course may be offered in classroom-based or online format. 2 seminars.

AGED 400. Advanced Special Problems in Agricultural Education. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head.

Individual investigation, research, studies or surveys of selected problems in Agricultural Communication/Agricultural Education. Total credit limited to 8 units, with a maximum of 4 units per quarter.

AGED 410. Computer Applications in Agricultural Education. 2 units

Term Typically Offered: W

Prerequisite: Junior standing. Recommended: AGED 303.

Advanced use of computer technology to address professional demands in a variety of agricultural education situations. Practical application of computer applications as tools for presentations, informational aids, instruction, assessment, and other common uses. Provide support to industry pre-professionals and pre-service teachers. Course may be offered in classroom-based or online format. 2 activities.

AGED 424. Organizing and Teaching Agriculture. 3 units

Term Typically Offered: W

Prerequisite: AGED 438 and consent of instructor.

Determining course objectives, content, and calendar for use by the teacher in classroom, shop and field instruction while assigned to community schools. Concurrent with student teaching. 3 activities.

AGED 440. Student Teaching in Agricultural Education. 6-12 units

Term Typically Offered: W, SP

CR/NC

Off-campus assignment to a selected cooperating public school. Participation in all phases of agriculture teacher duties and activities including departmental organization and administration. Prior approval and appointment necessary. Total credit limited to 18 units. Credit/No Credit grading only.

AGED 441. Student Teaching Practicum. 2 units

Term Typically Offered: W

Prerequisite: Consent of instructor.

Problems encountered and practices applied during student teaching. Methods, procedures and materials adapted for use by the teacher concurrent with student teaching. 2 activities.

AGED 461. Senior Project I. 1 unit

Term Typically Offered: F, SP

Prerequisite: AGED 460.

Empirical application of the scientific method as it relates to the selection of a project. Projects typical of problems that graduates must solve in their field of employment. 1 seminar.

AGED 462. Senior Project II. 1 unit

Term Typically Offered: F, SP

Prerequisite: AGED 461.

Completion of a project begun in AGED 461. Projects typical of problems that graduates must solve in their field of employment. Project results are presented in a formal report. 1 seminar.

AGED 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

AGED 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

AGED 500. Individual Study in Agricultural Education. 1-3 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

Advanced independent study planned and completed under the direction of a member of the Agricultural Education and Communication faculty. Total credit limited to 6 units.

AGED 501. Professional Seminar in Agricultural Education. 2 units

Term Typically Offered: F

Prerequisite: Admission to the Credential Programs in Single Subject Agriculture, or Agriculture Specialist, and/or the Masters of Agricultural Education.

Orientation to the Master of Agricultural Education program. Current requirements, processes, documentation, and discussion of expectations of pre-professional teacher candidates. Completion of formal documents for credentialing in California. 2 seminars.

AGED 513. Field Experience - Agricultural Education. 1-3 units

Term Typically Offered: W, SP

Prerequisite: Prior approval and appointment.

Practice and techniques in management and supervision of programs in agricultural education. Relationships among students, staff, community and school groups. Budgeting, staffing, records, reporting. Student activities and Future Farmers of America programs. Total credit limited to 6 units.

AGED 520. Program Development in Agricultural Education. 3 units

Term Typically Offered: SP

Prerequisite: Senior standing.

Approaches to the development of an integrated agricultural education program in the comprehensive high school, based on occupational opportunities and community needs. Philosophy, organization, and administration of programs. Development in curriculum, supervised occupational experience, student leadership such as Future Farmers of America, and summer programs. Field trip required. Course may be offered in classroom-based or online format. 3 seminars.

AGED 522. Laboratory Pedagogy in Agricultural Technology. 3 units

Term Typically Offered: F

Prerequisite: Senior standing.

Organizing agricultural technology laboratory instruction, curriculum, and facilities. Student demonstrations and presentations; assessment, analysis, and evaluation. Field trip required. Not open to students with credit in AGED 523. 1 seminar, 2 laboratories.

AGED 523. Laboratory Organization and Management in Agricultural Education. 3 units

Term Typically Offered: TBD

Prerequisite: Enrollment in MS degree in Agricultural Education.

Organizing and managing laboratories, including agriculture mechanics curriculum and determining course content. Student demonstrations and presentations; assessment, analysis, and evaluation. Course is designed for in-service secondary agriculture teachers. Field trip required. Not open to students with credit in AGED 522. 3 lectures.

AGED 524. Instructional Processes in Agricultural Education. 4 units

Term Typically Offered: F

Prerequisite: Admission to one of the following programs: the Single Subject Agriculture Credential, the Agriculture Specialist Credential, or the Master of Agricultural Education. Co-requisite: EDUC 412, EDUC 414, and EDUC 418. Recommended: AGED 303, and AGED 350.

Principles of agricultural teaching methods and developmentally-appropriate pedagogy. Daily and unit lesson plans incorporating content, teaching methods, and assessing learners. Accommodations for English learners and students with special needs. Class demonstrations in teaching procedures, analysis, assessment and reflection. Field trip required. 2 lectures, 2 activities.

AGED 525. Organizing Instruction for Growing and Selling Horticulture Products. 3 units

Term Typically Offered: TBD

Prerequisite: PLSC 120 or PLSC 230, and senior or graduate standing.

Skills and techniques of propagation and production of horticulture crops. Scheduling, growing media, construction and use of forcing structures, and plant identification. Marketing plans and promotions. Teaching methods, curriculum development, and identification of resources and materials for horticultural instruction. 3 lectures. Open to agricultural educators or credential students only.

AGED 530. Developing FFA and Supervised Agricultural Experience Programs in Secondary Education. 3 units

Term Typically Offered: TBD

Prerequisite: Senior or graduate standing.

Integrating FFA and supervised agricultural experience programs into the curriculum. Career development event implementation; record book usage; officer and committee training; recruitment; retention; retreat and leadership training. Current national and state initiatives and experiential learning opportunities in the workplace and entrepreneurial settings. Not open to students with credit in AGED 303. 3 lectures.

AGED 536. Teaching Agriculture in Higher Education. 3 units

Term Typically Offered: W

Prerequisite: Graduate standing.

Selection and use of teaching strategies, methods/approaches, and techniques when planning, delivering, and evaluating instruction. Intended for graduate students interested in pursuing a faculty position in agriculture, as well as other disciplines in higher education. Course may be offered in classroom-based or online format. 3 seminars.

AGED 537. Enhancing Instruction in Agricultural Biology. 3 units

Term Typically Offered: TBD

Prerequisite: AGED 438 or consent of instructor, enrollment in agriculture teaching credential program or MS degree in Agricultural Education, or current agriculture teacher; undergraduate biology course (BIO 111 or equivalent).

Teaching methods of important biological concepts using agriculture as the context. Assisting agriculture teachers in identifying proper pedagogical strategies to integrate activities and laboratories into existing agriculture biology courses, including leadership development opportunities and activities. Emphasis on appropriate teaching methods and techniques, curriculum integration and application, and classroom resources. 3 seminars.

AGED 539. Graduate Internship in Agricultural Education and Communication. 1-9 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of internship instructor.

Application of theory to the solution of problems of agricultural production or related business in the field of Agricultural Education and Communication. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty advisor before the internship commences. Degree credit limited to 6 units.

AGED 540. Instructional Planning in Agriculture. 2 units

Term Typically Offered: SU

Prerequisite: AGED 524.

Prior to the first day of teaching agriculture, develop a plan for delivery of instruction in a program of agriculture in a K-14 educational setting. Instructional strategies will address the statewide Quality Criteria for Programs of Instruction in Agriculture.

AGED 570. Selected Topics in Agricultural Education. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

AGED 571. Selected Advanced Laboratory in Agricultural Education. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

AGED 572. Selected Topics for Teaching Methods in Agriculture, Forestry, and Natural Resource Pathways. 3 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students in teaching Agriculture, Forestry, and Natural Resources pathways in secondary education. Open to undergraduate and graduate students. Class Schedule will list topic selected. Total credit limited to 9 units. 3 lectures.

AGED 580. Special Problems in Agricultural Education. 1-3 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

Individual study of modern issues and problems conducted through research, planning and development. Field problems and in-service study in agricultural industry encouraged. Final written report required. Total credit limited to 9 units with not more than 3 units in any one quarter.

AGED 581. Graduate Seminar in Agricultural Education. 3 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor.

Group study of selected developments, trends and issues in the field of Agricultural Education. 3 seminars.

Agriculture (AG)

undefined

AG Courses

AG 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of rodeo coach/instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit can only be used to satisfy free electives. Credit/No Credit grading only.

AG 210. Agricultural Leadership Experience. 1 unit

Term Typically Offered: F, W, SP

Participation in activities that promote personal growth and leadership development, including team work, cooperation, communication, problem solving, time management, and organization. Support CAFES in recruitment, public awareness, educational programs, campus tours, fundraising, and youth career development events. The Class Schedule will list topic selected. Total credit limited to 2 units. 1 activity.

AG 212. Leadership Practice: Poly Royal Rodeo. 3 units

Term Typically Offered: SP

CR/NC

Prerequisite: Consent of Instructor.

Application of the management and operations of the Poly Royal Rodeo event taking place during Open House at Cal Poly. Principles and procedures in planning, organizing, financing, promoting, and managing a major collegiate rodeo and the rodeo industry are discussed. Credit/No Credit grading only. 1 lecture, 2 activities.

AG 243. Theory and Practice of Rodeo. 2 units

Term Typically Offered: F, SP

CR/NC

Beginning skills in the event areas of rodeo. Areas include saddle bronc, bareback, and bull riding; calf, team, and breakaway roping; steer wrestling, goat tying, and barrel racing. Total credit limited to 4 units. Credit/No Credit grading. 2 activities.

AG 315. Principles of Organic Crop Production. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Origins, application, regulation and technology of organic crop production. Theoretical and practical issues surrounding organic crop production from a cross-disciplinary perspective. Topics include the history of the organic movement; current regulation and certification; and field management practices and technologies. Features industry guest lecturers. Field trip required. 3 lectures, 1 activity. Crosslisted as AG/PLSC 315. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog). Formerly AEPS/AG 315.

AG 330. Cal Poly Land: Nature, Technology, and Society. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course from GE Area B1 (GE Area B4 for students on the 2019-20 or earlier catalogs); one course from GE Area B2; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Scientific investigation of the natural features of the Cal Poly landscape and their transformations by land management technology. Environmental, economic, social, and political effects of agriculture, resource extraction, construction technology. Educational, land-use, long term planning issues. 4 lectures. Crosslisted as AG/ISLA/SCM/UNIV 330. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

AG 339. Internship in Agriculture. 1-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of internship instructor.

Selected students will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Credit/No Credit grading.

AG 350. The Global Environment. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/historical/political perspectives. Use of remote sensing maps. Sustainable solutions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as AG/EDES/ENGR/GEOG/ISLA/SCM/UNIV 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

AG 360. Holistic Management. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Application of holistic management, a goal-oriented, value-driven framework for making ecologically, economically, and socially sound decisions. Holistic approach to management, especially of land-based resources, aimed toward greater biodiversity and sustainability. 3 lectures, 1 laboratory. Crosslisted as AG/ASCI 360. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

AG 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of rodeo coach/instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit/No Credit grading only.

AG 410. Advanced Agricultural Leadership Experience. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: AG 210.

Activities that promote personal growth and development from a leadership perspective. Special attention on recruiting, organizing, and engaging volunteers. Teambuilding, cooperation, communication, problem solving, time management, and organization skills are emphasized. Guiding students in serving others in major student activities. The Class Schedule will list topic selected. Total credit limited to 2 units. 1 activity.

AG 412. Advanced Leadership Practice: Poly Royal Rodeo. 3 units

Term Typically Offered: W

CR/NC

Prerequisite: Consent of instructor.

Management and oversight of Poly Royal Rodeo during Cal Poly Open House. Proficiency in problem-solving as leaders and as a team. Discuss principles and procedures in planning, organizing, financing, promoting, and managing a major collegiate rodeo and the rodeo industry. Field trip may be required. Credit/No Credit grading only. 1 lecture, 2 activities.

AG 413. Committee Management: Poly Royal Rodeo. 2 units

Term Typically Offered: SP

Prerequisite: AG 412.

Continuation of AG 412. Oversight of volunteers, committee members and interacting with event attendees. Emphasis on leadership, problem solving and building a new management team. Annual evaluation of events and planning for future events while successfully mentoring new students. Field trip may be required. 1 lecture, 1 activity.

AG 452. Issues Affecting California Agriculture. 4 units

Term Typically Offered: W

Prerequisite: Junior standing.

Interactive seminars with speakers from government and industry covering policy and regulations affecting California agriculture. Students develop an understanding of agricultural policy and work in teams to develop a public presentation and position paper on a significant issue. Field trip to Sacramento required. 4 seminars.

AG 485. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 12 units. Credit/No Credit grading only.

AG 495. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 24 units. Credit/No Credit grading only.

AG 500. Individual Study. 1-6 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

Advanced independent study planned and completed under the direction of a member of the college faculty. Total credit limited to 6 units.

AG 539. Graduate Internship in Agriculture. 1-9 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of internship instructor.

Application of theory to the solution of problems of agricultural production or related businesses in the field. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty advisor before the internship commences. Degree credit limited to 6 units.

AG 581. Graduate Seminar. 1 unit

Term Typically Offered: W, SP

CR/NC

Prerequisite: Graduate standing or consent of instructor.

Advanced topics in agriculture and natural resources. Group study of current research and industry trends. Invited speakers covering a variety of topics. Total credit limited to 3 units. 1 hour seminar.

AG 585. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only.

AG 595. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only.

AG 598. Reading and Conference. 1-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Graduate standing and instructor consent.

Systematic development of an agricultural thesis research project including literature searches, reports and experimental design. Repeatable for up to 12 units. Credit/No Credit grading only.

AG 599. Thesis. 1-9 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Systematic research of a significant problem. Thesis will include problem identification, significance, methods, data analysis, and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Degree credit limited to 6 units.

Animal Science (ASCI)

undefined

ASCI Courses

ASCI 101. Introduction to the Animal Sciences. 2 units

Term Typically Offered: F

CR/NC

Economic, environmental and societal impact of the livestock, poultry and horse industries. Basic terminology, anatomy, and physical requirements of animals. Career and academic planning. Co-curricular, extra-curricular, and post-graduate opportunities. Required of all first-time students in the Animal Science Department. Credit/No Credit grading only. 2 lectures.

ASCI 112. Principles of Animal Science. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B2

2019-20 or earlier catalog: GE Area B2

Sustainability Related

Comparative physiology of digestive, endocrine, and reproductive systems in animals. Principles of nutrition, genetics, growth, behavior, food processing and safety of animals. Current issues including biosecurity, animal welfare, and government safeguards for human and animal health. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area B2.

ASCI 200. Special Problems. 1-4 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 3 units per quarter. Credit/No Credit grading only.

ASCI 203. Animal Parasitology. 3 units

Term Typically Offered: TBD

Prerequisite: BIO 111 or BIO 161.

Identification, life cycles, prevention and control of the common external and internal parasites causing economic loss in livestock. 3 lectures.

ASCI 211. Meat Science. 4 units

Term Typically Offered: F, W, SP

Muscle food processing methods and operations. Conversion of muscle to meat. Meat inspection, grading, composition, curing, preservation, food safety and related topics. Carcass beef, pork, and lamb processed into consumer ready products. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

ASCI 212. Livestock Show Management. 3 units

Term Typically Offered: W

Application of the management and operations of Cal Poly's Western Bonanza Livestock Show. Principles and procedures in planning, organizing, financing, promoting and managing a major livestock show and the fair industry. Total credit limited to 6 units. Not open to students with credit for ASCI 412 or ASCI 413. 1 lecture, 2 activities.

ASCI 214. Equine Management. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Application of safety, risk reduction, horsemanship skills. Develop a working equine/human relationship. Selection and application of nutrition, equipment, preventive health and farrier program, and equitation skills. Total credit limited to 6 units. 2 laboratories.

ASCI 215. Safe Handling of Animal-Based Foods for Consumers. 4 units

Term Typically Offered: W

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

Safe food handling of meat, dairy and egg products, emphasizing consumer knowledge in food safety from farm to table. Ecology of microorganisms in the kitchen environment. Detection, enumeration, and identification of pathogens and indicator microorganisms in animal-based food products. 3 Lectures, 1 laboratory. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs).

ASCI 220. Introductory Animal Nutrition and Feeding. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 111 or BIO 161; and CHEM 127.

Nutrient digestion and absorption; basic functions of major nutrient classes; NRC feed classification and feedstuff characteristics; Van Soest system of fiber analysis and practical applications; feed processing: effects on feeds and nutrient availability; nutrient requirements of animals; diet formulation techniques. 3 lectures, 1 laboratory.

ASCI 221. Introduction to Beef Production. 4 units

Term Typically Offered: F, SP

Survey of industry characteristics, breeds, market classes, production systems, and current issues facing the beef industry. 3 lectures, 1 laboratory.

ASCI 222. Systems of Swine Production. 4 units

Term Typically Offered: F, W, SP

Structure of the pork industry in the U.S.; production standards and new technologies; breed systems. Market classification, product quality and quality assurance. Swine behavior and husbandry systems; biosecurity, health and feeding systems and management. 3 lectures, 1 laboratory.

ASCI 223. Systems of Small Ruminant Management. 4 units

Term Typically Offered: F, W, SP

Sheep and goat industry overview, populations, trends, cultural implications, breed identification, nutritional, reproductive, health, marketing, and herd management of sheep and goats. Field trip may be required. 3 lectures, 1 laboratory.

ASCI 224. Equine Science. 4 units

Term Typically Offered: F, W, SP

History, status of the horse industry, breeds. Application of management skills, safety, conformation evaluation, hoof and leg conformation and care. Understanding equine behavior. Insurance and tax ramifications. Pedigree analysis. Alternate therapies. 3 lectures, 1 laboratory.

ASCI 225. Introduction to Poultry Management. 4 units

Term Typically Offered: F, SP

Introduction to modern techniques in poultry production, processing, marketing and price discovery. Consumption trends, breeds and consumer grades. Laboratory application of management skills, health care, keeping of production and accounting records and processing techniques. 3 lectures, 1 laboratory.

ASCI 226. Livestock Evaluation. 3 units

Term Typically Offered: TBD

Utilization of objective and subjective estimation measures in establishing economic worth of domestic animals of the three meat animal species and horses. 1 lecture, 2 laboratories.

ASCI 227. Companion Animal Science. 4 units

Term Typically Offered: F, W, SP

Companion animal anatomy and physiology, reproduction, nutrition, behavior, management, common parasites, and infectious diseases. Scientific method in studying the human-animal bond. Application of biological concepts to problems related to companion animals. Trends in pet industry including animal welfare issues. 3 lectures, 1 laboratory.

ASCI 228. Equine Evaluation. 2 units

Term Typically Offered: TBD

Appraisal of equine breeds at halter and in performance classes. Evaluate horse classes, decide their order of placement, and then orally justify these decisions to a judge. The relationship of equine anatomy and physiology on competitive performance. 2 laboratories.

ASCI 229. Anatomy and Physiology of Farm Animals. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 111 or BIO 161.

Comprehensive overview of the principal systems of farm animals using an integrative, systemic approach to learning the homeostasis of mammalian organisms so the information can be applied to their daily care and management. 3 lectures, 1 laboratory.

ASCI 232. General Animal Science Laboratory. 1 unit

Term Typically Offered: TBD

Basic handling skills of livestock; introductory selection of livestock; basic feedstuff identification and processing; and health care practices. 1 laboratory.

ASCI 239. Principles of Rangeland Management. 4 units

Term Typically Offered: F, SP

Sustainability Related

Characteristics of rangeland ecosystems, processes of directing ecological change, the history of their management, particularly in North America. Laboratory activities introduce basic ecological monitoring practices, including quantification of biomass, soil cover, and species composition. 3 lectures, 1 laboratory. Replaces ASCI 329.

ASCI 260. Preparation of Livestock for Shows and Sales. 3 units

Term Typically Offered: TBD

Techniques, equipment and knowledge necessary in order to properly condition, groom, and present beef cattle or horses for evaluation and merchandising. 3 activities.

ASCI 265. Equine Behavior and Training. 3 units

Term Typically Offered: F

Training of weanling and yearling horses at halter. Selection of proper attire for the handler and equipment for the horse. Application of safe, behavioral training techniques enabling the horse to accept handling, farrier and health care. 3 activities.

ASCI 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ASCI 290. Animal Production and Management Enterprise. 1-5 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of instructor.

Beginning field experience in animal production systems. May include health, nutrition, reproduction, management, processing, budgeting, and/or marketing exercises. Total major credit for ASCI 290 limited to 6 units. Total credit for ASCI 290 limited to 10 units. Credit/No Credit grading only. 1-5 lectures.

ASCI 302. Animal Genetics. 4 units

Term Typically Offered: F, W

Prerequisite: BIO 111 or BIO 161; and STAT 218.

Mendelian, population, quantitative, and molecular genetics as related to animal management practices. Predicted responses to natural and artificial selection in domesticated and wild animal populations. 4 lectures.

ASCI 304. Animal Genomics. 3 units

Term Typically Offered: F, W, SP

Prerequisite: ASCI 302, BIO 302, BIO 303, or BIO 351.

Application of genetic principles for domestic animal improvement. Improving animal performance and health through use of genetic markers and diagnostics, gene mapping, and related current technologies. 3 lectures.

ASCI 310. Technical Veterinary Skills. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ASCI 229.

Restraint and handling of animals, physical examination, necropsy procedure, basic wound management, applied pharmacology. Reproduction and herd health programs. 3 lectures, 1 laboratory.

ASCI 311. Advanced Beef Cattle System Management. 4 units

Term Typically Offered: W

Prerequisite: ASCI 221.

Management principles for the sustainability of commercial beef cattle operations. Systems approach for goal setting, financial analysis, range management, breeding systems, nutrition, health programs, marketing, and production practices to enhance profitability of commercial cow-calf operations. 3 lectures, 1 laboratory.

ASCI 312. Production Medicine. 3 units

Term Typically Offered: TBD

Prerequisite: ASCI 221 or ASCI 223; ASCI 225 or ASCI 222; ASCI 224 or ASCI 227; and ASCI 229.

Basic disease concepts. Fundamentals of immunology and therapeutics. Disease prevention principles, infectious and non-infectious. Pre-harvest food safety and milk and meat quality assurance. Herd health management programs for production efficiency and product quality. 3 lectures.

ASCI 315. Equine Biomechanics. 4 units

Term Typically Offered: TBD

Prerequisite: ASCI 224.

Anatomy and physiology of the equine hoof and limb. An understanding of the art and science of the farrier's work. Evaluation of proper hoof care, trimming, and shoeing. Foot and leg conformation as it relates to sound locomotion. 3 lectures, 1 activity.

ASCI 319. Physiological Chemistry of Animals. 4 units

Term Typically Offered: F, SP, SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); ASCI 229, BIO 231, or BIO 361; and CHEM 212, CHEM 216, or CHEM 312. Recommended: STAT 130, STAT 217, or STAT 218.

Integration of the principles of chemistry, biochemistry, physiology and nutrition to understand metabolism of carbohydrates, lipids and proteins at the cellular, organ and whole animal level. Regulation and coordination of metabolic function within and across tissues in domesticated and wild animals. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ASCI 321. Zoonoses and Veterinary Public Health Concerns. 4 units

Term Typically Offered: TBD

Prerequisite: BIO 111 or BIO 161.

Public health concerns including: animal and bird diseases which may be transmitted to people; pre-harvest food safety and handling concerns; and environmental public health hazards. 3 lectures, 1 activity.

ASCI 324. Advanced Equine Evaluation. 2 units

Term Typically Offered: TBD

Prerequisite: ASCI 228.

Appraising the relative merit of individual horses in halter and performance through the application, development and refinement of deductive and inductive logical processes. Oral and written expression of the selection rationale. 2 laboratories.

ASCI 325. Egg Production, Processing and Distribution. 4 units

Term Typically Offered: TBD

Prerequisite: ASCI 225.

Management of replacement pullets and laying hens including flock scheduling, vaccination and handling procedures, nutrition management, costs of operation and production projections. Quality determination, processing, sales and distribution of shell eggs and egg products. 3 lectures, 1 laboratory.

ASCI 326. Advanced Livestock Evaluation. 2 units

Term Typically Offered: TBD

Prerequisite: ASCI 112 and ASCI 226.

Application of deductive and inductive logical processes in appraising the relative merit of individual animals within a group sample. Oral expression of the selection rationale. Total credits limited to 4 units. 2 laboratories.

ASCI 330. Poultry Meat Production and Processing. 4 units

Term Typically Offered: W

Prerequisite: ASCI 211 or ASCI 225.

Modern production techniques for the poultry meat industry. Management of hatcheries, poultry production, and poultry meat processing. 3 lectures, 1 laboratory.

ASCI 333. Equine Reproduction. 5 units

Term Typically Offered: SP

Prerequisite: ASCI 224.

Management of the breeding farm, breeding problems, diseases, study of estrus cycles, servicing the mare, handling stallions. Breeding systems, teasing, embryo transfer, ultrasound pregnancy diagnosis, new developments in breeding technology. 4 lectures, 1 laboratory.

ASCI 339. Internship in Animal Science. 1-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of internship instructor.

Selected Animal Science students will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Major credit limited to 6 units. Total credit limited to 12 units. Credit/No Credit grading only.

ASCI 340. Animal Welfare and Ethics. 4 units

Term Typically Offered: W, SP

Prerequisite: BIO 111 or BIO 161; and Junior Standing.

Introduction to moral principles that have shaped the field of animal welfare science. Definition of Animal Welfare. Identification of science-based measures of welfare. Current welfare concerns with companion, laboratory, production, and exotic animals. 4 lectures.

ASCI 342. Poultry Business Management. 4 units

Term Typically Offered: TBD

Prerequisite: ASCI 225.

Organization and management of vertically integrated poultry operations. Personnel management, cash flow analysis, cash vs. accrual accounting, structuring of financial statements, projecting product outputs and cash flow needs, employee benefit programs and insurance needs for poultry companies. 4 lectures.

ASCI 344. Equine and Human Communication. 3 units

Term Typically Offered: F, W, SP

Prerequisite: ASCI 214.

Behavior of the horse and its relationship with people. Learning, motivation, social behavior and communication with techniques to improve the safety and understanding between people and horses. Total credit limited to 6 units. 3 activities.

ASCI 345. Equine Behavior Modification. 5 units

Term Typically Offered: F

Prerequisite: ASCI 344 and consent of instructor.

Advanced principles of equine behavior modification for training young horses under saddle. Identifying differences in individual horse's attitudes, techniques to teach horses to respond to different stimuli, management of young equine athlete. 5 activities.

ASCI 346. Equine Nutrition. 4 units

Term Typically Offered: SP

Prerequisite: ASCI 220 with a grade of C- or better.

Equine digestion, diet development considerations and evaluations, nutritional management, and the relationship of respective topics to recommended feeding practices, research data, and nutritional portfolios. Information is based on recent advances in horse nutrition and the National Research Council's Nutrient Requirements for Horses. 3 lectures, 1 laboratory.

ASCI 347. Equine Exercise Physiology. 3 units

Term Typically Offered: TBD

Prerequisite: ASCI 224.

Applied physiology of the exercising horse. Examine different physiological systems: muscular, cardiovascular, respiratory, and nutritional. Gait analysis, lameness, and treatment. The athletic horse: sports medicine, conditioning, drugs, and necropsy evaluation. A distance learning course. 3 lectures.

ASCI 350. Nonruminant Nutrition. 4 units

Term Typically Offered: W

Prerequisite: ASCI 220 with a grade of C- or better or consent of instructor.

Comparison of nonruminant and ruminant digestive systems, nutrient requirements, risk management for ingredients, formulation and nutritional management. Influence of growth and production curves, consumption patterns, and feeding management in commercial poultry and swine industries. Feed manufacturing and governmental regulations. 3 lectures, 1 laboratory.

ASCI 351. Reproductive Physiology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ASCI 229.

Reproductive anatomy of male and female farm animals. General endocrinology and systemic physiology. Endocrine system effects on the various aspects of reproduction, such as: gametogenesis, estrus, gestation, parturition, mothering and seasonality. Introduction to reproductive biotechnology and embryo manipulation. 3 lectures, 1 laboratory.

ASCI 355. Ruminant Nutrition. 4 units

Term Typically Offered: W

Prerequisite: ASCI 220 with a grade of C- or better or consent of instructor; and ASCI 320 or CHEM 313 or CHEM 371.

Digestive physiology and nutrition of ruminants. Anatomy and physiology of the digestive tract. Rumen microbial fermentation. Nitrogen utilization and metabolism. Energy partitioning. Net energy system. Range livestock and feedlot nutrition. Supplementation. Common metabolic and nutritional dysfunctions. Diet formulation. 3 lectures, 1 laboratory.

ASCI 360. Holistic Management. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Application of holistic management, a goal-oriented, value-driven framework for making ecologically, economically, and socially sound decisions. Holistic approach to management, especially of land-based resources, aimed toward greater biodiversity and sustainability. 3 lectures, 1 laboratory. Crosslisted as AG/ASCI 360. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ASCI 363. Undergraduate Seminar. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing.

Major developments in the chosen field of the student. Discussion of new developments, policies, practices, and procedures. Each individual is responsible for the development and presentation of a topic in the chosen field, resume, and cover letter. 2 seminars.

ASCI 366. Veterinary Pharmacology. 4 units

Term Typically Offered: TBD

Prerequisite: CHEM 111 or CHEM 127, and ASCI 229.

Investigation of pharmacological principles applied to animal systems. Overview of drugs acting on the nervous, endocrine, circulatory, urinary systems, and reproductive systems, specialty areas of pharmacology, and pharmacogenomics of livestock and companion animals. 3 lectures, 1 activity.

ASCI 370. Rangeland Improvements. 3 units

Term Typically Offered: W

Prerequisite: ASCI 239 or ASCI 329.

Review of practices used for improving the productivity or ecological functions of rangeland landscapes managed for grazing livestock, wildlife, or for ecological and/or aesthetic values. 3 lectures.

ASCI 372. California Rangeland & Ranch Resource Management. 3 units

Term Typically Offered: SP

Sustainability Related

Prerequisite: ASCI 239 or ASCI 329.

Natural resource management practices recommended for regulatory compliance and resource protection of rangeland ecosystems in California. Regulations that impact rangeland management under the Clean Water and Porter-Cologne Acts, and State and Federal endangered species protections. 3 lectures.

ASCI 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Credit/No Credit grading only.

ASCI 403. Applied Biotechnology in Animal Science. 5 units

Term Typically Offered: W

Prerequisite: BIO 161; BIO 162; and upper division genetics course (BIO 302 or BIO 303 or BIO 351 or ASCI 304).

Coverage of current resources, techniques and methodologies used in animal research and biotechnology as well as experimental design, model assessment, and data interpretation with application to an experimental setting in the laboratory. 3 lectures, 2 laboratories.

ASCI 405. Domestic Livestock Endocrinology. 4 units

Term Typically Offered: F

Prerequisite: ASCI 229 or BIO 361.

Endocrine homeostasis with emphasis on the influence of hormones involved in digestion, metabolism, calcium and phosphorous, thyroid gland, adrenal gland, reproduction, and pregnancy. Signaling pathways. 4 lectures.

ASCI 406. Applied Animal Embryology and Assisted Reproduction. 4 units

Term Typically Offered: W

Prerequisite: ASCI 229 and ASCI 351.

Comparative physiology and molecular understanding of oocyte development, fertilization, culturing, cryopreservation and micromanipulation of gametes and embryos. 3 lectures, 1 activity.

ASCI 407. Assisted Reproduction Technologies of Gametes and Embryos Laboratory. 3 units

Term Typically Offered: TBD

Prerequisite: ASCI 229; ASCI 351; and ASCI 406. Recommended: ASCI 320 or CHEM 371; CHEM 327.

Coverage of current resources, advanced techniques and methodologies of assisted reproduction of gametes and embryos involving in-vivo collection, in-vitro fertilization, cryopreservation and micromanipulation. Mouse, cattle and horse gametes used for learning the techniques involved in embryology and assisted reproduction 1 lecture, 2 laboratories.

ASCI 410. Applied Animal Behavior Science. 4 units

Term Typically Offered: W, SP

Prerequisite: BIO 111 or BIO 161; and ASCI 229 or BIO 162.

Principles of behavior applied to animals in managed environments. Observation and measurement of behavior, including sampling and recording methods. Learning, including training and operant conditioning. Discussion of issues related to behavioral welfare. Etiology and management of maladaptive behavior. 3 lectures, 1 laboratory.

ASCI 412. Advanced Livestock Event Planning. 3 units

Term Typically Offered: W

Prerequisite: ASCI 212, AGB 314 and consent of instructor.

Organization and planning for the Western Bonanza Junior Livestock Show. Establishment of committee assignments and show manager responsibilities. Corporate partnerships established and fund raising begun. Planning for activities and guest speakers and new student recruitment. Total credit limited to 6 units. 1 lecture, 2 activities.

ASCI 413. Advanced Livestock Event Management. 1 unit

Term Typically Offered: F, SP

Prerequisite: ASCI 412 and consent of instructor.

Student management of the Western Bonanza Junior Livestock Show. Leadership skills, team building, media relations, use of computer applications, livestock and fair industry contacts and mentoring to new students. Application of knowledge learned in ASCI 412. Total credit limited to 2 units. 1 activity.

ASCI 415. HACCP for Meat and Poultry Operations. 3 units

Term Typically Offered: W, SP

Prerequisite: ASCI 211.

Using Hazard Analysis and Critical Control Point (HACCP) principles to develop regulatory inspection plans for meat and poultry operations; development and use of prerequisite programs; microbiological and process overviews. 3 lectures.

ASCI 419. Animal Metabolism and Nutritional Modeling. 4 units

Term Typically Offered: F, SP, SU

Prerequisite: ASCI 220 with grade of C- or better; and ASCI 319, CHEM 314, or CHEM 369.

Relation of nutrient metabolism to animal production, exploration of systems used in development of animal nutritional models. Course may be offered in classroom-based or online format. 4 lectures. Formerly ASCI 420.

ASCI 425. Meat Industry Study Tour. 2 units

Term Typically Offered: W

Prerequisite: ASCI 211.

Study tour of commercial meat businesses. Livestock harvest and carcass fabrication, further meat processing, retail and food service operations. Personnel, processing procedures, regulatory standards, industry specifications and current issues. Travel for 4 days. 2 activities.

ASCI 438. Systemic Animal Physiology. 4 units

Term Typically Offered: F, SP

Prerequisite: ASCI 229; CHEM 313 or CHEM 371, or ASCI 320.

Homeostatic relationships of organ systems. Cardiovascular, respiratory, urogenital and neuro-endocrinological functions. 3 lectures, 1 laboratory.

ASCI 440. Immunology and Diseases of Animals. 4 units

Term Typically Offered: SP

Prerequisite: ASCI 229. Recommended: ASCI 320, CHEM 371 or equivalent.

Introduction to immune system, including innate and acquired immunity of domesticated animals. Application of immunological analyses and examination of current disease issues in domesticated animals. 3 lectures, 1 laboratory.

ASCI 450. Computer Applications in Animal Science: Spreadsheet Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing.

Development of spreadsheets relating to livestock production. Integration of database and analytical techniques. Cost-benefit analyses of livestock production systems. 2 lectures, 2 activities.

ASCI 455. Advanced Equine Reproductive Technologies. 4 units

Term Typically Offered: TBD

Prerequisite: ASCI 333 and ASCI 351. Recommended: ASCI 405 and ASCI 406.

Assisted reproductive technologies in horses; use of gametes from normal and sub-fertile horses; manipulation of sub-fertile horses, donor and recipient mares; manipulation of endocrine system; embryo utilization; cryobiology of gametes and embryos; assessment of high-risk mare, fetus, and neonate. 3 lectures, 1 laboratory.

ASCI 460. Rangeland Assessment and Planning. 4 units

Term Typically Offered: TBD

Prerequisite: ASCI 239 or ASCI 329.

Examination of methods used for determining the healthy and function of rangeland ecosystems, and the application of planning processes used in the management of rangelands and associated ecosystems. Field trip required. 3 lectures, 1 laboratory.

ASCI 465. Applied Practices for Monitoring California Rangelands. 4 units

Term Typically Offered: TBD

Sustainability Related

Prerequisite: ASCI 239 or ASCI 329; and consent of instructor.

Theory and application of grassland and brushland assessment and monitoring practices for evaluating grazing use, wildlife habitat quality, and fuels condition, and general ecological health. Course completion may be counted towards professional certifications. The course is intentionally structured to accommodate inservice training for federal land management agency and conservation organization staff. 2 lectures, 2 activity.

ASCI 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ASCI 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ASCI 477. Senior Project - Research Experience in Animal Science. 3 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing, ASCI 363 and consent of instructor.

Recommended: one course in statistics.

Independent research experience in a specific area of animal science conducted under faculty supervision. Satisfies senior project requirement. Minimum 90 hours required.

ASCI 478. Senior Project - Advanced Internship Experience in Animal Science. 3 units

Term Typically Offered: F, W, SP

Prerequisite: ASCI 363 and senior standing.

Independent internship experience conducted under faculty supervision focusing on a discipline area of animal science. Completion of a project as a component of the internship. Satisfies senior project requirement. Minimum 90 hours required.

ASCI 479. Senior Project - Current Topics in Animal Science. 3 units

Term Typically Offered: F, SP

Prerequisite: Senior standing and ASCI 363.

Critical evaluation and formal presentation of current issues facing animal agriculture. Evaluation of current topics, analysis of supporting evidence and logic, and synthesis and formal presentation of the resulting perspectives on different approaches to current challenges. 3 lectures.

ASCI 484. Processed Meat Products. 4 units

Term Typically Offered: F

Prerequisite: ASCI 211, FSN 204, or graduate standing.

Physical, chemical and functional characteristics of meat food raw materials. Science and technology of value-added processing including curing, sausage manufacture, low moisture products, and restructuring. Quality assurance and related current industry topics. 3 lectures, 1 laboratory. Formerly ASCI 384.

ASCI 490. Advanced Animal Production and Management Enterprise. 1-5 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of instructor.

Advanced field experience in animal production systems. May include health, nutrition, reproduction, management, processing, budgeting, and/or marketing exercises as well as management decision-making opportunities. Total major credit for ASCI 490 limited to 6 units. Total credit for ASCI 490 limited to 10 units. Credit/No Credit grading only. 1-5 lectures.

ASCI 500. Individual Study in Animal Science. 1-6 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

Advanced independent study planned and completed under the direction of a member of the Animal Science faculty. Total credit limited to 6 units.

ASCI 520. Comparative Animal Nutrition. 4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor. Recommended: ASCI 320, or CHEM 313 or CHEM 371, and one of the following: ASCI 346, or ASCI 350, or ASCI 355, or DSCI 301.

Advanced problem-based presentation of animal nutrition case studies. Emphasis on nutrients, clinical nutrition disorders and species not commonly considered in production animal nutrition. Analytical and problem-solving skills will be utilized to develop solutions to complex animal nutrition management issues. 3 lectures, 1 activity.

ASCI 570. Selected Topics in Animal Science. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

ASCI 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ASCI 581. Graduate Seminar in Animal Science. 1-4 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Current findings and research problems in the field and their application to the industry. Credit/No Credit grading only. Total credit limited to 12 units. 1-4 seminars.

ASCI 583. Research Experience for Regenerative Medicine Students. 2 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in the Specialization in Regenerative Medicine for the MS in Biological Sciences; or Specialization in Regenerative Medicine for the MS in Biomedical Engineering; or the Animal Science Specialization for the MS in Agriculture.

Independent research experience in biological or biomedical research. Proposal writing and literature review; experimental design, implementation and troubleshooting; oral and poster presentations. 1 seminar and supervised work. Crosslisted as ASCI/BIO/BMED 583. Formerly ASCI/BIO/BMED 594.

ASCI 593. Regenerative Medicine Internship. 3-5 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in the Specialization in Regenerative Medicine for the MS in Biological Sciences; or the Specialization in Regenerative Medicine for the MS in Biomedical Engineering; or the Specialization in Animal Science for the MS in Agriculture.

Supervised graduate research and/or development in stem cell science or regenerative medicine and engineering. Provides students with an off-campus industrial or university internship. Total credit limited to 10 units. Crosslisted as ASCI/BIO/BMED 593.

Anthropology (ANT)

undefined

ANT Courses

ANT 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

ANT 201. Cultural Anthropology. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Cultural patterns, divergence and uniformity in language and communication, family organization, gender, and adaptation to environment. Economics and productivity, political organization, religion and ritual, ethnicity and race, illness and healing, globalization and culture change. Skills: ethnographic analysis and cultural relativity. Course may be offered in classroom-based, online or hybrid format. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

ANT 202. World History Before Writing. 4 units

Term Typically Offered: F

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Long-term development of global biological and cultural diversity from emergence of the first human ancestors 6-7 million years ago to the advent of writing. Biological evolution, cultural development, emergent socio-political complexity and social inequality, migrations, adaptation to climate change, and sustainability. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

ANT 250. Biological Anthropology. 4 units

Term Typically Offered: F, W

2020-21 or later catalog: GE Area B2

2019-20 or earlier catalog: GE Area B2

Biological aspects of human unity and diversity. Primate and human evolution, including anatomical, physiological and behavioral adaptations. Evolutionary ecological perspectives and theories on human behavior and biology. Field trip required. 4 lectures. Fulfills GE Area B2.

ANT 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ANT 309. Elements of Archaeology. 4 units

Term Typically Offered: SP

Prerequisite: ANT 202.

Archaeological method and theory covering the history and development of archaeological thought, approaches to data recovery, dating and analysis of artifacts and ecofacts, the construction of models of prehistoric human behavior through application of archaeological and anthropological theories. 4 lectures.

ANT 310. Archaeological Field Methods. 4 units

Term Typically Offered: TBD

Prerequisite: ANT 202 or ANT 309.

Hands-on introduction to the methods and techniques of archaeology with an emphasis on excavation. Training in artifact and ecofact identification with a focus on lithic technology. Practical field experience with hand tools, and stratigraphic interpretation. Methodological approaches to both academic research questions and compliance with environmental planning mandates. 3 lectures, 1 laboratory.

ANT 311. Archaeological Laboratory Methods. 4 units

Term Typically Offered: F

Prerequisite: ANT 309 or ANT 310.

Hands-on introduction to the methods employed in post-field processing, classification, analysis, and preservation of archaeological materials. Compilation of quantitative and qualitative information in data base format to assist in the classification and interpretation of faunal remains and artifacts. 3 lectures, 1 laboratory.

ANT 312. Introduction to Cultural Resources Management. 4 units

Term Typically Offered: W

Prerequisite: ANT 201, ANT 202 or ANT 309.

Introduction to federal, state, and local legislation pertinent to the identification, evaluation, and treatment of cultural resources. A history of preservation legislation, culminating with detailed discussion of Section 106 of the National Historic Preservation Act and the California Environmental Quality Act. Practical experience in orienteering, map-reading, and simple cartography. 4 lectures.

ANT 320. California's Native Past. 4 units

Term Typically Offered: SP

Prerequisite: ANT 202.

Overview of the paleoenvironment, prehistory, archaeology, and ethnography of Native California. The last 12,000 years of California's past from the arrival of the first human beings to the establishment of Spanish settlements in 1769, and the demise of native societies. 4 lectures.

ANT 330. Indigenous South Americans. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Indigenous peoples of South America from the past to the present. Cross-cultural study of small band societies, tribes and large civilization states located from the Amazon basin to the Altiplano. Comparison of current state of indigenous rights and place in modern society. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

ANT 344. Sex, Death, and Human Nature. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Area B2; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

How Darwinian processes of differential reproduction and mortality influence human interests, passions and behaviors. Theories of inclusive fitness, parental investment and senescence. Sex differences, sexual attraction, life histories, violence and aggression, including rape, homicide and infanticide. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

ANT 345. Human Behavioral Ecology. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Sustainability Related

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Area B2; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Biological and cultural influences of natural and sexual selection on individual behavior. Ecological effects on human behavior to reproduce and acquire resources. Scientific method for understanding foraging behavior, group living, social skills, kinship, parenting, religion, and mating. Cross-cultural, cross-sex, and cross-species comparisons. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

ANT 360. Human Cultural Adaptations. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Social and cultural evolution from Paleolithic times to the present. Interactions of demographic, economic and ecological factors are emphasized. Main topics include human nature/culture, sex and gender, cooperation and conflict, the 'agricultural revolution', state formation, social inequality and globalization. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

ANT 384. Professional Preparation for Anthropologists/Geographers. 1 unit

Term Typically Offered: F, W

CR/NC

Prerequisite: Sophomore standing; ANT 201 or GEOG 150.

Preparation for professional advancement in the fields of anthropology and geography. Supervised career planning emphasizing resume development, selection of an internship or international experience, exploration of career options and graduate programs. Lectures from outside, practicing professionals. Course may be offered in classroom-based or online format. Credit/No Credit grading only. 1 seminar. Formerly ANT 464.

ANT 393. Action-oriented Ethnography. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs); and one of the following: ANT 201, ANT 202, ANT 250, ISLA 123, any Ethnic Studies (ES) course, any Women's and Gender Studies (WGS) course.

Development of knowledge and skills needed to conduct original action-oriented ethnographic research. Grounded in the reflexive 'turn' in anthropology and critical race, science, technology and society, queer and feminist studies, students will engage questions of authority, representation, critical consciousness and justice. 4 lectures. Crosslisted as ANT/ISLA 393.

ANT 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

ANT 401. Culture and Health. 4 units

Term Typically Offered: F

Prerequisite: Junior standing, ANT 201, and one of the following: ANT 250, BIO 160, or BIO 263; or graduate standing.

Global perspective on the relationship between culture and health. Ecological factors influencing health and illness. Origins of disease and impact of diseases on society. Diet and nutrition. Classifications of illness causation. Kinds of curers. Relationship of gender and reproduction to illness. Pharmacology. Mental illness. Global health problems. Alternative health care modalities. Health-care needs of U.S. ethnic groups. 4 lectures.

ANT 402. Nutritional Anthropology. 4 units

Term Typically Offered: TBD

Sustainability Related

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and ANT 201. Recommended: ANT 250.

Interrelationships of sociocultural and ecological factors and their influence on nutrition and human health in developing and developed country contexts. Topics include human adaptation, nutritional assessment, food production and allocation, the effect of development on diet and health. 4 lectures.

ANT 415. Native American Cultures. 4 units

Term Typically Offered: TBD

USCP

Prerequisite: One upper division ANT course.

Survey of Native American cultures from earliest times to present, emphasizing regional diversity in traditional lifeways. Origins of New World peoples, domestication, war, social organization, trade and gender roles. 4 lectures. Fulfills USCP.

ANT 425. Meaning, Gender, and Identity in Anthropological Theory. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs). Recommended: ANT 201.

Exploration of the intersection of anthropological theory with meaning, gender/sexuality, and identity formations within and between cultural contexts. Situate and analyze anthropological discourses regarding social meanings and cultural identities as defined by oppositions of us and other, male and female, normal and abnormal, natural and unnatural. Provide a potential source of comparative cultural reflection and critique. 4 lectures.

ANT 455. Anthropology-Geography Research Design and Methods. 4 units

Term Typically Offered: F, SP

Prerequisite: Completion of GE Area B2; and two upper-division ANT or GEOG courses.

Development of knowledge and skills needed to conduct original scientific anthropology-geography research and prepares students for senior projects. Various empirical methodologies highlighted, with a focus on quantitative design and measurement of human culture, biology, behavior, environment and ecology. Course may be offered in classroom-based, online, or hybrid. 3 lectures, 1 laboratory. Crosslisted as ANT/ GEOG 455.

ANT 460. Queer Anthropology. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs); and one of the following: ANT 201, ISLA 123, any Ethnic Studies (ES) course, any Women's and Gender Studies (WGS) course.

Exploration of intersections of queer identities and politics of race, gender, kinship, the body, class, and desire. Evaluation of how anthropology has been transformed by queer critique and knowledge production. Investigation of the multi-scaled fields of power that articulate a cultural understanding of the body. 4 lectures.

ANT 461. Senior Project I. 2 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

ANT 462. Senior Project II. 2 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

ANT 465. Internship. 3-8 units

Term Typically Offered: TBD

CR/NC

Prerequisite: ANT 384 or ANT 464; senior standing; and/or consent of instructor.

Supervised training, research, and work in public and private organizations. Credit/No Credit grading only. Total credit limited to 18 units.

ANT 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ANT 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

Architectural Engineering (ARCE)

undefined

ARCE Courses

ARCE 106. Introduction to Building Systems. 2 units

Term Typically Offered: F

Sustainability Related

Introduction to building systems and materials. Use and application of structural, foundation, envelope, mechanical and electrical systems in the field of Architectural Engineering. 1 lecture, 1 activity.

ARCE 211. Structures I. 3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: For ARCE majors: PHYS 141, MATH 142; for ARCH and CM majors: PHYS 121 or PHYS 141, MATH 142 or MATH 182.

Introduction to the role of structures in the making of buildings. Introduction to statics and creation of simple three-dimensional structures. Development of skills to analyze structures composed of axial force (truss) members. 3 lectures.

ARCE 212. Structures II. 3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: ARCE 211 (C- or better required for ARCE Majors).

Introduction to the role of structures in the making of buildings. Introduction to shear and moment diagrams using the principles of statics and the application of the diagrams to simple three-dimensional structures. Development of skills, particularly free body diagrams, to analyze structures composed of bending (beams) members. 3 lectures.

ARCE 223. Mechanics of Structural Members. 3 units

Term Typically Offered: F, SP

Prerequisite: ARCE 212 (C- or better required for ARCE Majors).

Concurrent for ARCE majors: ARCE 224.

Advanced topics of stresses in beams. Plastic bending, unsymmetrical bending. Combined stresses. Stress transformation. Buckling. Deflection of beams. 3 lectures.

ARCE 224. Mechanics of Structural Members Laboratory. 1 unit

Term Typically Offered: F, SP

Concurrent: ARCE 223.

Experimental investigations of material properties. Experimental studies of stresses and deflections in beams, including plastic bending, and unsymmetrical bending. Stress transformations via strain gages for combined loading cases. Culminating lab experience: A student run, self-designed experiment. 1 laboratory.

ARCE 226. Introduction to Structural Systems. 3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: ARCE 212.

Description, behavior and comparison of structural building systems. Concepts of structural stability, load flow, framing schemes and building configuration related to vertical and lateral loads. Not open to Architectural Engineering majors. 3 lectures.

ARCE 227. Structures III. 2 units

Term Typically Offered: F, SP

Prerequisite: ARCE 212 (C- or better required for ARCE Majors).

Continuation of selected concepts covered in ARCE 211 and ARCE 212. Advanced topics in two-dimensional and three-dimensional equilibrium of structural building systems. 2 lectures.

ARCE 257. Structural CAD for Building Design. 2 units

Term Typically Offered: W, SP

Prerequisite: CM 115.

Emphasis on the use of computer graphics software to represent a building's structural system and its individual elements. 1 lecture, 1 laboratory.

ARCE 260. History of Structures. 4 units

Term Typically Offered: W, SU

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Social, symbolic, and technical importance of landmark structures.

Analysis of breakthrough ideas that led to major advances in building design. Contextualization of these advances. Tools by which to assess and critique structural art as a separate and distinct art form. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ARCE 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ARCE 302. Structural Analysis. 3 units

Term Typically Offered: F, W

Prerequisite: ARCE 223 and ARCE 227 (C- or better required for ARCE Majors). Concurrent for ARCE majors: ARCE 352.

Analysis of statically indeterminate structures using virtual work, slope deflection, the force method and plastic analysis methods. 3 lectures.

ARCE 303. Steel Design I. 3 units

Term Typically Offered: W, SP

Prerequisite: ARCE 223 (C- or better required for ARCE Majors).

Corequisite for ARCE majors: ARCE 371. Corequisite for ARCE minors: ARCE 226.

Analysis and design of steel structural members subjected to bending, shear and axial forces. 3 lectures.

ARCE 304. Timber Design. 3 units

Term Typically Offered: W, SP

Prerequisite: ARCE 371 for ARCE majors (with C- or better); ARCE 223 and ARCE 226 for ARCE minors.

Analysis and design of timber structural members subjected to bending, shear, and axial forces. Wood diaphragms, shear walls and their connections. 3 lectures.

ARCE 305. Masonry Design. 2 units

Term Typically Offered: W, SP

Prerequisite: ARCE 371 for ARCE majors (with C- or better); ARCE 223 and ARCE 226 for ARCE minors.

Design of load-bearing walls, shear walls, columns and beams in masonry. 2 lectures.

ARCE 306. Matrix Analysis of Structures. 3 units

Term Typically Offered: F, W

Prerequisite: ARCE 302 (C- or better required for ARCE Majors). Concurrent: ARCE 353.

Analysis of statically indeterminate structures by direct stiffness method including continuous beams, plane trusses, and frames. Introduction to finite-element methods. 3 lectures.

ARCE 315. Introduction to Structural Design. 4 units

Term Typically Offered: F,W,SPSU

Prerequisite: ARCE 226.

Introduction to structures that use timber, steel and concrete as the primary construction material. Introduction to gravity load carrying systems and lateral load resisting systems using timber, steel and concrete elements. Credit not allowed for ARCE majors. 4 lectures.

ARCE 316. Structural Integration in Architecture. 4 units

Term Typically Offered: SP

Prerequisite: ARCE 315. Concurrent: ARCH 353.

Integration of structural systems into architectural design. Preliminary design of structures including the development of gravity load carrying systems and lateral load resisting systems. Introduction to tall building and long span structural systems. Introduction to structural issues of cladding systems. Not open for major credit to Architectural Engineering majors. 4 lectures.

ARCE 352. Structural Computing Analysis. 1 unit

Term Typically Offered: F, W

Prerequisite: CSC 231 or CSC 234. Concurrent: ARCE 302.

Computer calculations, programming and technical reporting. Emphasis on use of two-dimensional structural analysis software to analyze a building's structural system and its individual elements. 1 laboratory.

ARCE 353. Matrix Structural Computing Analysis. 1 unit

Term Typically Offered: F, W

Prerequisite: ARCE 352 (C- or better required for ARCE Majors). Concurrent: ARCE 306.

Emphasis on the use of nonplanar structural analysis software to analyze a building's structural system and its individual elements. 1 laboratory.

ARCE 354. Numerical Analysis Laboratory. 1 unit

Term Typically Offered: W, SP

Prerequisite: MATH 244 and ARCE 353 (C- or better required for ARCE Majors). Concurrent: ARCE 412.

An intensive survey of numerical analysis techniques used for solving engineering problems. Topics include integration, ordinary differential equations, and the eigenproblem. 1 laboratory.

ARCE 360. Equilibrium Without Statics. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Equilibrium without statics via state of the art geometric visualization and programming. Use of a programmed drawing environment to study the flow of loads through a building. Mathematical insights into Virtual Work and both Castigliano's Theorems. Historical analysis and context. Course is offered online only. 4 Lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ARCE 371. Structural Systems Laboratory. 3 units

Term Typically Offered: F, W

Prerequisite: ARCE 223, ARCE 227 (C- or better required for ARCE Majors), and third year standing in Architectural Engineering.

Studies in the relationship of structural framing to overall building geometry. Emphasis on the stability of structural configurations, calculation of building loads and development of a complete gravity and lateral load path. 3 laboratories.

ARCE 372. Steel Structures Design Laboratory. 3 units

Term Typically Offered: F, SP

Prerequisite: ARCE 257, ARCE 302, ARCE 303, ARCE 352 and ARCE 371 (C- or better required for ARCE Majors).

Steel framed project incorporating structural system configuration and selection, structural analysis for gravity and lateral loads, and construction drawings and specifications. Integration of building services and architectural design, constructability issues, and relationships between construction methods and cost. 3 laboratories. Cannot be taken concurrently with ARCE 451 or ARCE 452.

ARCE 400. Special Problems for Advanced Undergraduates. 1-3 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor and department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter.

ARCE 410. Integrated Building Envelopes. 4 units

Term Typically Offered: TBD

Prerequisite: Fourth year standing. Recommended: Third year design and analysis courses; ARCE 302, ARCE 372.

Multidisciplinary exploration of the value and collaboration required of an integrated project team approach to the design and construction of sophisticated building envelopes. Team taught by instructors and practitioners from each of the following disciplines: architecture, architectural engineering and construction management. 4 lectures.

ARCE 412. Dynamics of Framed Structures. 3 units

Term Typically Offered: W, SP

Prerequisite: ME 212; MATH 244; and ARCE 306 (C- or better required for ARCE Majors). Concurrent: ARCE 354.

Analysis of structures subjected to dynamic loads with single- and multi-degrees of freedom. Development of techniques for analysis of structures in response to time varying loads. 3 lectures.

ARCE 415. Interdisciplinary Capstone Project. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing and consent of instructor.

Team based interdisciplinary capstone / senior project course. Analysis and evaluation of interdisciplinary challenges associated with integrating the design and construction processes to deliver a project with respect to the design, budget, schedule, quality, and performance expectations of a client. 4 laboratories.

ARCE 421. Soil Mechanics. 3 units

Term Typically Offered: F, W, SP

Prerequisite: ARCE 212 (C- or better required for ARCE Majors).

Recommended: GEOL 201.

Principles of soil mechanics, including rudiments of geology, soil classification, gravimetric and volumetric relations, compaction, methods and testing, shear strength of soil and strength theories. 2 lectures, 1 laboratory.

ARCE 422. Foundation Design. 3 units

Term Typically Offered: W, SP

Prerequisite: ARCE 421 (C- or better required for ARCE Majors).

Soil-bearing capacity; sizing and design of spread footings, driven piles and drilled shafts. Design and analysis of earth-retaining structures. Analysis of the stability of slopes. 3 lectures.

ARCE 444. Reinforced Concrete Design. 4 units

Term Typically Offered: F, W

Prerequisite: ARCE 371 and ARCE 302 (C- or better required for ARCE Majors).

Theory and design of basic reinforced concrete elements: non-slender columns, beams, tee beams and one way slabs. 3 lectures, 1 laboratory.

ARCE 451. Timber and Masonry Structures Design and Constructability Laboratory. 3 units

Term Typically Offered: F, SP

Prerequisite: ARCE 257, ARCE 304, ARCE 305, and ARCE 371 (C- or better required for ARCE Majors).

Timber and masonry framed project incorporating structural system configuration and selection, structural analysis for gravity and lateral loads, and construction drawings and specifications. Integration of building services and architectural design, constructability issues, and relationships between construction methods and cost. 3 laboratories. Cannot be taken concurrently with ARCE 372 or ARCE 452.

ARCE 452. Concrete Structures Design and Constructability Laboratory. 3 units

Term Typically Offered: W, SP

Prerequisite: ARCE 257, ARCE 444, and ARCE 372 or ARCE 451 (C- or better required for ARCE Majors).

Cast in place concrete framed project incorporating structural system configuration and selection, structural analysis for gravity and lateral loads, and construction drawings and specifications. Integration of building services and architectural design, constructability issues, and relationships between construction methods and cost. 3 laboratories. Cannot be taken concurrently with ARCE 372 or ARCE 451.

ARCE 453. Interdisciplinary Senior Project. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing and consent of instructor.

Interdisciplinary projects under faculty supervision that go beyond topics covered in the Architectural Engineering curriculum. Projects must include integration with other disciplines outside of structural or architectural engineering. Exemption of interdisciplinary requirement can be approved by department head on a case by case basis. Total credit limited to 4 units.

ARCE 460. Collaborative Design Laboratory. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Investigation of the collaborative nature of the design process as it relates to the architectural engineer and related disciplines. Development of skills necessary to create a successful design team through the development of specific projects. Total credit limited to 4 units. 2 laboratories.

ARCE 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ARCE 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ARCE 473. Advanced Timber and Masonry Structures Laboratory. 3 units

Term Typically Offered: TBD

Prerequisite: ARCE 372, ARCE 422, ARCE 444 and ARCE 451 (C- or better required for ARCE Majors).

Emphasis on long span industrial/warehouse type buildings. Use of steel in timber/masonry construction and constructability. Holes in diaphragms, out-of-plane wall behavior and sub-diaphragms, perforated wood and masonry shear walls, pre-manufactured shear walls, masonry retaining walls, connections including post-installed anchors. 3 laboratories.

ARCE 475. Civil Infrastructure and Building Systems. 4 units

Term Typically Offered: F, W, SP

Sustainability Focused

Prerequisite: Senior standing in CE or ARCE.

Principles and practices for the sustainable design, fabrication, and installation of systems for the civil infrastructure and building; including structural, air/gas, water/wastewater, electrical, and control systems. Methods and materials used for fabrication and installation; including cost and schedule considerations. 4 lectures. Crosslisted as ARCE/CE 475.

ARCE 476. Architectural Engineering Building Systems. 3 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing in ARCE.

Principles and practices for the sustainable design, fabrication, and installation of architectural engineering building systems; including air/gas, water/waste water, electrical, and control systems. Methods and materials used for fabrication and installation; including cost and schedule considerations. 3 lectures. Not open to students with credit in ARCE/CE 475.

ARCE 483. Seismic Analysis and Design. 3 units

Term Typically Offered: F, SP

Prerequisite: ARCE 372, ARCE 412 (C- or better required for ARCE Majors).

Introduction to dynamic response analysis of building structures with emphasis on earthquake ground motion. Earthquake resistant design of buildings in accordance with building codes. Application of computer programs and physical models for seismic design. Laboratory studies utilizing physical models for studying the behavior of building structures subjected to simulated ground motions. 2 lectures, 1 activity.

ARCE 485. Cooperative Education Experience. 6 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Sophomore standing and consent of department head.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 12 units. Credit/No Credit grading only. Credits to not count toward graduation in the ARCE Degree Program.

ARCE 495. Cooperative Education Experience. 12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 24 units. Credit/No Credit grading only. Credits to not count toward graduation in the ARCE Degree Program.

ARCE 501. Advanced Structural Mechanics. 3 units

Term Typically Offered: F

Prerequisite: ARCE 306, ARCE 353.

Principles, concepts, and techniques of advanced structural mechanics. Studies of displacement, strain, stress, strain-displacement relation and constitutive models in three dimensions. Failure criteria. Introduction into energy principles and approximate solutions. 3 lectures.

ARCE 502. Nonlinear Structural Behavior I. 3 units

Term Typically Offered: F

Prerequisite: ARCE 306 and ARCE 353.

Principles, concepts, and behavior of structures loaded beyond their linear-elastic limit. Elastic-plastic behavior of truss, beam, and frame structures. Buckling and post-buckling behavior of columns. Behavior of beam-columns and the principle of superposition. Second-order elastic behavior of frames. 3 lectures.

ARCE 503. Nonlinear Structural Behavior II. 3 units

Term Typically Offered: W

Prerequisite: ARCE 502.

Principles, concepts, and techniques of nonlinear structural analysis currently used in practice. Classification of nonlinear problem types. Investigation of typical iterative solution strategies. Studies in material and geometric nonlinearities in spring, truss, and frame elements. Use of current nonlinear analysis software. 3 lectures.

ARCE 504. Finite Element Method for Building Structures. 3 units

Term Typically Offered: W

Prerequisite: MATH 244, ARCE 306, ARCE 501.

Basic concepts of equilibrium and compatibility. Stiffness and flexibility properties of various types of finite elements. Development and application of displacement and force methods. Elastic stability and dynamic response of buildings to earthquake, wind, and moving loads. Use of finite-element computer programs. 3 seminars.

ARCE 511. Structural Systems Behavior. 3 units

Term Typically Offered: SP

Prerequisite: ARCE 452, ARCE 503, ARCE 504.

Design, performance, and construction issues related to structural systems. Further development of design and analysis techniques necessary for performance based engineering of structural systems. Assessment of advantages and limitations of different structural forms and systems. 3 laboratories.

ARCE 522. Structural Systems. 3 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in Architecture.

Exploration of the relationship between structural systems and architectural form. Understanding of structural stability and structural order is developed through construction of a series of small scale models. Historical perspectives are presented along with the effects of available materials and technology on structural possibilities. 3 seminars.

ARCE 546. Advanced Structural Systems. 3 units

Term Typically Offered: TBD

Prerequisite: ARCE 371 (C- or better required for ARCE Majors) or graduate standing. Corequisite: ARCE 412 or graduate standing.

Concepts and issues involved in the linear and non-linear design of complex structures including tall buildings, long-span structures and advanced seismic systems. 2 lectures, 1 laboratory. Formerly ARCE 446.

ARCE 548. Seismic Rehabilitation. 3 units

Term Typically Offered: TBD

Prerequisite: ARCE 303, ARCE 304, ARCE 305, ARCE 412, ARCE 444 (C- or better required for ARCE Majors).

Introduction to the seismic rehabilitation process and philosophy. Evaluation and analysis of existing buildings to determine expected performance due to seismic demands. Development of basic seismic rehabilitation strategies for buildings. 2 lectures, 1 laboratory. Formerly ARCE 448.

ARCE 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ARCE 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ARCE 598. Structural Engineering Design Project. 3 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor. Recommended: ARCE 371, ARCE 372, ARCE 452, and ARCE 483.

Independent development, research, and conclusion of a graduate project by individuals or teams specializing in the area of architectural or structural engineering. Projects may include graduate students from other disciplines. Total credit limited to 9 units.

Architecture (ARCH)

undefined

ARCH Courses

ARCH 101. Survey of Architectural Education and Practice. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Sustainability Related

Exploration of the major paradigms which have guided the development of architectural education and the profession. Survey of the roles of the architects and an introduction to curricula and programs designed to prepare students for careers in architecture. Credit/No Credit grading only. 1 lecture. Total credit limited to 3 units.

ARCH 131. Design and Visual Communication 1.1. 4 units

Term Typically Offered: F

Prerequisite: Architecture or Architectural Engineering majors only.

An introduction to the issues, concepts, processes and skills pertaining to two- and three-dimensional design and the freehand, constructed and digital representation and visual communication of ideas, objects and environments. 4 laboratories.

ARCH 132. Design and Visual Communication 1.2. 4 units

Term Typically Offered: W

Prerequisite: ARCH 131.

Continuation of ARCH 131 plus the issues, concepts, processes and skills pertaining to color theory and the design and visual communication of architectural space. 4 laboratories.

ARCH 133. Design and Visual Communication 1.3. 4 units

Term Typically Offered: SP

Prerequisite: ARCH 132.

Continuation of ARCH 131 and ARCH 132 plus the issues, concepts, processes and skills pertaining to the analysis and design of architectural form, space and organizations. 4 laboratories.

ARCH 201. Architecture Design Studio for Non-Majors. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Introduction to processes, tools, and methods of drawing and modeling for architectural design. Analysis of architectural case studies to provide an overview of architectural concepts and constructs. Studio experience includes architectural design projects at varying scales. Not open for major credit in Architecture. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ARCH 207. Architectural Technology Fundamentals 2.3. 4 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: ARCH 242. Concurrent: ARCH 253.

Theory and application of climate, energy use and comfort as determinants of architectural form in small-scale buildings. Emphasis on architectural methods of ventilating, cooling, heating, and lighting for envelope-load dominated buildings. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 2 activities.

ARCH 217. History of World Architecture: Prehistory - Middle Ages. 4 units

Term Typically Offered: F

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Architecture and urbanism in the ancient world, from prehistory to the Middle Ages. Social, cultural and physical conditions that influenced the built environment to the Mediterranean basin, plus Europe, Asia, Africa and Pre-Columbian America. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ARCH 218. History of World Architecture: Middle Ages - 18th Century. 4 units

Term Typically Offered: W

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

World architecture and urbanism from the Middle Ages until the end of the 18th century Baroque. Social, cultural and physical conditions which influenced the built environment of Europe, Asia, and the Pre-Columbian and Colonial Americas. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ARCH 219. History of World Architecture: 18th Century - Present. 4 units

Term Typically Offered: SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Architecture and urbanism of the modern world, from the 18th century to the present. Social, cultural and physical conditions influencing the built environment of Europe, Asia, Africa and the Americas. Course may be offered classroom-based or online format. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ARCH 241. Architectural Technology Fundamentals 2.1. 4 units

Term Typically Offered: F

Sustainability Related

Prerequisite: ARCH 133. Corequisite: ARCH 251.

The language, principles and materials of construction with an emphasis on the origin, history, and application of traditional and emergent materials. Field trip required. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 2 activities.

ARCH 242. Architectural Technology Fundamentals 2.2. 4 units

Term Typically Offered: W

Prerequisite: ARCH 241. Corequisite: ARCH 252.

A continuation of ARCH 241 with an emphasis on the fundamental aspects of construction systems and the basics of construction documentation. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 2 activities.

ARCH 251. Architectural Design 2.1. 5 units

Term Typically Offered: F

Sustainability Related

Prerequisite: ARCH 133. Corequisite: ARCH 241.

Continuation of ARCH 133 in terms of materiality and the theories, concepts, processes and skills pertaining to the analysis and design of architectural form, space and organizations to communicate intended concepts and meanings. 5 laboratories.

ARCH 252. Architectural Design 2.2. 5 units

Term Typically Offered: W

Sustainability Related

Prerequisite: ARCH 251, ARCH 241. Corequisite: ARCH 242.

Continuation of ARCH 251 plus the theories, concepts, processes and skills pertaining to light, construction and function as determinants that shape the built environment and support the communication of intended concepts and meanings. 5 laboratories.

ARCH 253. Architectural Design 2.3. 5 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: ARCH 252 and ARCH 242. Corequisite: ARCH 207.

Continuation of ARCH 251 and ARCH 252 plus the theories, concepts, processes and skills pertaining to context, structure and climate as determinants that shape the built environment and support the communication of intended concepts and meanings. 5 laboratories.

ARCH 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Directed group study of selected topics. The Class Schedule will list topic selected. Open to first-, second-, third-year students. Total credit limited to 8 units. 1 to 4 lectures.

ARCH 307. Architectural Systems Integration 3.2. 4 units

Term Typically Offered: W

Sustainability Focused

Prerequisite: ARCH 341. Concurrent: ARCH 352.

Continuation of ARCH 341 plus theory and application of climate, energy use and comfort as determinants of architectural form in large-scale buildings. Emphasis on architectural and mechanical methods of ventilating, cooling, heating, lighting, acoustics, and water and waste systems for internal-load dominated buildings. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 2 discussions.

ARCH 313. Advanced Delineation. 4 units

Term Typically Offered: SP

Prerequisite: ARCH 253.

Development of proficiency in architectural presentation. Projects and critiques. 4 seminars.

ARCH 320. Topics in Architectural History. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one of the following: ARCH 217, ARCH 218, ARCH 219, or ART 112.

In-depth examination of a significant region, movement or period in architectural history, theory and criticism. The material covered will vary depending upon the topic. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ARCH 326. Native American Architecture and Place. 4 units

Term Typically Offered: W
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The role of culture and setting in the construction of spatial, material and landscape concepts and artifacts, through the introduction of selected North American cultures, with focus from 1300 AD through contemporary time. 4 lectures. Crosslisted as ARCH/ES 326. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

ARCH 341. Architectural Systems Integration 3.1. 4 units

Term Typically Offered: F
 Sustainability Related
 Prerequisite: ARCH 207 and ARCH 253. Corequisite: ARCH 351.

Continuation of ARCH 207 plus the concepts, methods and processes and building systems that pertain to the detailing and construction of large-scale masonry, steel, concrete and combination structures. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 2 discussions.

ARCH 342. Architectural Systems Integration 3.3. 4 units

Term Typically Offered: SP
 Sustainability Related
 Prerequisite: ARCH 307. Concurrent: ARCH 353.

Continuation of ARCH 307 plus the concepts, methods, and processes pertaining to the preparation of outline specifications, production of design development drawings, life safety, building systems integration and building envelope and fabrication systems that inform the design and development of large scale buildings. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 2 discussions.

ARCH 351. Architectural Design 3.1. 5 units

Term Typically Offered: F
 Sustainability Related
 Prerequisite: ARCE 212, ARCH 253, ARCH 207 and PHYS 122 or PHYS 132, or consent of department head. Corequisite: ARCH 341.

Continuation of ARCH 253 plus the development and exploration of architectural theories, building systems, and design concepts and processes involved in creating architecture with an emphasis on implications of the program and space planning issues as building form generator. 1 lecture, 4 laboratories.

ARCH 352. Architectural Design 3.2. 5 units

Term Typically Offered: W
 Sustainability Related
 Prerequisite: ARCH 351, ARCH 341. Corequisite: ARCH 307.

Continuation of ARCH 351 plus the development and exploration of architectural theories, building systems, and design concepts and processes involved in creating sustainable architecture with an emphasis on implications of ecological, environmental and site issues as building form generator. 1 lecture, 4 laboratories.

ARCH 353. Architectural Design 3.3. 5 units

Term Typically Offered: SP
 Sustainability Related
 Prerequisite: ARCH 352, ARCH 307. Corequisite: ARCH 342.

Continuation of ARCH 352 plus the development and exploration of architectural theories, building systems, and design concepts and processes involved in creating large-scale architecture with an emphasis on implications of socio-cultural issues and comprehensive/life safety systems integration as building form generator. 1 lecture, 4 laboratories.

ARCH 363. Off-Campus Orientation Seminar. 2 units

Term Typically Offered: SP
 CR/NC
 Prerequisite: Consent of instructor.

Preparation for off-campus architectural study programs includes cultural orientation, an introduction to basic language skills, travel and housing protocols as well as academic and financial advising. Credit/No Credit grading only. Total credit limited to 4 units, with a maximum of 2 units per quarter. 2 seminars.

ARCH 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F,W,SP,SU
 CR/NC
 Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit/No Credit grading only.

ARCH 420. Seminar in Architectural History, Theory and Criticism. 4 units

Term Typically Offered: F, W, SP
 Prerequisite: ARCH 217; ARCH 218; and ARCH 219.

Special topics based on the exploration of specific approaches, periods of time, and cultural or geographic areas. The Class Schedule will list topic selected. Total credit limited to 12 units; repeatable in same term. 4 seminars.

ARCH 443. Issues in Contemporary Professional Practice. 4 units

Term Typically Offered: W
 Prerequisite: ARCH 342, ARCH 353.

An exploration of topics related to the practice of architecture, including financial considerations, client obligations, project and practice management, leadership, legal responsibilities, ethics and professional judgment, community and social responsibility, as well as the process and requirements for internship and licensure. 2 lectures, 2 discussions.

ARCH 445. Urban Design in Architecture. 3 units

Term Typically Offered: TBD
 Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs).

Analysis of the roles of architects and related professionals in urban areas. Emphasis on design reactions to environmental, economic, and technological conditions. Total credit limited to 12 units. 3 lectures.

ARCH 451. Architectural Design 4.1. 5 units

Term Typically Offered: F
Sustainability Focused
Prerequisite: ARCE 316, ARCH 353, ARCH 342.

Problems of increasing architectural complexity involving the comprehensive integration of architectural theory, design processes, and building systems with emphasis placed on multifunction singular buildings. 5 laboratories.

ARCH 452. Architectural Design 4.2. 5 units

Term Typically Offered: W
Sustainability Focused
Prerequisite: ARCE 316, ARCH 353, ARCH 342.

Problems of increasing architectural complexity involving the comprehensive integration of architectural theory, design processes, and building systems with emphasis placed on multibuilding, multifunctional projects. 5 laboratories.

ARCH 453. Architectural Design 4.3. 5 units

Term Typically Offered: SP
Sustainability Focused
Prerequisite: ARCE 316, ARCH 353, ARCH 342.

Problems of increasing architectural complexity involving the comprehensive integration of architectural theory, design processes, and building systems with emphasis placed on multifunctional projects in an urban context. Total credit limited to 10 units and may substitute for ARCH 451 or ARCH 452. 5 laboratories.

ARCH 460. Computer Applications. 3 units

Term Typically Offered: TBD
Prerequisite: ARCH 133.

Advanced methods in the application of computer graphics and multi-media techniques in architectural design. Total credit limited to 6 units. 2 lectures, 1 activity.

ARCH 461. Advanced Computer-Aided Fabrication in Architecture. 4 units

Term Typically Offered: TBD
Prerequisite: Junior standing.

Applications of computer-aided manufacturing in architectural design with emphasis on subtractive and additive fabrication methods, material assemblies, and advanced techniques in digital design software. 2 lectures, 2 activities.

ARCH 462. Topics in Architectural Practice. 3-4 units

Term Typically Offered: TBD
Prerequisite: ARCH 242.

Selected advanced topics addressing various aspects of Architectural Practice. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units; repeatable in same term. 3 to 4 lectures.

ARCH 469. Topics in Design Methods. 3 units

Term Typically Offered: TBD
Prerequisite: Junior standing and current participation in the Washington Alexandria Architectural Consortium off-campus program.

Relationship of art and architecture addressed to encourage critical debate. Historically, the "art" and the "architecture" were not as polarized as today. Both historical perspective and practical issues concerning collaboration. Class Schedule will list topic selected. Total credit limited to 12 units. 3 lectures.

ARCH 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 16 units. 1 to 4 lectures.

ARCH 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ARCH 472. Housing Design Concepts. 3-4 units

Term Typically Offered: TBD
Sustainability Focused
Prerequisite: Third-year standing.

For students preparing for further study or practice relating to housing, urban design and new communities. This course will address design objectives, concepts, and current theories and forms in housing and mixed-use projects. 3-4 lectures.

ARCH 473. Material Innovation Lab. 4 units

Term Typically Offered: TBD
Prerequisite: ARCH 461.

Applied research through the design and fabrication of full-scale building assemblies, using computer-aided manufacturing. Material properties, methods of manufacturing, and building performance. Total credit limited to 12 units. 2 lectures, 2 activities.

ARCH 479. Design Build. 4 units

Term Typically Offered: TBD
Prerequisite: Third-year standing.

Experimental design-build projects derived from real-world architectural problems. Objectives achieved through design, analysis, construction, and team-based production. The Class Schedule will list topic selected. Total credit limited to 12 units. 2 lectures, 2 activities.

ARCH 480. Special Studies in Architecture. 1-12 units

Term Typically Offered: F,W,SP,SU
Prerequisite: Junior standing.

Special issues and problems through research, field trips, design projects, and other forms of investigation and involvement. Course requirements are determined prior to each individual project through a contractual agreement between students and department. The departmental Off Campus Study Guidelines apply except when superseded by guidelines and practices of the London Study Program of the College of Liberal Arts. Total credit limited to 36 units.

ARCH 481. Senior Architectural Design Project. 5 units

Term Typically Offered: F, W, SP
Prerequisite: ARCH 451, ARCH 452 and ARCH 453.

Advanced architectural design and research project. Integration of architectural theory, principles and practice with creative, organizational and technical abilities in architectural design and design research. Total credit limited to 15 units. 5 laboratories.

ARCH 484. Architectural Research. 2-4 units

Term Typically Offered: TBD
Prerequisite: Architecture, Architectural Engineering, City and Regional Planning, Construction Management, and Landscape Architecture majors only; and consent of instructor.

Development of guided architectural research under the direction of faculty. The Class Schedule will list topic selected. Total credit limited to 8 units, repeatable in the same term. 2 to 4 seminars.

ARCH 485. Internship/Cooperative Education Experience. 1-12 units

Term Typically Offered: F,W,SP,SU
Prerequisite: Senior standing.

Part-time or full-time professional work experience in architecture and related fields, usually off-campus. Positions are paid or unpaid. Formal report and evaluation by work supervisor required. 30 hours of work experience per quarter per unit of credit. Total credit limited to 24 units.

ARCH 492. Senior Design Thesis. 3 units

Term Typically Offered: F
Prerequisite: ARCH 451, ARCH 452 and ARCH 453. Concurrent: First quarter of ARCH 481.

Review and research of architectural theory and precedents related to the specific design option. Development of a thesis and a design project proposal. 3 seminars.

ARCH 532. Research Methods in Architecture. 3 units

Term Typically Offered: TBD
Prerequisite: Graduate standing.

Roles of research and analysis in architecture. Approaches to research, hypothesis testing, design process, and systems for design. Use of research findings in various decision-making systems. 3 seminars.

ARCH 551. Architectural Design. 5 units

Term Typically Offered: F, W, SP
Prerequisite: Graduate standing.

Professional initiative and responsibility in integrating architectural design theory and practice with fields influencing the total environment. Building types considered as the coordinating factor. Total credit limited to 15 units with no more than 5 units in any one quarter. 5 laboratories.

ARCH 561. Advanced Design. 3 units

Term Typically Offered: F, W, SP
Prerequisite: Graduate standing.

Continuation of ARCH 551. Advanced studies integrating architectural design theory and practice with fields influencing the shaping of the total environment. Total credit limited to 9 units. 3 laboratories.

ARCH 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ARCH 598. Master's Design Project. 3-6 units

Term Typically Offered: F, W, SP
Prerequisite: Consent of graduate advisor.

Completion of a master project demonstrating in-depth research ability at a graduate level. Total credit limited to 9 units. 3 or 6 laboratories.

Art (ART)

undefined

ART Courses

ART 101. Fundamentals of Drawing. 4 units

Term Typically Offered: F, W, SP
2020-21 or later catalog: GE Area C1
2019-20 or earlier catalog: GE Area C3
Introduction to the artistic practice and cultural value of drawing with emphasis on the practical skills of observation, rendering, and understanding meaning in visual art. Projects encourage growth in technical skill, conceptual innovation, critical thinking, and visual communication. 3 lectures, 1 laboratory. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ART 102. Art and Design Foundation Studies I. 4 units

Term Typically Offered: F
Introduces elements and principles of design, establishing a foundation for all artistic practice. Emphasizing critical thinking and creative problem solving, the interrelationship between form and content are examined. Traditional, digital and lens-based media are explored through individual and collaborative experiences. 3 lectures, 1 laboratory.

ART 104. Art and Design Foundation Studies II. 4 units

Term Typically Offered: SP
Prerequisite: ART 102.

Principles and essential skills for three-dimensional practice in art and design. Understanding, envisioning, and communicating effectively about space, objects, scale, and the relationship of the body to the built environment. 3 lectures, 1 laboratory.

ART 111. Introduction to the Visual Arts. 4 units

Term Typically Offered: F, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Introduction to the material techniques and social purposes of painting, graphic arts, sculpture, performance, and architecture across diverse cultures. Builds visual analysis skills and research techniques needed to interpret and talk about the visual arts broadly. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ART 112. Western Art: A Thematic History. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Introduction to artistic production, reception, and meaning throughout different eras and contexts of Western civilization. Evaluates the role of art in relation to religion, politics, and commemoration while considering the expressive nature and affective qualities of images and objects. Field trip required. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2021-22 or earlier catalogs).

ART 122. Introduction to Digital Photography. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Fundamental techniques in photography. Mechanics of digital cameras, optics, composition, perception of light and subject content. Understanding photographic principles and the language of camera vision. Introduction to the impact of photography on culture. Digital camera required. 3 lectures, 1 laboratory. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ART 145. Ceramics I. 4 units

Term Typically Offered: SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Introduction to artistic practice and cultural value from antiquity to 21st Century. Basic clay working emphasizing design quality, hand building, and potter's wheel. Exercises encouraging growth in technical skill, use of materials for personal expression, conceptual innovation, critical thinking, and visual communication. 3 lectures, 1 laboratory. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ART 148. Beginning Sculpture. 4 units

Term Typically Offered: F, W

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Introduction to the challenges, methods, and modalities within the expanding field of contemporary sculpture. Emphasis on understanding the signs of meaning produced in visual art. Exploration of materials, tools, and techniques including found objects, casting, carving, wood, and metal. 3 lectures, 1 laboratory. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ART 182. Foundation in Digital Art I. 4 units

Term Typically Offered: F

Introduction to image creation and manipulation, design, illustration, and layout/composition using digital tools, with an emphasis on visual problem solving and creative expression. 3 lectures, 1 laboratory.

ART 183. Foundation in Digital Art II. 4 units

Term Typically Offered: F, SP

Prerequisite: ART 182.

Development of digital skills in image creation, design, illustration, layout, and simple animation. Emphasis on visual problem solving, creative expression, and narrative. 3 lectures, 1 laboratory.

ART 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ART 201. Intermediate Drawing. 4 units

Term Typically Offered: W, SP

Prerequisite: ART 101 and ART 102 or ART 106.

Development of additional drawing techniques with emphasis on form content, pictorial space, B/W media, color, mixed media and composition. 3 lectures, 1 laboratory.

ART 203. Art Theory and Practice. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ART 101; and ART 102 or ART 106.

Contemporary issues in art and design, linking "ideas" to development of concepts. Emphasis on individual creative process, and problem solving. Focus on contemporary critical thinking regarding aesthetics, techniques, and vocabulary. 3 lectures, 1 laboratory.

ART 209. Beginning Painting. 4 units

Term Typically Offered: F, W

Prerequisite: ART 101.

Introduction to technical and formal problems in painting. Exploration of pictorial space, light, and color from observation. Physical characteristics of paint, various tools, studio methods, and styles of painting. 3 lectures, 1 laboratory.

ART 211. Art Hist - Ancient to Renaissance. 4 units

Term Typically Offered: TBD

Development of art from antiquity to the early stages of the Renaissance in Europe. Particular emphasis on European art with appropriate references to sources from antiquity which have been particularly influential on European painting and sculpture. Comparison of relevant parallel examples of the art of non-European cultures. 4 lectures.

ART 212. Art History - Renaissance through Baroque Eras. 4 units

Term Typically Offered: F, W

The significant visual expressions of Northern and Southern European art of the Renaissance and Baroque period. Relevant parallel examples of the art of antiquity and non-European cultures. 4 lectures.

ART 213. Art History- Modern Art, 1900-1945. 4 units

Term Typically Offered: SP

Examines the development of significant styles and movements in modern art, including Fauvism, German Expressionism, Cubism, Futurism, Neo-Plasticism, Russian and Soviet avant-gardes, Dada, Surrealism, and/or American modernism. Also introduces selected modern developments in graphic design and photography. 4 lectures.

ART 222. Black and White Photography. 4 units

Term Typically Offered: F, SP

Control and understanding of tonal range under available light. Composition, camera based visual communication skills and concept development. Emphasis on 'photographic seeing' and professional quality printing. 2 lectures, 2 laboratories.

ART 224. Introduction to Artificial Lighting for Photography. 4 units

Term Typically Offered: F, W, SP

Introduction to studio lighting and contemporary professional studio photography. Production of professional quality prints using digital camera and printing methods. 3 lectures, 1 laboratory.

ART 227. Portrait Photography. 4 units

Term Typically Offered: TBD

Prerequisite: ART 224.

Studio and environmental portraiture. Emphasis on light ratios/patterns; posing and methods of personality portrayal. 3 lectures, 1 laboratory.

ART 237. Graphic Design I. 4 units

Term Typically Offered: F

Prerequisite: ART 104 and ART 183; Art and Design majors only.

Exploration of the technical and conceptual underpinnings of graphic design. Focus on the design process and how raw ideas are translated into professional work. 3 lectures, 1 laboratory.

ART 238. Typography I. 4 units

Term Typically Offered: W

Prerequisite: ART 104 and ART 183; Art and Design majors only.

Fundamentals of theory, practice, technology and history of typography. Exercises include the study of letterforms, type with image, proportion and grids, hierarchy, and legibility. 3 lectures, 1 laboratory.

ART 260. Critique, Discourse and Practice. 4 units

Term Typically Offered: SP

Prerequisite: ART 101 and ART 104; Art and Design majors only.

Developing an individual body of artwork. Rigorous critiques, lectures, and seminar-style discussions aimed at forming a process for discussing artwork. Art writing, research, and individual conceptual and formal development. 4 lectures.

ART 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ART 288. Interaction Design I. 4 units

Term Typically Offered: SP

Prerequisite: ART 237 and ART 238.

An introduction to concepts, uses and design principles of interactive media. Exploration of methods for planning and implementing interaction design projects. Not open to students with credit in ART 380. 3 lectures, 1 laboratory.

ART 302. Figure Drawing. 4 units

Term Typically Offered: F

Prerequisite: ART 101.

Development of advanced drawing methods and techniques in the study of the human form and structure as it relates to proportion, anatomical analysis, and figure/ground relationships. Understanding materials, techniques, and ideas in the practice of contemporary figure drawing. 3 lectures, 1 laboratory.

ART 309. Intermediate Painting. 4 units

Term Typically Offered: W

Prerequisite: ART 209.

Continued study of technical and formal problems in painting. Emphasis on the creative process, development of individual ideas, and the connection between form and content. Contemporary issues in painting introduced. 3 lectures, 1 laboratory.

ART 310. Art History - American Art. 4 units

Term Typically Offered: SP

Prerequisite: ART 112, ART 211, or ART 212.

Major historical periods of American art from the colonial period to the present. Special emphasis will be given to the broader notion of American art as a process of developing an identity of the varied historical and sociological forces that have shaped images in American art. 4 lectures.

ART 311. Art History - Nineteenth Century Art. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one of the following: ART 111, ART 112, ART 211, or ART 212.

History of painting and sculpture from the French Revolution to the beginning of the 20th century. Focuses on significant movements such as Neo-Classicism, Romanticism, Realism, Impressionism and Post-Impressionism. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ART 313. Design History. 4 units

Term Typically Offered: TBD

Prerequisite: One of the following: ART 112, ART 211, ART 212, or ART 213.

Survey of design from the Victorian era to the present, including major philosophies and movements, political, social, cultural, and technological trends that influenced designers in the 20th century. 4 lectures.

ART 314. History of Photography. 4 units

Term Typically Offered: F, W

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Art and Design major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

In-depth survey of the artistic and cultural achievements in photography from its invention to the present day. Significant photographers, the evolution of aesthetic criteria in the context of other visual arts as well as social/cultural impact. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ART 315. Art History - Art Since 1945. 4 units

Term Typically Offered: W, SP

Prerequisite: ART 112 or ART 211 or ART 212 or ART 213; and Junior standing.

History of visual art from 1945 to the present. Focus on significant movements such as Abstract Expressionism, Pop art, minimalism, conceptual art, earthworks, feminism, and postmodernism. Also focus on new mediums such as performance, video, and installation. 4 lectures.

ART 317. Asian Art Survey. 4 units

Term Typically Offered: TBD

Prerequisite: One of the following: ART 111, ART 112, ART 211, or ART 212.

Survey of the traditional arts of Asia - primarily India, China and Japan. Emphasis on the connections between the visual arts in Asia and the philosophical, social and cultural environments in which they arose. 4 lectures.

ART 318. Asian Art Topics: National, Religious, and Intellectual Movements. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

In-depth examination of significant art movements in Asia. Each topic will focus on the development of art in Asia within the context of a specific geographical or theoretical framework. Details will vary depending on topic. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ART 324. Photographic Expression. 4 units

Term Typically Offered: F

Prerequisite: ART 122 or ART 224. Recommended: ART 222.

Emphasis on personal expression and developing style, introduction to symbology, visual source development and the work of contemporary creative photographers. Total credit limited to 8 units. 3 lectures, 1 laboratory.

ART 325. Advanced Camera and Lighting Techniques. 4 units

Term Typically Offered: F

Prerequisite: ART 224.

Emphasis on advanced camera and lighting techniques through concept-driven projects. Mastery of multiple photographic and video cameras used in available and artificial lighting situations. 3 lectures, 1 laboratory.

ART 329. Editorial Photography. 4 units

Term Typically Offered: W

Prerequisite: ART 224.

Creating, lighting and executing editorial assignments on location and in studio. Producing photography and video for the needs of editorial and corporate clients, i.e. print and online publications. Emphasis on creating compelling content and working with clients. 3 lectures, 1 laboratory.

ART 330. Book Arts. 4 units

Term Typically Offered: TBD

Numerous traditional book structures and derivations including accordion, pamphlet, stab, and multiple signature construction. Emphasis on both craftsmanship and experimentation. Hands-on experience and a broad historical overview of paper and book arts. 3 lectures, 1 laboratory.

ART 333. Concept Art and Storyboarding. 4 units

Term Typically Offered: F

Prerequisite: ART 182 or CSC 123.

Students develop critical thinking and technical skills to storyboard for animation and interactive immersive projects. Thumbnail sketching, character design, and storyboarding to convey emotions. Students complete an animatic for a short animation, virtual or augmented reality experience. Total credit limited to 8 units. 3 lectures, 1 activity.

ART 334. Illustration I: Techniques and Tools. 4 units

Term Typically Offered: SP

Prerequisite: ART 101.

Introduction to the basic practices of commercial illustration as used in the visual communications industry. Emphasis on the generation of ideas, rendering techniques and tools, and self marketing methods, with an overview of the history of illustration. 3 lectures, 1 laboratory.

ART 337. Graphic Design II. 4 units

Term Typically Offered: F

Prerequisite: ART 237 and ART 238; Art and Design majors only.

Exploration of identity design problems through the use of symbolism and metaphor. Design and implementation of corporate logos. 3 lectures, 1 laboratory.

ART 338. Typography II. 4 units

Term Typically Offered: W

Prerequisite: ART 238; Art and Design majors only.

Exploration of typography in the form of text. Application of different typefaces, composition, layout and page systems for the design of periodicals and books. 3 lectures, 1 laboratory.

ART 345. Ceramics II. 4 units

Term Typically Offered: SP

Prerequisite: ART 104 or ART 107; and ART 145, ART 148, or ART 245.

Studio course in hand, wheel, mold, extruder, jigger, and press forming skills. Design of single and multiple forms and kiln firing procedures. Total credit limited to 8 units. 3 lectures, 1 laboratory.

ART 348. Intermediate Sculpture. 4 units

Term Typically Offered: W

Prerequisite: ART 104 or ART 107 and ART 148.

Intermediate sculpture course in expressive use of form with modeling, casting, carving, and/or assembly. Total credit limited to 8 units. 3 lectures, 1 laboratory.

ART 350. Computing for Interactive Arts Capstone I. 2 units

Term Typically Offered: W

Prerequisite: ART 384; CSC/CPE 103 or CSC/CPE 202; and junior standing.

Definition and specification of a team-based creative collaboration on a digital interactive art project (e.g. animation, video game, interactive media display, etc). Research and techniques, project planning and project team organization, prototype creation. 1 lecture, 1 laboratory. Crosslisted as ART/CSC 350.

ART 353. Intermedia / Art. 4 units

Term Typically Offered: SP

Prerequisite: ART 101; ART 102 or ART 106; and ART 148; or Computing for Interactive Arts Minors and ART 182.

Studio course emphasizing individual and collaborative creative exploration with project content derived from student's experience. Focus on using traditional as well as new genres of artistic expression such as site specific installations, video art, book works, and performance art. The Class Schedule will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory.

ART 366. Junior Studio Art Practice. 4 units

Term Typically Offered: F

Prerequisite: ART 148, ART 201, ART 260, ART 209 and junior standing.

Critiques, lectures, and seminar-style discussions aimed at establishing a rigorous creative practice. Includes art writing, research, and individual conceptual and formal development. 3 lectures, 1 laboratory.

ART 370. Michelangelo. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Art and Design major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and ART 211, ART 212, or ART 213 for Art and Design majors or completion of GE Area C1 for all other majors (GE Area C3 for students on the 2019-20 or earlier catalogs).

The art and life of Michelangelo (1475-1564), the renowned painter, sculptor, architect, and poet, with reference to early biographies, his artistic development, and the demands of his patrons. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ART 371. Topics in Renaissance Art. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Art and Design major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and ART 211, ART 212, or ART 213 for Art and Design majors or completion of GE Area C1 for all other majors (GE Area C3 for students on the 2019-20 or earlier catalogs).

A thematic analysis of Renaissance Art (1300-1600) with special attention paid to politics, patronage, myth, religion, and the development of new genres and subject matter. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ART 373. New Media Art History. 4 units

Term Typically Offered: SP

Prerequisite: ART 111 or ART 212 or ART 213.

In-depth study of past and contemporary media arts practices. Explores different approaches used by media artists in the 20th and 21st centuries to examine new media and how the lenses of new technologies are used by artists to present knowledge and alter social, cultural and political behaviors. 4 lectures.

ART 375. Intersectional Feminist Art Histories. 4 units

Term Typically Offered: F, SP

USCP

Prerequisite: Junior standing; and one of the following: ART 112, ART 212, ART 213, or WGQS 201.

Intersectional feminist exploration of the role of women, gender, and sexuality in the visual arts and art history. In-depth focus on intersectional feminisms as they impact the study of the visual arts and art history. Not open to students with credit in ART 316. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ART/WGQS 375. Fulfills USCP. Formerly WGS 375.

ART 376. The Art of Mixed Reality. 4 units

Term Typically Offered: W

Prerequisite: ART 182 or CSC 123. Recommended: ART 384.

Conceptual creation of mixed reality (MR) worlds, visual styles, and metaphors. Theory-based view of mixed reality, including design of the experience and exploration of the technical challenges and constraints. Students research and propose their own MR project. 3 lectures, 1 laboratory.

ART 383. Digital Video I. 4 units

Term Typically Offered: F, SP

Prerequisite: ART 122 or ART 224.

Introduction to the use of the DSLR camera as a tool for shooting video and basic digital editing including audio editing. Topics will include scripting, storyboarding, composition, motion, editing, lighting and sound. Emphasis on effective communication and expression. 2 lectures, 2 laboratories.

ART 384. Digital 3D Modeling and Design. 4 units

Term Typically Offered: W
Prerequisite: ART 182.

Development of skills and techniques in the use of three-dimensional design and modeling via digital technology. Capabilities of current software in the design and modeling of three-dimensional form. 2 lectures, 2 activities.

ART 388. Interaction Design II. 4 units

Term Typically Offered: F
Prerequisite: ART 288; or Computing for Interactive Arts minor and ART 182.

Design of original and innovative digital products of interaction design in different media, using user-centered design and usability analysis. Design research methods to engage potential users from the beginning to the end of the design process. 3 lectures, 1 laboratory.

ART 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP
Prerequisite: Senior standing and consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ART 402. Advanced Figure 2D. 4 units

Term Typically Offered: W
Prerequisite: ART 302.

Advanced problems in figure drawing and painting. Advanced methods and techniques in the study of the human form as it relates to technical and conceptual issues. Includes working from direct observation of the figure and the development of individual content and approaches. Total credit limited to 8 units. 3 lectures, 1 laboratory.

ART 409. Advanced 2-D. 4 units

Term Typically Offered: SP
Prerequisite: ART 201 or ART 309.

Advanced problems in painting and drawing. Emphasis on the creative process from initial concept to the finished work of art. Investigation of traditional, non-traditional and explorative work to encourage development of personal approach. Total credit limited to 8 units. 3 lectures, 1 laboratory.

ART 427. Advertising Photography. 4 units

Term Typically Offered: W
Prerequisite: ART 325 and senior standing.

Applied principles of design and color to produce a photograph that sells an idea, product, or service. Joint projects with ART 432, Advertising Design. Emphasis on thinking, planning, interpreting, and presenting an idea photographically. 3 lectures, 1 laboratory.

ART 432. Advertising Design. 4 units

Term Typically Offered: TBD
Prerequisite: ART 337 and ART 338 and senior standing or consent of instructor.

Development of print advertising from concept to final presentation. Emphasis on art direction, photo direction and copywriting. For Art and Design majors only. Computer applications are required for appropriate problems. 3 lectures, 1 laboratory.

ART 434. Illustration II. 4 units

Term Typically Offered: F, SP
Prerequisite: ART 209, ART 334, or consent of instructor; for Art and Design majors only.

Advanced development of concepts and illustration techniques and skills, both as analogue and digital, for use in a variety of graphic design applications such as editorial/publication, retail, educational, technical, or advertising purposes. 3 lectures, 1 laboratory.

ART 437. Graphic Design III. 4 units

Term Typically Offered: W
Prerequisite: ART 337 and ART 338; for Art and Design majors only.

Advanced graphic design. The creation of basic 3-D structures, and the application of graphics in 3-D environments (such as package design and signage). Emphasis on integrative communication activity of all elements including: color, graphics, 3-D forms, typography, and constructions, and includes market research. 3 lectures, 1 laboratory.

ART 438. Typography III. 4 units

Term Typically Offered: SP
Prerequisite: ART 338; for Art and Design majors only.

Advanced exploration of communication and structural aspects of typography. Focus on experimentation and expressively using type to enhance meaning. 3 lectures, 1 laboratory.

ART 439. Type in Motion. 4 units

Term Typically Offered: TBD
Prerequisite: ART 438; or Computing for Interactive Arts minor and ART 182.

Sequential organization of typographic information in time and how ideas such as intonation, proximity, pacing, rhythm and progression can influence and shape meaning. Focus on animated typography for a range of applications. 3 lectures, 1 laboratory.

ART 448. Advanced Topics in Sculpture. 4 units

Term Typically Offered: F
Prerequisite: ART 348.

Studio course specializing in three-dimensional form. Materials include clay, plaster, metal, or wood. Course content will be selected from various topics that are representational, abstraction, non-objective, or conceptual. The Class Schedule will list topic selected. Total credit limited to 8 units; may be in same term. 3 lectures, 1 laboratory.

ART 450. Computing for Interactive Arts Capstone II. 2 units

Term Typically Offered: TBD
Prerequisite: ART/CSC 350.

Team-based design, construction and deployment of a collaborative interactive computational art project typically found in the fields of animation, game design, and interactive media. Management of interdisciplinary teams, documentation, creative development, testing, and assessment. 2 activities. Crosslisted as ART/CSC 450.

ART 463. Senior Portfolio Project. 4 units

Term Typically Offered: SP
Prerequisite: Senior standing and ART 260; Art and Design majors only.

Planning, preparation, and physical production of a portfolio of work for entrance into the professional job market or graduate school. 3 lectures, 1 laboratory.

ART 466. Senior Studio Art Practice. 4 units

Term Typically Offered: F

Prerequisite: ART 366 and senior standing.

Builds upon content explored in ART 366. Critiques, lectures, and seminar-style discussions aimed at establishing a rigorous creative practice. Art writing, research, and individual conceptual and formal development. 3 lectures, 1 laboratory.

ART 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ART 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ART 474. Collaborative Studio: Storyboarding, Modeling, Animation and Rendering. 4 units

Term Typically Offered: TBD

Prerequisite: ART 122 or ART 182. Recommended: ART 384.

A collaborative visualization studio focused on designing a story and building a short animation. Modeling and animation software for design conceptualization and expression, materials, lighting and rendering techniques. Collaboration in teams. Total credit limited to 8 units. 3 lectures, 1 laboratory.

ART 483. Digital Video II. 4 units

Term Typically Offered: W

Prerequisite: ART 383.

Advanced practices in digital video. Creation of genre-specific narratives using methods in storyboarding, shooting, editing, and sound design. Advanced methods of storytelling, including documentary video, web-based narratives, and fine art video practices. Creation of quality expressive videos. 2 lectures, 2 laboratories.

ART 484. Animation, Video, and Interactive Design. 4 units

Term Typically Offered: TBD

Prerequisite: ART 122 or ART 182 or ART 224.

Creation of in-depth animations and interactive presentations. Advanced scripting, storyboarding, video production, and interactive communication techniques. 3 lectures, 1 laboratory.

ART 488. Interaction Design III. 4 units

Term Typically Offered: TBD

Prerequisite: ART 388.

Advanced development of complex systems in the interaction design space and an exploration of emerging technologies. 3 lectures, 1 laboratory.

ART 489. Advanced Interactive Media Art. 4 units

Term Typically Offered: TBD

Prerequisite: ART 488.

Advanced topics in the digital media field such as interface design, information architecture techniques, digital typography and interactive storytelling. Survey of new applications of design for the new media, and the development of digital portfolio pieces. 3 lectures, 1 laboratory.

ART 494. Cooperative Education Experience. 6 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 12 units. Credit/No Credit grading only.

ART 495. Cooperative Education Experience. 12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 12 units. Credit/No Credit grading only.

Astronomy and Astrophysics (ASTR)

undefined

ASTR Courses

ASTR 101. Introduction to the Solar System. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area B1

2019-20 or earlier catalog: GE Area B3

Descriptive astronomical properties of the Earth, Moon, other planets and their satellites. Comets, asteroids and other members of the Solar System. Theories of the formation of the Solar System. Opportunities for astronomical observations. Intended for non-engineering and non-science majors. Not open to students who have completed or are taking ASTR 301 or ASTR 302. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs).

ASTR 102. Introduction to Stars and Galaxies. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B1

2019-20 or earlier catalog: GE Area B3

Descriptive astronomical properties of the Sun, stars, galaxies and interstellar material. Expanding universe and cosmological models. Opportunities for astronomical observations. Not open to students who have completed or are taking ASTR 301, ASTR 302, or PHYS 132. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs).

ASTR 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ASTR 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ASTR 301. Planetary Systems. 3 units

Term Typically Offered: W

Prerequisite: PHYS 132 or PHYS 122 and MATH 141 or MATH 161.

Quantitative and descriptive properties of planetary systems, including our solar system. Physics of planets and their formation, moons, comets, and interplanetary media. Extrasolar planets and astrobiology. 3 lectures.

ASTR 302. Stars and Galaxies. 3 units

Term Typically Offered: SP

Prerequisite: PHYS 122 or PHYS 132; and MATH 141 or MATH 161.

Quantitative and descriptive properties of stars, galaxies and interstellar material; including stellar structure and evolution, and structure and evolution of galaxies. 3 lectures.

ASTR 324. Longitude, Navigation, and Timekeeping. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Areas B1 through B3; and completion of MATH 119 with a grade of C- or better.

Evolution of navigational science from 1700 to today, covering the 'longitude problem' to the Global Positioning System. Emphasizes relevant concerns with navigation and timekeeping, including celestial navigation, clocks, and the use of technology, mathematics, and science to address societal problems. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ASTR 326. Cosmology. 3 units

Term Typically Offered: F

Prerequisite: PHYS 211 (may be taken concurrently).

Introduction to the basic ideas of modern observational cosmology from the Big Bang to the ultimate fate of the universe. Topics include: special and general relativity, curvature of space, dark matter, dark energy, cosmic microwave background, type Ia supernovae. 3 lectures.

ASTR 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ASTR 404. Research Experience for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of department chair.

Individual investigations, research, studies, or surveys of selected problems. Credit/No Credit grading only. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ASTR 444. Observational Astronomy. 4 units

Term Typically Offered: F

Prerequisite: ASTR 301 or ASTR 302.

Introduction to observational astronomy. Coordinate systems, telescopes and observational instruments (CCDs, filters, spectrographs), observational methods and techniques, data reduction and analysis. Laboratory activities include use of a telescope, CCD camera for data acquisition, data reduction and analysis, and presentation of results. 3 lectures, 1 laboratory.

ASTR 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ASTR 471. Selected Advanced Laboratory. 1-2 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 2 laboratories.

Biology (BIO)

undefined

BIO Courses

BIO 111. General Biology. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

Overview of fundamental concepts in biology and of scientific inquiry. Principles of cellular life and energetics, inheritance and genetic mechanisms, evolution and ecology. Emphasis on the relationship between biology and human affairs. Not open for major credit in Biological Sciences, Microbiology or Marine Sciences. Not open to students who have completed BIO 161. Course offered in hybrid format with classroom-based and online learning. 3 lectures, 1 laboratory. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs).

BIO 114. Plant Diversity and Ecology. 4 units

Term Typically Offered: W, SP

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

Plant diversity and ecology in aquatic and terrestrial plant communities including adaptations of plants to their environment. Identification of common, local native plants and plant communities, uses of native plants by Indigenous People, and human impacts on native plant communities. Field trip required. 2 lectures, 2 laboratories. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs).

BIO 123. Biology of Sex. 4 units

Term Typically Offered: W, SP

2020-21 or later catalog: GE Area B2

2019-20 or earlier catalog: GE Area B2

Fundamental principles of biology related to sexual reproduction:

genetics, physiology, behavior, ecology and evolution of sex in a broad range of organisms. Not open for major credit in Biological Sciences, Microbiology, or Marine Sciences. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area B2.

BIO 150. Diversity and History of Life. 4 units

Term Typically Offered: F, W

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

Overview of the history, diversity and genetic relatedness of life on Earth. Broad-scale evolutionary framework of the organization and expansion of life on Earth. 3 lectures, 1 laboratory. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs).

BIO 161. Introduction to Cell and Molecular Biology. 4 units

Term Typically Offered: F,W,SPSU

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

Recommended: CHEM 110 or CHEM 124 or CHEM 127.

Fundamentals of cellular biology with an emphasis on the molecular perspective of life: biomolecules, cellular energetics, cell structure and reproduction, molecular mechanisms of genetics and gene expression. 3 lectures, 1 laboratory. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs).

BIO 162. Introduction to Organismal Form and Function. 4 units

Term Typically Offered: W, SP

Prerequisite: BIO 161. Recommended: CHEM 110 or CHEM 111 or CHEM 124 or CHEM 127.

Fundamentals of the structure and physiology of tissues and organs of plants and animals: energy acquisition and food distribution, gas exchange and fluid transport, and sensing and responding to the environment. 3 lectures, 1 laboratory.

BIO 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F,W,SPSU

CR/NC

Prerequisite: Consent of department chair.

Individual investigation, research, studies or surveys of selected problems. Intended for lower division students in the Biological Sciences Department. Total credit limited to 12 units, with a maximum of 2 units per quarter. Credit/No Credit grading only.

BIO 202. Orientation to Biotechnology. 2 units

Term Typically Offered: W

Prerequisite: Completion of a course with a BIO, BOT or MCRO prefix and a course with a CHEM prefix.

Introduction to the diversity of fields in biotechnology. Applications in agriculture, nutrition, medicine and environmental problems. 1 lecture, 1 activity. Crosslisted as BIO/CHEM 202.

BIO 211. Biology of Plants and Animals. 4 units

Term Typically Offered: W, SP

Prerequisite: BIO 111; for Liberal Studies majors only. Recommended: STAT 130 or STAT 217.

Plant and animal anatomy, physiology, diversity and life cycles. How plants and animals acquire nutrients, reproduce, and adapt to environments. Emphasis on hands-on activities and model organisms suited for the elementary classroom. 3 lectures, 1 laboratory. Not open for major credit in Biological Sciences, Microbiology, or Marine Sciences.

BIO 213. Life Science for Engineers. 2 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B2

2019-20 or earlier catalog: GE Area B2

Corequisite: BMED/BRAE 213. Recommended: CHEM 124.

Fundamentals of life sciences: energetics, cell biology, genetics, microbiology, organismal biology, and ecology. Not open for major credit in Biological Sciences, Microbiology, or Marine Sciences. 2 lectures. Fulfills GE B2.

BIO 222. Biodiversity of California. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B2

2019-20 or earlier catalog: GE Area B2

Recommended: Completion of GE Area A.

Foundations and importance of California's biological diversity from historical and modern contexts. Overview of California's diverse habitats, wildlife and their adaptations. Current challenges to preserving California's biodiversity. Concepts in quantification, conservation and appreciation for California's biodiversity. 4 lectures. Fulfills GE Area B2.

BIO 227. Wildlife Conservation Biology. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area B2
 2019-20 or earlier catalog: GE Area B2
 Sustainability Focused
 Recommended: Completion of GE Area A2.

Wildlife biology and philosophies of conservation. Basic principles of ecology and evolution. Practices applied to wildlife management. Current problems involving people-wildlife interactions with special reference to world biodiversity. Not open for major credit in Biological Sciences, Microbiology, or Marine Sciences. Not open to students with credit in BIO 363. 4 lectures. Fulfills GE Area B2.

BIO 231. Human Anatomy and Physiology I. 5 units

Term Typically Offered: F, W, SP
 Prerequisite: BIO 111 or BIO 161; CHEM 110, CHEM 111, CHEM 124, CHEM 127, or PSC 102.

Structure and function of the skeletal, muscular, nervous, endocrine, and integumentary systems. Molecular, cellular, and organ system levels of organization. Lab includes study of prosected human cadavers. Not intended for Biological Sciences majors. May be taken after BIO 232. 4 lectures, 1 laboratory.

BIO 232. Human Anatomy and Physiology II. 5 units

Term Typically Offered: F,W,SP,SP
 Prerequisite: BIO 111 or BIO 161; CHEM 110, CHEM 111, CHEM 124, CHEM 127, or PSC 102.

Structure and function of the circulatory, immune, respiratory, digestive, urinary, and reproductive systems. Molecular, cellular, and organ system levels of organization. Lab includes study of prosected human cadavers. Not intended for Biological Sciences majors. May be taken before BIO 231. 4 lectures, 1 laboratory.

BIO 253. Health Professions Shadowing. 1 unit

Term Typically Offered: F
 CR/NC
 Prerequisite: Consent of instructor.

Observation in a healthcare setting. Students will shadow healthcare practitioners on campus or in a community setting. Specific placement depend on practitioner availability. Total credit limited to 2 units with a maximum of 1 unit per quarter. Credit/No Credit grading only. 1 activity. Priority to BIO and MCRO majors.

BIO 263. Introductory Ecology and Evolution. 4 units

Term Typically Offered: F, SP
 Prerequisite: BIO 160 or BIO 161.

Basic concepts in ecology and evolution. Relationships among organisms in populations, communities and ecosystems, structures and dynamics of populations, communities and ecosystems, ecosystem inputs and energy flows, nutrient cycling, biogeography, population genetics, evolution, patterns of biodiversity and issues in conservation biology. 3 lectures, 1 laboratory.

BIO 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
 Prerequisite: Consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

BIO 300. Research Experience for Undergraduates. 1-2 units

Term Typically Offered: F,W,SP,SP
 CR/NC
 Prerequisite: Consent of instructor. Recommended: STAT 218.

Laboratory, field, or biology education research experience. Development of research skills and techniques. Interested students consult with a faculty member prior to enrolling to clarify expectations and deliverables. Total major credit limited to 6 units, with a maximum of 2 units per quarter. Total credit limited to 12 units. Credit/No Credit grading only.

BIO 301. Service Learning in the Health Professions. 3 units

Term Typically Offered: W
 Prerequisite: BIO 161 or MCRO 221 or MCRO 224; completion of GE Area A with a grade of C- or better; one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs); and consent of instructor.

Framework for understanding the implications of service in different health-related settings through discussion and participation in a local service project. Social determinants of health, cultural competency and unconscious bias, identity/intersectionality, and health needs of different populations. 2 lectures, 1 laboratory.

BIO 302. Human Genetics. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later: Upper-Div GE Area B
 2019-20 or earlier catalog: GE Area B5, B6, or B7
 Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one of the following courses: ASCI 112, BIO 111, BIO 123, BIO 161, BIO 213, or BOT 121. Recommended: STAT 217, STAT 218, STAT 251, STAT 305, STAT 312, STAT 321, or STAT 350.

Basic principles of human inheritance, including the transmission of genetic traits, chromosomal abnormalities and their effects, gene structure and function, mutations and mutagenic agents, cancer genetics, population genetics, and principles of genetic counseling. Not open for major credit in Biological Sciences, Microbiology, or Marine Sciences. Not open to students with credit in BIO 303 or BIO 351. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

BIO 303. Survey of Genetics. 4 units

Term Typically Offered: F, W, SP
 Prerequisite: BIO 111 or BIO 161 or BOT 121. Recommended: STAT 218.

Principles of heredity and variation. Transmission genetics; molecular mechanisms of inheritance and gene expression. Not open to Biological Sciences, Microbiology, or Marine Sciences majors. Not open to students with credit in BIO 351. Credit will be granted in only one of the following courses: BIO 302 or BIO 303. 4 lectures.

BIO 305. Biology of Cancer. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one BIO or MCRO course in GE Area B2; completion of GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Introduction to the causes, characteristics and treatment of human cancer. Effects of carcinogens and radiation; the genetics of cancer; molecular, cellular and physiological changes in common cancers; conventional chemotherapy and new treatments. Not open for major credit in Biological Sciences, Microbiology, Marine Sciences, or Biochemistry. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

BIO 308. Genetic Engineering Technology. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); and one of the following courses: CHEM 110, CHEM 124, or CHEM 127.

Introduction to the biology, methodology, and techniques used in genetic engineering. Potential benefits and problems in application within agriculture, nutrition, medicine and environmental context, including the underlying ethical questions. Not open to students with credit in CHEM 373, or to Biological Sciences, Marine Sciences, or Microbiology majors. 4 lectures. Crosslisted as BIO/CHEM 308. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

BIO 321. Mammalogy. 4 units

Term Typically Offered: F, W

Prerequisite: one of the following: BIO 162, BIO 263, NR 306 or ASCI 239.

Ecology, behavior, physiology, functional morphology, and evolution of mammals. Classification and identification of mammals, with emphasis on California species. 2 lectures, 2 laboratories.

BIO 322. Ichthyology. 4 units

Term Typically Offered: SP

Prerequisite: BIO 162.

Phylogeny, anatomy, functional morphology, physiology, and ecology of marine and freshwater fishes. Special reference to local and economically important species. Laboratory emphasis on taxonomy of California species, especially marine groups. Field trip required. 3 lectures, 1 laboratory.

BIO 323. Ornithology. 4 units

Term Typically Offered: SP

Prerequisite: BIO 162 or BIO 263 or BIO 427 or ASCI 239.

Classification and identification of birds, with emphasis on California species. Functional morphology, physiology, ecology, behavior and census methods. Field trips may require meeting in the morning before scheduled lab time. 2 lectures, 2 laboratories.

BIO 324. Herpetology. 4 units

Term Typically Offered: SP

Prerequisite: BIO 160 and BIO 162.

Living and extinct reptiles and amphibians; an adaptive approach to their diversity, biology, and classification. 2 lectures, 2 laboratories.

BIO 327. Wildlife Ecology. 4 units

Term Typically Offered: TBD

Prerequisite: BIO 263 or NR 306. Recommended: STAT 217 or STAT 218.

Principles of ecology as applied to the study of wild vertebrates and their habitats. Emphasis on techniques for collecting and analyzing field data and how these data apply to the study and management of wildlife. Use of the literature, inventory of plants and animal populations, use of maps and databases, quantifying diet and habitat use, determining sex and age and nutritional condition, capture and marking techniques, non-invasive sampling methods. 3 lectures, 1 laboratory.

BIO 329. Vertebrate Field Zoology. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing; BIO 162 or BIO 263 or BIO 427 or ASCI 239.

Identification and natural history of terrestrial vertebrates, with emphasis on field studies and local species. Field trips may require meeting in the morning before scheduled lab time. 2 lectures, 2 laboratories.

BIO 330. Extended Field Biology Activity. 1-3 units

Term Typically Offered: TBD

Corequisite: Enrollment in corresponding field biology course.

Minimum of two days of field instruction in places with significant biological diversity, and an individual or group project. Focus on field notebooks, field identification, survey methods, experimental design, and significant habitat types for various groups of organisms. The Class Schedule will list the topic of the associated field biology course. Total credit limited to 6 units, each associated with a different field biology course, with no more than 4 units applied as advisor approved electives. Field trip required. 1 to 3 activities.

BIO 335. General Entomology. 4 units

Term Typically Offered: F

Prerequisite: BIO 160, BIO 211, or PLSC 313. Recommended: BIO 162.

Introduction to the study of insects. Structure, major orders and families of insects, life histories, medical, and economic importance. Insect collection required. 2 lectures, 2 laboratories.

BIO 336. Invertebrate Zoology. 4 units

Term Typically Offered: W

Prerequisite: BIO 160 and BIO 162.

Invertebrate groups of animals with emphasis on taxonomy, morphology, distribution, and economic importance. 2 lectures, 2 laboratories, and fieldwork.

BIO 351. Principles of Genetics. 5 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 161; CHEM 216, CHEM 312, or CHEM 316.

Recommended: BIO 263; STAT 217 or STAT 218.

Principles of genetics and genetic analysis, including underlying molecular mechanisms. Subjects include gene structure and function, inheritance patterns, regulation of gene expression, mutation, recombination, recombinant DNA technology, and an introduction to population genetics. 5 lectures.

BIO 361. Principles of Animal Physiology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 162; and CHEM 216, CHEM 312 or CHEM 316.

Fundamental principles of animal physiology, including cellular mechanisms and integration to whole animals including humans. Membrane transport, fluid/salt balance, excitable cells, metabolic rate, temperature, gas exchange and circulation. 3 lectures, 1 laboratory.

BIO 363. Principles of Conservation Biology. 4 units

Term Typically Offered: F, W, SP

Sustainability Focused

Prerequisite: BIO 263 or NR 306, or graduate standing in Biological Sciences.

Foundational concepts in the conservation of wild organisms and their habitats. Quantification and valuation of biological diversity, current threats to diversity, and approaches to better understand and address these threats, across terrestrial, freshwater, and marine environments. 4 lectures. Formerly BIO 401.

BIO 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor. Recommended: STAT 218.

Investigation, research, studies, or surveys of biological problems by students working with faculty. Interested students should consult with a faculty member prior to enrolling to clarify expectations and deliverables. Total major credit limited to 6 units, with a maximum of 2 units per quarter. Total credit limited to 12 units.

BIO 405. Developmental Biology. 4 units

Term Typically Offered: SP

Prerequisite: BIO 161, BIO 162, and BIO 303 or BIO 351 or CHEM 373.

Events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation, and organogenesis, with emphasis on differential gene expression in model organisms. 3 lectures, 1 laboratory.

BIO 406. Advanced Anatomy and Physiology: Neuroscience. 4 units

Term Typically Offered: F, W

Prerequisite: BIO 361; CHEM 331 or STAT 218; PHYS 123 or PHYS 133; or graduate standing in Biological Sciences.

Anatomy and physiology of nervous systems, including electrophysiology, molecular and cellular mechanisms of neurotransmission, and interactions between the nervous system and other body systems, including integumentary and digestive, with an emphasis on humans and other vertebrates. Includes human cadaver study. 3 lectures, 1 laboratory.

BIO 407. Advanced Anatomy and Physiology: Endocrinology. 4 units

Term Typically Offered: F, SP, SU

Prerequisite: BIO 361; CHEM 331 or STAT 218; or graduate standing in Biological Sciences.

Anatomy and physiology of the endocrine system and hormones, and interactions with body systems including digestive and reproductive systems, with an emphasis on humans and other vertebrates. Course may be offered in classroom-based or online format. 4 lectures.

BIO 408. Advanced Anatomy and Physiology: Cardiorespiratory and Renal. 4 units

Term Typically Offered: F, W

Prerequisite: BIO 361; CHEM 331 or STAT 218; or graduate standing in Biological Sciences.

Anatomy and physiology of the cardiovascular, respiratory, and renal systems, with an emphasis on humans and other vertebrates. Discussion of health and disease states and responses to exercise and environmental factors. Includes human cadaver study. 3 lectures, 1 laboratory.

BIO 409. Advanced Anatomy and Physiology: Muscle and Locomotion. 4 units

Term Typically Offered: W, SP

Prerequisite: BIO 361; CHEM 331 or STAT 218; PHYS 121 or PHYS 141; or graduate standing in Biological Sciences.

Anatomy and physiology of musculoskeletal systems, including energetics and biomechanics of locomotion. Discussion of invertebrates and vertebrates with emphasis on humans. Includes human cadaver study. 3 lectures, 1 laboratory.

BIO 410. Functional Histology. 4 units

Term Typically Offered: SP

Prerequisite: ASCI 229 or BIO 231 or BIO 232 or BIO 361 or graduate standing in Biological Sciences.

Functional microscopic anatomy of principal tissues and organs of vertebrates, including humans. Structural studies to determine mechanisms underlying physiological processes and their clinical applications in medicine. 2 lectures, 2 laboratories.

BIO 411. Advanced Human Gross Anatomy. 2 units

Term Typically Offered: SU

Prerequisite: One of the following courses with a grade of C- or better: BIO 231, BIO 232, or BIO 361; and consent of instructor.

Human gross anatomy using human cadaver dissection from a regional perspective. Dissection of the musculo-skeletal and nervous tissues, vasculature, and viscera of body regions including: head, neck, torso, extremities, and body cavities. 2 laboratories.

BIO 413. Evolutionary Medicine. 4 units

Term Typically Offered: TBD

Prerequisite: BIO 263; and BIO 303 or BIO 351. Recommended: MCRO 224.

Principles and mechanisms of biological evolution in the context of human health. Microevolutionary and macroevolutionary processes, adaptation, phenotypic plasticity, biogeographic patterns of allele frequencies, tradeoffs. Focus on human health including host-pathogen coevolution, cancer, mental health, obesity, drug metabolism, evolutionary history. 4 lectures. Not open to students with credit in BIO 414.

BIO 414. Evolution. 4 units

Term Typically Offered: FW,SP,SU

Prerequisite: BIO 263; and BIO 303 or BIO 351. Recommended: BIO 327, BOT 326, or MSCI 300.

Principles, theories and mechanisms of biological evolution of plants, animals and microorganisms. Core principles include microevolutionary and macroevolutionary processes, adaptation, phenotypic plasticity, biogeographic patterns of allele frequencies, tradeoffs. Not open to students with credit in BIO 413. 4 lectures.

BIO 415. Biogeography. 4 units

Term Typically Offered: W

Prerequisite: BIO 263 or graduate standing in Biological Sciences.

Plant and animal distribution patterns in terrestrial and aquatic systems in relation to past and present physical and biotic factors. Methods to determine local and global distribution patterns of biota. Role of humans in past, present and future distributions of organisms. 4 lectures.

BIO 416. Climate Change Biology. 4 units

Term Typically Offered: F

Prerequisite: BIO 160; BIO 162; and BIO 263.

Biological consequences of climate change. Effects on cellular and organismal physiology and geographic distribution of organisms. Biodiversity, community and ecosystem impacts. Introduction to atmospheric chemistry, climate dynamics, and consequences for human populations. Possible biological mitigation strategies to reduce CO₂ emissions. Field trip required. 3 lectures, 1 laboratory.

BIO 421. Wetlands. 4 units

Term Typically Offered: TBD

Prerequisite: BOT 121 or BIO 162; CHEM 127; and SS 120 or SS 130. Recommended: one of the following: BIO 327, BOT 313, BOT 326, MSCI 300, NR 304, NR 305, or NR 306.

The formation, characteristics, and functions of wetlands. Genesis of hydric soils. Plant adaptations to saturated soils. Wetlands as wildlife habitat. Policies and social issues associated with wetlands. The procedures of wetland delineations. 3 lectures, 1 laboratory. Crosslisted as BIO/NR/SS 421.

BIO 424. Organizing and Teaching Science. 4 units

Term Typically Offered: TBD

Prerequisite: Admission to the Single Subject Credential Program.

Techniques, aims and objectives in the teaching of physical and life sciences at the secondary level. Selection and organization of teaching material, including strategies for English language learners (ELL) and special needs students. Evaluation of results. 3 lectures, 1 activity. Crosslisted as BIO/PSC 424.

BIO 425. Clinical Experience in Teaching Science Seminar. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Acceptance into the Single Subject Credential Program in Science. Concurrent: EDUC 469 or EDUC 479.

Principles and practices in effective teaching of science at the middle and high school level, learning theories, curriculum content and structure, classroom issues, and the teaching profession. Credit/No Credit grading only. Total credit limited to 4 units. 2 seminars. Crosslisted as BIO/PSC 425.

BIO 426. Immunology. 4 units

Term Typically Offered: W, SP

Prerequisite: BIO 351 or CHEM 373. Recommended: CHEM 313 or CHEM 371.

Principles of molecular and cellular immunology. Emphasis on molecular regulation of immune cell development, including generation of unique receptors, lymphocyte signal transduction and selection, programmed cell death and regulation of immune responses. Discussion and demonstration of roles of immunology in disease and as diagnostic tools. 3 lectures, 1 laboratory.

BIO 427. Wildlife Management. 4 units

Term Typically Offered: F

Prerequisite: One of the following upper-division ecology courses: BIO 327, BIO 363, BIO 401, BIO 444, BOT 326, MSCI 300, or NR 306, or graduate standing in Biological Sciences.

Important habitats, such as riparian, wetlands, and habitat features important to wildlife, such as vegetation types and snags. Basic concepts of wildlife management. Emphasis on planning and designing habitats to meet the needs of wildlife. 3 lectures, 1 laboratory.

BIO 428. Hematology. 4 units

Term Typically Offered: W

Prerequisite: one of the following: BIO 351, BIO 302, BIO 303, CHEM 373, or graduate standing in Biological Sciences. Recommended: BIO 361 or ZOO 332 or BMED 460; and CHEM 313 or CHEM 371.

Development and function of blood as a tissue. Composition, function, and mechanisms of formation and destruction of blood components in health and disease. Methods for examination of blood. 3 lectures, 1 laboratory.

BIO 429. Parasitology. 4 units

Term Typically Offered: F

Prerequisite: BIO 160 and BIO 161; or MCRO 221; or MCRO 224; or graduate standing in Biological Sciences.

External and internal parasites of man and animals. Life history. Parasite-host relationships. Control and recognition of species of clinical importance. 2 lectures, 2 laboratories.

BIO 434. Environmental Physiology. 4 units

Term Typically Offered: F, SP

Sustainability Focused

Prerequisite: BIO 162, or graduate standing in Biological Sciences. Recommended: BIO 263.

Comparative physiological mechanisms involved in the regulation of oxygen uptake, water and ion balance, and temperature regulation in animals. Emphasis is placed on physiological adaptations which maintain or restore homeostasis in animals which are subjected to environmental changes. 3 lectures, 1 laboratory.

BIO 435. Plant Physiology. 4 units

Term Typically Offered: SP

Prerequisite: BOT 121 or BIO 162. Recommended: BIO 161 or BIO 303; CHEM 312 or CHEM 216.

Consideration of the principal physiological and biochemical processes of plants with emphasis on water relations, mineral nutrition, photosynthesis, and the physiology of plant development. 3 lectures, 1 laboratory.

BIO 441. Bioinformatics Applications. 4 units

Term Typically Offered: F, SP

Prerequisite: BIO 302, BIO 303, BIO 351, or CHEM 373.

Introduction to new problems in molecular biology and current computer applications for genetic database analyses. Use of software for: nucleic acid, genome and protein sequence analysis; genetic databases, database tools; industrial applications in bioinformatics; ethical and societal concerns. 3 lectures, 1 laboratory. Crosslisted as BIO/CHEM 441.

BIO 442. Behavioral Ecology. 4 units

Term Typically Offered: F

Prerequisite: BIO 263, or graduate standing in Biological Sciences.

Behavioral adaptations of animals to their environment and way of life. Analysis of behavior patterns, use of patterns in clarifying evolutionary and ecological relationships. 3 lectures, 1 laboratory.

BIO 444. Population Ecology. 4 units

Term Typically Offered: TBD

Prerequisite: BIO 263 or NR 306.

Growth, fluctuations, balance, and natural mechanisms controlling wild populations, and methods for assessing their interconnectedness. Field trip may be required. 3 lectures, 1 laboratory.

BIO 445. Community Ecology. 4 units

Term Typically Offered: W

Prerequisite: BIO 160, BIO 162, BIO 263, and STAT 218; or graduate standing in Biological Sciences. Recommended: BIO 327, BIO 363, BIO 401, BOT 326, or MSCI 300.

Principles of ecology at the community level including the mechanisms that structure ecological communities, and the quantitative methods used to study community ecology such as diversity metrics, community composition analyses, interaction strengths and the application of statistics to field and experimental studies. 3 lectures, 1 laboratory.

BIO 446. Ecosystem Ecology. 4 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: BIO 263, BOT 326, or NR 306; and STAT 218, or Graduate standing in Biological Sciences. Recommended: BIO 327, BIO 363, BIO 401, MSCI 300, SS 120, or SS 121.

Advanced ecosystem ecology and biology, and the interactions of biological communities with the abiotic environment. Emphasis on climate change, ecosystem services, and major fluxes and pools of organic elements. 4 lectures.

BIO 447. Spatial Ecology. 4 units

Term Typically Offered: SP

Prerequisite: BIO 263; GEOG 318 or NR/LA 218; and STAT 218; or graduate standing in Biological Sciences. Recommended: BIO 327, BOT 326, or MSCI 300; and STAT 313 or STAT 513.

Effect of geographical space on distribution and abundance of organisms. Analysis of movement, home ranges, connectivity, range limits, and factors that shape these processes. Survey of available tools and data to answer questions in the discipline. 3 lectures, 1 lab.

BIO 448. Geoecology. 4 units

Term Typically Offered: SP

Prerequisite: BIO 114, BIO 162, BIO 211, or BOT 121; and BIO 227, BIO 263, NR 305, NR 306, or SS 321. Recommended: GEOL 102 or SS 120.

Exploration of the role of landforms and lithology in shaping species and community diversity, and ecological and evolutionary processes. Plant-microbe-soil relations, heavy metal tolerance, conservation of rock outcrop plants and associated biota. Green technologies such as phytoremediation and agromining. Field trip required. 3 lectures, 1 laboratory.

BIO 450. Undergraduate Laboratory Assistantship. 1-4 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of instructor and department chair.

Assisting the instructor in teaching and supervising undergraduate laboratories in the Biological Sciences Department. Total credit limited to 8 units, with a maximum of 4 units per quarter. Credit/No Credit grading only.

BIO 452. Cell Biology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 351 or CHEM 373; and CHEM 216, CHEM 312 or CHEM 316. Recommended: CHEM 313 or CHEM 371.

Introduction to cell structure and function, energy conversions, protein sorting, signaling, cytoskeleton, cell adhesion, and the cell cycle. 3 lectures, 1 laboratory.

BIO 461. Senior Project - Research Proposal. 2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Completion of GWR; STAT 218; and junior standing.

Guided course with group meetings, leading to completion of a written research proposal. Review of scientific literature and analysis of existing experimental results from published peer-reviewed articles in biology. Includes oral presentations. Course may be offered in classroom-based, online, or hybrid format. 2 activities.

BIO 462. Senior Project Research Experience. 2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Completion of GWR; STAT 218; junior standing; and consent of instructor. Recommended: BIO 400.

Completion of research, data analysis, or other substantial project as a capstone for the major. Student identifies faculty mentor before enrolling to develop project proposal and clarify deliverables. Typically a continuation of BIO 400. Written project report and/or presentation required.

BIO 463. Honors Research. 2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: BIO 461 or BIO 462; and consent of instructor.

Continuation of research experience leading to completion of advanced research in the biological sciences. Topic selected and conducted in consultation with a faculty mentor. Results presented as a written report and/or oral presentation in a public forum.

BIO 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: F, SP

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

BIO 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: F, SU

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topics selected. Total credit limited to 8 units. 1 to 4 laboratories.

BIO 472. Current Topics in Biological Research. 1-4 units

Term Typically Offered: F, SP

Prerequisite: Junior standing.

Applications of biological research topics. Discussions of how selected discoveries in biological research formed the basis for, and were developed into, practical applications, currently accepted theories, generally utilized techniques or decisions affecting society and political policies. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 seminars.

BIO 475. Molecular Biology Laboratory. 3 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 161, and grade of C- or better in BIO 351 or CHEM 373 or consent of instructor.

Introduction to techniques used in molecular biology and biotechnology; DNA extraction, characterization, cloning, Southern blotting, reverse transcription, polymerase chain reaction, and sequencing analysis. 1 lecture, 2 laboratories. Crosslisted as BIO/CHEM 475.

BIO 476. Gene Expression Laboratory. 3 units

Term Typically Offered: SP

Prerequisite: BIO/CHEM 475 with a grade of C- or better or consent of instructor; CHEM 313 or CHEM 371, or graduate standing in Biological Sciences.

Heterologous gene expression of a recombinant protein in a microbial system: gene cloning, construction of expression plasmid, DNA sequence analysis, transformation of microbial host, selection and analysis of transformed host cells, expression and purification of recombinant protein. 1 lecture, 2 laboratories. Crosslisted as BIO/CHEM 476.

BIO 485. Cooperative Education Experience. 6 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only.

BIO 495. Cooperative Education Experience. 12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only.

BIO 500. Individual Study. 1-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing in Biological Sciences and consent of instructor.

Advanced study planned and completed with the approval of and under the direction of a member of the department faculty. A written scholarly presentation of the results of each BIO 500 project must be included in the graduate student's departmental file. Total degree credit limited to 3 units. Total credit limited to 12 units.

BIO 501. Molecular & Cellular Biology. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

Principles of molecular and cellular biology including gene function and regulation, energetics, protein trafficking, cytoskeleton, signaling, adhesion, and the cell cycle. 3 lectures, 1 laboratory.

BIO 502. Biology of Organisms. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing in Biological Sciences, or consent of instructor.

Principles of and current topics in organismal biology, with an emphasis on physiology (including organ systems), behavior, and responses to the environment. 3 lectures, 1 laboratory.

BIO 503. Population Biology. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

Considerations of theory and practice in population ecology, evolutionary biology, and biosystematics. 3 lectures, 1 laboratory.

BIO 509. Communicating Biology to General Audiences. 1 unit

Term Typically Offered: SP

Prerequisite: Graduate standing.

Key issues for scientists communicating with the general public. Introduction to principles, examination of case studies, and practical application in outreach projects. Intended for graduate students in biology and related disciplines. 1 activity.

BIO 524. Developmental Biology Seminar. 2 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in Biological Sciences or consent of instructor. Recommended: BIO 501.

Principles and selected topics in developmental biology. Issues of differentiation, morphogenesis, and pattern formation; specific topics chosen by participants. 2 seminars.

BIO 534. Principles of Stem Cell Biology. 2 units

Term Typically Offered: F

Prerequisite: Graduate standing in Biological Sciences, Biomedical Engineering, or Agriculture, or consent of instructor. Recommended: BIO 452 or BIO 501.

Principles of stem cell biology including characteristics, types, roles in development, therapeutic uses, historical perspectives and ethical issues. 2 seminars.

BIO 537. Advanced Behavioral Ecology. 2 units

Term Typically Offered: W

Prerequisite: BIO 442 or graduate standing.

Function and evolution of behavioral traits as they relate to ecological phenomena. Behaviors include habitat selection, migration, spacing mechanisms, mating strategies, foraging, aggression, parasitism, altruism, communication, and comparative social systems. Examples from the primary literature. Includes oral presentations. 2 seminars.

BIO 560. Graduate Professional Seminar. 2 units

Term Typically Offered: F

Prerequisite: Graduate standing in Biological Sciences.

Preparation for a successful career in biology within or outside of academia through skills development in professional communication and presentation, the peer-review process, mentorship, scientific ethics. 2 seminar.

BIO 561. Proposal Writing for Biological Research. 3 units

Term Typically Offered: W

Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

Written and oral presentations of a proposal for research in biology including a literature review. 3 seminars.

BIO 562. Data Management and Visualization in Biology. 3 units

Term Typically Offered: F

Prerequisite: STAT 218 and graduate standing in Biological Sciences; or consent of instructor. Recommended: Experience with Excel and R.

Data management and visualization tools for research. Introduction to data management in menu driven applications. Extensive work with data management in code-driven applications. Advanced visualization techniques for data presentation and publication. 3 seminars.

BIO 570. Selected Topics in Biology. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

Directed group study of selected topics for graduate students. The Class Schedule will list topics for selection. Total credit limited to 12 units. 1 to 4 seminars.

BIO 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

BIO 574. Teaching Strategies for College Biology Laboratories. 1 unit

Term Typically Offered: F

CR/NC

Prerequisite: Graduate standing in Biological Sciences.

Concepts of teaching and learning related to instructor performance in college biology laboratory classes. Introduction to teaching strategies, managing a classroom, writing exam questions, and science education research for the laboratory class setting. Credit/No Credit grading only. 1 activity.

BIO 575. College Biology Teaching Practicum. 1-2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Graduate standing; Department Chair and Graduate Coordinator approval required.

Supervised teaching-related activities associated with undergraduate classes in the Biological Sciences Department including assessment, curriculum development, implementing novel teaching approaches. Total credit limited to 2 units. Credit/No Credit grading only.

BIO 583. Research Experience for Regenerative Medicine Students. 2 units

Term Typically Offered: SP

Prerequisite: Graduate standing in the Specialization in Regenerative Medicine for the MS in Biological Sciences; or Specialization in Regenerative Medicine for the MS in Biomedical Engineering; or the Animal Science Specialization for the MS in Agriculture.

Independent research experience in biological or biomedical research. Proposal writing and literature review; experimental design, implementation and troubleshooting; oral and poster presentations. 1 seminar and supervised work. Crosslisted as ASCI/BIO/BMED 583. Formerly ASCI/BIO/BMED 594.

BIO 585. Cooperative Education Experience. 6 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Graduate standing in Biological Sciences and consent of instructor.

Advanced study, analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 6 units. Credit/No Credit grading only.

BIO 590. Seminar in Biology. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

Critical evaluation of primary literature on a specific topic in biology. Includes oral and/or written presentation of critiques. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 2 seminars.

BIO 591. Biology Colloquium. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing in Biological Sciences.

Recent trends in the field of biology for graduate students in the Biological Sciences master's degree program. Overview of current research with presentations from visiting scholars and Cal Poly faculty. Total credit limited to 4 units. 1 activity.

BIO 593. Regenerative Medicine Internship. 3-5 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing in the Specialization in Regenerative Medicine for the MS in Biological Sciences; or the Specialization in Regenerative Medicine for the MS in Biomedical Engineering; or the Specialization in Animal Science for the MS in Agriculture.

Supervised graduate research and/or development in stem cell science or regenerative medicine and engineering. Provides students with an off-campus industrial or university internship. Total credit limited to 10 units. Crosslisted as ASCI/BIO/BMED 593.

BIO 595. Cooperative Education Experience. 12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Graduate standing in Biological Sciences and consent of instructor.

Advanced study, analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 12 units. Credit/No Credit grading only.

BIO 599. Thesis. 1-3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing in Biological Sciences and consent of instructor.

Individual research under the general supervision of the faculty, leading to a graduate thesis of suitable quality. Total credit limited to 9 units.

Biomedical Engineering (BMED)

undefined

BMED Courses

BMED 101. Introduction to the Biomedical Engineering Major. 1 unit

Term Typically Offered: F

Prerequisite: Biomedical or General Engineering Freshmen.

Introduction to major topics in Biomedical Engineering. Time management, study skills and class scheduling necessary for academic success. Overview of university services. Professional pathways and ethics. Review of career opportunities. 1 seminar.

BMED 102. Introduction to Biomedical Engineering Analysis. 1 unit

Term Typically Offered: W

Prerequisite: BMED 101.

General introduction to bioengineering analysis applied to representative topics in biomechanics, biofluidics, bioinstrumentation, biomaterials, biotechnology, and related areas. Review of technological needs, testing procedures, governmental regulation, quality of life, and ethical issues. 1 seminar.

BMED 212. Introduction to Biomedical Engineering Design. 3 units

Term Typically Offered: F, W, SP

Prerequisite: MATH 143.

General introduction to bioengineering design, including examples of engineering analysis and design applied to representative topics in biomechanics, bioinstrumentation, biomaterials, biotechnology, and related areas. A review of technological needs, design methodology, testing procedures, statistical analysis, governmental regulations, evaluation of costs and benefits, quality of life, and ethical issues. 2 lectures, 1 laboratory.

BMED 213. Bioengineering Fundamentals. 2 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B2

2019-20 or earlier catalog: GE Area B2

Sustainability Related

Prerequisite: MATH 142; for engineering students only. Corequisite: BIO 213. Recommended: CHEM 124.

Treatment of the engineering applications of biology. Genetic engineering and the industrial application of microbiology. Systems physiology with engineering applications. Structure and function relationships in biological systems. The impact of life on its environment. Course may be offered in classroom-based or online format. 2 lectures. Crosslisted as BMED/BRAE 213. Fulfills GE B2.

BMED 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

BMED 310. Biomedical Engineering Measurement and Analysis. 4 units

Term Typically Offered: F, W

Prerequisite: EE 201; and CPE/CSC 101, CSC 231, CSC 232, or CSC 234.

Fundamentals of biomedical engineering analysis. Use and application of tools and analytical methods used by bioengineers. 3 lectures, 1 laboratory.

BMED 330. Intermediate Biomedical Design. 4 units

Term Typically Offered: W, SP

Prerequisite: MATE 210, ME 328, STAT 312. Recommended: BMED 420, BMED 460.

Design of biomedical devices and systems using various machine elements and components including gears, welded connections, prime movers. Decision modeling based on technical and economic feasibility. 3 lectures, 1 laboratory.

BMED 355. Electrical Engineering Concepts for Biomedical Engineering. 4 units

Term Typically Offered: W

Prerequisite: EE 201, MATH 344.

Introduction to electrical engineering concepts for biomedical engineers. Continuation of basic circuit analysis. Steady state AC circuit analysis and phasor concepts. Application of the Laplace Transform to transient circuit analysis. Introduction to digital logic gates, combinational and sequential logic circuits. 4 lectures.

BMED 400. Special Problems for Advanced Undergraduates. 2-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: ME 212; junior standing; and consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total degree credit limited to 4 units. Total credit limited to 6 units.

BMED 401. Biomedical Entrepreneurship. 4 units

Term Typically Offered: TBD

Prerequisite: Senior standing and engineering major.

Identification and evaluation of commercial opportunities in the healthcare industry. Methods necessary for rapid iteration and market validation of early-stage prototypes, with emphasis on issues critical to biomedical products, including intellectual property, FDA submission, funding sources, and business models. 3 lectures, 1 laboratory.

BMED 404. Applied Finite Element Analysis. 4 units

Term Typically Offered: F, W

Prerequisite: BMED 410, and CE 207 or CE 208; or CE 406; or ME 328.

Finite element based solutions to engineering problems with an emphasis on elastostatic problems in structural mechanics. The power and pitfalls associated with the finite element method highlighted through practical modeling assignments. Introduces the use of commercial finite element codes. 3 lectures, 1 laboratory. Crosslisted as BMED/CE/ME 404.

BMED 409. Interdisciplinary Study in Biomechanics. 4 units

Term Typically Offered: SP

Prerequisite: BMED 410 and CE 207 or CE 208; or KINE 403; or ME 326.

Examination of human motion biomechanics. Experimental and analytical methods in motion analysis based on rigid body dynamics. Protocols for protection of human subjects in research. Hypothesis-driven research in interdisciplinary teams, including written proposal development and written/oral communication of results to a scientific audience. 1 lecture, 3 activities. Crosslisted as BMED/KINE/ME 409.

BMED 410. Biomechanics. 4 units

Term Typically Offered: W, SP

Prerequisite: CE 204 or CE 208; and ME 212. Corequisite: BMED 310.

Introduction to physiological systems, with emphasis on structure and function of major tissues and organs. Application of mechanics to understand the behavior of these tissues and organs at gross and microscopic levels. Bioelastic solids. Rigid body biomechanics. Biofluids, basic mechanical properties of collagen and elastin, bone, cartilage, muscles, blood vessels, and other living tissues. Application of continuum mechanics to hard and soft tissues. Biomechanical engineering design for clinical applications. 3 lectures, 1 laboratory.

BMED 420. Principles of Biomaterials Design. 4 units

Term Typically Offered: F, SP

Prerequisite: CE 204 or CE 208; and MATE 210. Corequisite: BMED 310.

Fundamentals of materials science as applied to bioengineering design. Biocompatibility of materials. Materials characterization and design. Natural and synthetic polymeric materials. Wound repair, foreign body response, blood clotting. Transplantation biology, artificial organs, and tissue engineering. Medical devices, government regulations, and ethical issues. 3 lectures, 1 laboratory.

BMED 422. Medical Device Evaluation and the FDA Approval Process. 4 units

Term Typically Offered: W, SP

Prerequisite: BMED 420.

Overview of the path to market for new medical devices, including nonclinical and clinical evaluation and the regulatory process. Course covers bench, in vitro, and in vivo models, GLP studies, clinical trials, Quality Systems, and FDA clearance and approval processes. 4 lectures.

BMED 425. Biomedical Engineering Transport. 4 units

Term Typically Offered: F, SP

Prerequisite: ME 302 and ME 341.

Physiological fluid mechanics, convective mass transfer, and diffusion in tissue. Properties of blood. Exchange of fluids between capillary beds and tissue. Coupled diffusion and convection. Application of mass transfer coefficients. Rates of diffusion in various physiologic media. 3 lectures, 1 laboratory.

BMED 430. Biomedical Modeling and Simulation. 2 units

Term Typically Offered: F, W

Prerequisite: BMED 310.

Computational methods for anatomical modeling and boundary value problems in the biomechanics of tissues and biomedical devices. Nonlinear biodynamics, heat flow, cardiac impulse propagation, anatomic modeling, and biomechanics. Course may be offered in classroom-based or online format. 1 lecture, 1 laboratory.

BMED 432. Micro/Nano System Design. 4 units

Term Typically Offered: F

Prerequisite: BMED 212 or MATE 210.

Fundamentals of designing micro/nano scale systems employing sensors, actuators and intelligent controls. Explore mechanics, electronics, heat transfer, photonics, fluid mechanics and biometrics at the micrometer and nanometer scale. Discover how scaling impacts design criteria. Investigate the integration of science and engineering and evaluate applications in living systems. Not open to students with credit in MATE 550. 4 lectures.

BMED 434. Micro/Nano Fabrication. 3 units

Term Typically Offered: W

Prerequisite: BMED 212 or MATE 210.

Fabrication science and technology for creating micro and nano scale devices. Explore basic processes such as oxidation, diffusion, ion implantation, etching, chemical and physical vapor deposition, photolithography. Develop an understanding of the science of each process and how to select the right steps for fabricating electronic, photon and micro-electro-mechanical systems devices. 3 lectures. Crosslisted as BMED 434/EE 423/MATE 430.

BMED 435. Microfabrication Laboratory. 1 unit

Term Typically Offered: W

Corequisite: BMED 434/EE 423/MATE 430.

Application of basic processes involved in microfabrication: cleanroom protocol, oxidation, diffusion, photolithography etching and sputtering. Explore process development through fabrication of electronic, photonic or microfluidic devices. Each student will be part of a team that will fabricate and test a device. 1 laboratory. Crosslisted as BMED 435/EE 473/MATE 435.

BMED 436. Characterization of Micro/Nano Scale Structures. 4 units

Term Typically Offered: TBD

Prerequisite: BMED 212 or MATE 210.

Fundamentals of material's surface analysis techniques for exploring structure and composition of micro/nano scale features and films will be assessed. Students will develop data analytics for deciding which technique to apply for morphological, elemental or chemical composition analysis. 4 lectures.

BMED 440. Bioelectronics and Instrumentation. 4 units

Term Typically Offered: F, W

Prerequisite: BMED 310 and EE 201.

Analog and digital circuits in bioinstrumentation. Biomedical signals in continuous and discrete systems. Sampling and digital signal processing. Ultrasound, MRI, CT, Bioelectromagnetics. Electrokinetics. Biophysical phenomena, transducers, and electronics as related to the design of biomedical instrumentation. Potentiometric and amperometric signals and amplifiers. Biopotentials, membrane potentials, chemical sensors. Mechanical transducers for displacement, force and pressure. Temperature sensors. Flow sensors. Light-based instrumentation. Electrical safety. 3 lectures, 1 laboratory.

BMED 445. Biopotential Instrumentation. 4 units

Term Typically Offered: SP

Prerequisite: BMED 440.

Focus on the principles associated with instrumentation used to detect surface biopotentials. Emphasis on circuit level design and laboratory implementation of systems used to detect ECG, EMG and EEG signals. Development of practical experience with analog electronic instrumentation used in the design and testing process. A system level design project related to surface biopotential detection and recording. 2 lectures, 2 laboratories.

BMED 450. Contemporary Issues in Biomedical Engineering. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing in Biomedical Engineering.

Current and evolving topics in biomedical engineering, including medical and industrial applications. Exploration of contemporary issues in biomedical engineering, including technical and societal implications. The Class Schedule will list topic selected. Total credit limited to 16 units. Course may be offered in classroom-based or online format. 4 lectures.

BMED 455. Biomedical Engineering Design I. 4 units

Term Typically Offered: F, W

Prerequisite: BMED 410.

Engineering design methodology, design process, project planning, decision making, modeling, construction, and testing of an open-ended design project. Preparation of formal engineering reports. Statistical analysis. Governmental regulations. Bioethical issues. 2 lectures, 2 laboratories.

BMED 456. Biomedical Engineering Design II: Senior Project. 4 units

Term Typically Offered: W, SP

Prerequisite: BMED 455.

Engineering design methodology, design process, project planning, decision making, modeling, construction, and testing of an open-ended design project. Preparation of formal engineering reports. Statistical analysis. Governmental regulations. Bioethical issues. 2 lectures, 2 laboratories.

BMED 459. Senior Thesis. 4 units

Term Typically Offered: F,W,SPSU

Prerequisite: senior standing, and consent of instructor.

Selection and completion of senior thesis under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Thesis results presented in a formal report. Minimum commitment of 120 hours.

BMED 460. Engineering Physiology. 4 units

Term Typically Offered: F, W

Prerequisite: BMED 310 and either BIO 231 or BIO 232; or graduate standing.

Physiology for biomedical engineering students, with an emphasis on control mechanisms and engineering principles. Engineering aspects of basic cell functions; biological control systems; muscle; neural; endocrine, and circulatory systems, digestive, respiratory, renal, and reproductive systems; regulation of metabolism, and defense mechanisms. 3 lectures, 1 laboratory.

BMED 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

BMED 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

BMED 495. Cooperative Education Experience. 1-12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A fully developed formal report and evaluation by work supervisor is required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

BMED 500. Individual Study. 2-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing and consent of department chair.

Individual investigation, research, studies or surveys of selected problems. Advanced study planned and completed under the direction of faculty. Open to graduate students who have demonstrated the ability to do independent work. Total credit limited to 8 units.

BMED 505. Biomedical Signal Transduction and Data Acquisition. 4 units

Term Typically Offered: SP

Prerequisite: BMED 440.

Bridging the physical gap between biological and digital systems. Physics of chemical, mechanical, electrical, thermal, and optical sensors relevant to biomedical engineering. Evaluation of transducer performance and system design. Includes realization of a transducer system relevant to graduate projects. 3 lectures, 1 laboratory.

BMED 510. Principles of Tissue Engineering. 4 units

Term Typically Offered: F

Prerequisite: one of the following: ASCI 438, BIO 361, or BMED 460; or graduate standing.

Exploration of areas including cell source and isolation, scaffold selection and modification, tissue cultivation and bioreactor design, and patient implantation. Applications of tissue engineering for creating skin, cartilage, blood vessels, and other tissues. 3 lectures, 1 laboratory.

BMED 512. Biomedical Engineering Horizons. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing, MATH 143, CHEM 125, PHYS 131 or PHYS 141, BIO 161 or consent of instructor.

Examination of the advances in nanotechnology, micro-electro-mechanical systems, materials and clinical technology. Relationship between modern medical achievements and advances in engineering and science, the biomedical engineering industry, and the use of technology in a human context. 4 lectures.

BMED 515. Introduction to Biomedical Imaging. 4 units

Term Typically Offered: W

Prerequisite: PHYS 132, MATH 244, and graduate standing.

Fundamental principles and applications of biomedical imaging, modalities in medicine. Topics focus on optical imaging techniques, such as brightfield, fluorescence, confocal, multiphoton, DIC, OCT, SEM, and other advanced microscopy techniques. 2 lectures, 2 laboratories.

BMED 520. Modeling of Biomedical Systems. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing.

Analytic and computational representation of biomedical systems with applications in physiology and medicine. Emphasis on biomedical engineering systems, applications, and system modeling including the use of modern tools. Serves as a foundation for biomedical engineering graduate electives and research projects. 4 lectures.

BMED 525. Skeletal Tissue Mechanics. 4 units

Term Typically Offered: F

Prerequisite: CE 204 or CE 208; and BMED 460.

Overview of the mechanical properties of various tissues in the musculoskeletal system, the relationship of these properties to anatomic and histologic structures, and the changes in these properties caused by aging, disease, overuse, and disuse. Tissues covered include bone, cartilage and synovial fluid, ligament, and tendon. 4 lectures.

BMED 530. Biomaterials. 4 units

Term Typically Offered: F

Prerequisite: BIO 161, or BIO 213 and BMED/BRAE 213; MATE 210 and graduate standing or consent of instructor.

Structure-function relationships for materials in contact with biological systems. Interactions of materials implanted in the body. Histological and hematological considerations including foreign body responses, inflammation, carcinogenicity, thrombosis, hemolysis, immunogenic and toxic properties. Microbial interaction with material surfaces, degradation. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as BMED/MATE 530.

BMED 535. Bioseparations and Clinical Diagnostics. 4 units

Term Typically Offered: W

Prerequisite: BMED 425, ME 341 or consent of instructor.

Physicochemical hydrodynamics and microfluidic bioseparations, which includes electrokinetics, colloid science and suspension mechanics in the context of Clinical Diagnostic Systems. Understanding key separation design parameters through a course project, theoretical and numerical models. 4 lectures.

BMED 541. Microcirculation. 3 units

Term Typically Offered: TBD

Prerequisite: BMED 460.

Topic groups include microvessel wall structure, network architecture, flow regulation, transport, inflammation, angiogenesis, arteriogenesis, and rarefaction. Additional focus on patho-physiology and the engineering approaches to assess and treat microvascular dysfunction. Not open to students with credit in BMED 540. 3 lectures.

BMED 542. Microcirculation Laboratory. 1 unit

Term Typically Offered: TBD

Prerequisite: BMED 460.

Laboratory procedures include direct visualization of microvessels by microscopy and indirect assessment by skin temperature, evaluation of microvascular networks by casting and immunostaining, and assessment of vascular wall structure by histology. 1 laboratory.

BMED 550. Current and Evolving Topics in Biomedical Engineering. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in Biomedical Engineering or consent of department chair.

Current topics in biomedical engineering, including medical and industrial applications. Exploration of detailed technical treatment of contemporary issues in biomedical engineering, and examination of technical and societal implications of these subjects. Class Schedule will list topics selected. Total credit limited to 12 units. 4 lectures.

BMED 555. Neural Systems Simulation and Modeling. 4 units

Term Typically Offered: SP

Prerequisite: MATH 244, BMED 440.

The biophysical basis of the Hodgkin-Huxley active membrane model. A detailed description of the dynamics of voltage gated ion channels. The complete Hodgkin-Huxley active membrane model, with an emphasis on its use in simulating the electrical activity of nerve cells. Equivalent circuit/ circuit simulator based approaches to modeling Hodgkin-Huxley neurons. 4 lectures.

BMED 560. Cell Transplantation and Biotherapeutics. 2 units

Term Typically Offered: SP

Prerequisite: ASCI 438, BIO 361, or BMED 460.

Topics include the etiology, patho-physiology, and rodent models for various forms of disease, such as inflammatory, autoimmune, and monogenic diseases, as well as nucleic acid, protein, and cellular-based therapies for these conditions. Not open to students with credit in BMED 545. 2 lectures.

BMED 561. Cell Transplantation and Biotherapeutics Laboratory. 2 units

Term Typically Offered: SP

Prerequisite: ASCI 438, BIO 361, or BMED 460; and STAT 218 or STAT 312. Corequisite: BMED 560.

Procedures include rodent handling, anesthesia, surgically modeling disease, biotherapy delivery, and visualizing/measuring therapeutic efficacy. Additional focus on experimental design, data collection, and analysis. 2 laboratories.

BMED 563. Biomedical Engineering Graduate Seminar. 2 units

Term Typically Offered: W, SP

Prerequisite: Graduate standing or consent of instructor.

Selected topics of interest to biomedical engineering and other graduate students. Open to graduate students and selected seniors. A forum to share information about research and research tools; an opportunity to discuss topics of interest with professionals in the field, academics, and other graduate students. The Class Schedule will list topic selected. Total credit limited to 4 units. 1 seminar, 1 laboratory.

BMED 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

BMED 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

BMED 583. Research Experience for Regenerative Medicine Students. 2 units

Term Typically Offered: SP

Prerequisite: Graduate standing in the Specialization in Regenerative Medicine for the MS in Biological Sciences; or Specialization in Regenerative Medicine for the MS in Biomedical Engineering; or the Animal Science Specialization for the MS in Agriculture.

Independent research experience in biological or biomedical research. Proposal writing and literature review; experimental design, implementation and troubleshooting; oral and poster presentations. 1 seminar and supervised work. Crosslisted as ASCI/BIO/BMED 583. Formerly ASCI/BIO/BMED 594.

BMED 591. Thesis Project Design Laboratory I. 2 units

Term Typically Offered: F

Prerequisite: Graduate standing.

Selection and completion of project by individuals or team which is typical of problems graduates must solve in their fields of employment or applied research. Project may involve, but is not limited to, physical modeling and testing of integrated design projects, costs, planning, scheduling and research and may involve students from several disciplines. Formulation of outline, literature, review and project schedule. 2 laboratories.

BMED 592. Thesis Project Design Laboratory II. 2 units

Term Typically Offered: SP

Prerequisite: BMED 591 or consent of instructor.

Continuation of BMED 591. Completion of project by individuals or team which is typical of problems graduates must solve in their fields of employment or applied research. Project may involve, but is not limited to, physical modeling and testing of integrated design projects, costs, planning, scheduling and research. Formulation of outline, literature review, and project schedule. 2 laboratories.

BMED 593. Regenerative Medicine Internship. 3-5 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing in the Specialization in Regenerative Medicine for the MS in Biological Sciences; or the Specialization in Regenerative Medicine for the MS in Biomedical Engineering; or the Specialization in Animal Science for the MS in Agriculture.

Supervised graduate research and/or development in stem cell science or regenerative medicine and engineering. Provides students with an off-campus industrial or university internship. Total credit limited to 10 units. Crosslisted as ASCI/BIO/BMED 593.

BMED 599. Design Project (Thesis). 1-9 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing.

Selection by individual or group, with faculty guidance and approval, of topic for independent research or investigation resulting in a thesis or project to be used to satisfy the degree requirement. An appropriate experimental or analytical thesis or project may be accepted. Total credit limited to 9 units.

BioResource and Agricultural Engineering (BRAE)

undefined

BRAE Courses

BRAE 121. Agricultural Mechanics. 2 units

Term Typically Offered: F, W

Identification and use of tools and materials; shop safety; tool sharpening and care; concrete mixes and materials; simple electric wiring; metal work; pipe fitting; basic woodworking; estimating quantities and costs. Students are required to meet safety regulations in laboratory work. 1 lecture, 1 laboratory.

BRAE 128. Careers in Bioresource and Agricultural Engineering. 2 units

Term Typically Offered: F

Introduction to careers associated with BioResource and Agricultural Engineering, and Agricultural Systems Management. Professional engineering registration process. Engineering problem solution and report format. Design procedures. Engineering fundamentals. Laboratory includes visits to facilities relating to career opportunities. 1 lecture, 1 laboratory.

BRAE 129. Laboratory Skills and Safety. 1 unit

Term Typically Offered: F, W

Prerequisite: BRAE and ASM majors only.

Introduction to fabrication and construction materials used in the field of Agricultural Engineering. Fabrication skills in the development of wood, metal, concrete projects, and creative design. Strength tests of wood, fasteners, concrete, and student design projects. 1 laboratory.

BRAE 141. Agricultural Machinery Safety. 3 units

Term Typically Offered: F, SP

Evaluation of safe tractor and equipment operation. Supervised field operation emphasizing the safe and efficient performance of modern farm and utility-industrial equipment. 2 lectures, 1 laboratory.

BRAE 142. Agricultural Power and Machinery Management. 4 units

Term Typically Offered: F

Prerequisite: MATH 116 or equivalent.

Evaluation of agricultural machinery and tractor power performance. Equipment studied includes primary and secondary tillage tools, grain drills, row crop planters, sprayers, grain and forage harvesters, and specialty crop harvesters. Emphasis on management, selection, cost analysis using computers and efficient operation of agricultural machinery. 3 lectures, 1 laboratory.

BRAE 150. Design Graphics and CAD for Agricultural Engineering. 2 units

Term Typically Offered: F, W

Visual communication in engineering design and problem solving. Principles of freehand sketching, and computer-aided-drafting. Computer aided drafting using CAD software. 2-D projections including automatic dimensioning and hatching. Plan set development and external references. Land grading design, using 3-D drawing software. Not open to students with credit in BRAE 133 and BRAE 151. 2 laboratories.

BRAE 152. 3-D Solids Modeling. 1 unit

Term Typically Offered: W, SP

Prerequisite: BRAE 133 and BRAE 151; or BRAE 150.

Introduction to 3-dimensional solids modeling using state-of-the-art software. Model generation and modification of associative properties, assembly modeling, extrusions and revolutions. 1 laboratory.

BRAE 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

BRAE 203. Agricultural Systems Analysis. 4 units

Term Typically Offered: W

Prerequisite: MATH 118 or equivalent.

Agricultural Systems Analysis investigates the interrelationships between sub-components in an overall system. Problem solving algorithms, network analysis, project planning techniques, and optimization. 2 lectures, 2 activities.

BRAE 213. Bioengineering Fundamentals. 2 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B2

2019-20 or earlier catalog: GE Area B2

Sustainability Related

Prerequisite: MATH 142; for engineering students only. Corequisite: BIO 213. Recommended: CHEM 124.

Treatment of the engineering applications of biology. Genetic engineering and the industrial application of microbiology. Systems physiology with engineering applications. Structure and function relationships in biological systems. The impact of life on its environment. Course may be offered in classroom-based or online format. 2 lectures. Crosslisted as BMED/BRAE 213. Fulfills GE B2.

BRAE 216. Fundamentals of Electricity. 4 units

Term Typically Offered: F

Prerequisite: BRAE 129; MATH 142; and PHYS 131 or PHYS 141.

Application of electricity in BioResource and Agricultural Engineering, including basic electric circuits. Will include wiring materials, code regulations, electrical measurements, R-L-C circuit fundamentals, system planning, motors, basic electronics, and an introduction to computer usage. 3 lectures, 1 laboratory.

BRAE 220. Introduction to Biological Systems. 4 units

Term Typically Offered: F, W

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

Prerequisite: MATH 141 or MATH 161. Recommended. Corequisite: CHEM 124 or CHEM 127.

Systems approach to introductory life science that focuses on patterns and cycles in biology. Introductory modeling and quantitative measurement of life science parameters. Emphasis on the interaction between organisms and their environment. Course may be offered in classroom-based or hybrid format. 3 lectures, 1 laboratory. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs).

BRAE 232. Agricultural Structures Planning. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 129; BRAE 150 or BRAE 151; and PHYS 132.

Planning of facilities required in production systems. Materials and processes used in construction of agricultural structures. Environmental factors affecting crop storage structures and animal housing. Design of structural environments to meet the needs of commodities, animals, and plants. 3 lectures, 1 laboratory.

BRAE 234. Introduction to Mechanical Systems in Agriculture. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 152; and PHYS 131 or PHYS 141.

Introduction to elements used in the mechanical transmission of power and force in agricultural systems. Power transmission using v-belts, roller chain, gear and shaft drives, hydraulic actuators. Linear and nonlinear actuation devices including linkages, cams, and hydraulic/pneumatic cylinders. 3 lectures, 1 laboratory.

BRAE 236. Principles of Irrigation. 4 units

Term Typically Offered: F

Prerequisite: MATH 141.

Land grading design, operation, management, and evaluation of irrigation methods. 3 lectures, 1 laboratory.

BRAE 237. Introduction to Engineering Surveying. 2 units

Term Typically Offered: F, W, SP

Prerequisite: MATH 119.

Introduction to field measurement using automatic levels, total stations, robotic stations, GNSS RTK receivers and field data collectors. Field procedures for differential and profile leveling, directional measurement, traversing and construction surveying. An understanding in direction, elevation and earthwork volume computations. 1 lecture, 1 laboratory.

BRAE 239. Engineering Surveying. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATH 119.

Field measurement using levels, robotic stations, RTK receivers, data collectors. Leveling, profiles, traverses, traverse adjustment, triangulation, earthwork volumes and curve alignment computations. Topographic surveys, topographic mapping, building layout, road design. Topics as geodetic survey, licensing, aerial mapping, GIS, and remote sensing. 2 lectures, 2 laboratories.

BRAE 240. Agricultural Engineering Laboratory. 1 unit

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Individual projects. Total credit limited to 4 units. 1 laboratory.

BRAE 244. Precision Farming. 4 units

Term Typically Offered: W

Prerequisite: One of the following: PLSC 133, PLSC 190, PLSC 260, BRAE 237, or BRAE 239.

Precision agriculture applications. Integrating GIS, GPS, and remote sensing technologies with site-specific farming practices to optimize agricultural productivity. Field trip required. 3 lectures, 1 laboratory. Crosslisted as BRAE/PLSC 244.

BRAE 247. Forest Surveying. 2 units

Term Typically Offered: TBD

Prerequisite: NR 215.

Use and care of tapes, staff compass, abney levels, total stations, and GPS receivers. Keeping field notes, measurements by tape. Closed and open traverse by compass and total stations. Turning angles and determining directions of lines. Map reading and public land description. GPS measurements. Weekend field trips required. 1 lecture, 1 laboratory. Crosslisted as BRAE/NR 247.

BRAE 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

BRAE 301. Hydraulic and Mechanical Power Systems. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 152; and PHYS 121 or PHYS 141.

Selection, application and use of hydraulic components and mechanical power transmission equipment. Use of standardized circuit design procedures. 3 lectures, 1 laboratory.

BRAE 302. Servo Hydraulics. 4 units

Term Typically Offered: W

Prerequisite: BRAE 216 or BRAE 324 and BRAE 234 or BRAE 301.

Application of microcomputers and programmable logic controllers to hydraulic, pneumatic and mechanical systems. Theory, instrumentation and sensors used in process and control systems used in agricultural equipment. 3 lectures, 1 laboratory.

BRAE 312. Hydraulics. 4 units

Term Typically Offered: F

Prerequisite: PHYS 132, ME 211.

Static and dynamic characteristics of liquids, flow in open and closed channels, uniform and nonuniform flow, flow measurement, pumps. 3 lectures, 1 laboratory.

BRAE 317. Agricultural Systems Management Theory. 4 units

Term Typically Offered: W
Prerequisite: BRAE 203.

Introduction to systems and technical management with application in agricultural business settings, including logistics, reliability, system behavior, causal loops, feedback and delay. Data analysis, systematic decision-making, and simulation. Field trip required. 4 lectures.

BRAE 320. Principles of Bioresource Engineering. 4 units

Term Typically Offered: SP
Prerequisite: BRAE 232; BRAE 236; CHEM 125; and PHYS 132.

Theory and applications of bioprocess technology in biological and agricultural systems. Engineering properties of biological materials and organisms. Basic unit operations, fluid mechanics and heat/mass transfer as applied to bioprocess technology. Special requirements of agricultural and biological processes. 3 lectures, 1 laboratory.

BRAE 321. Agricultural Safety. 3 units

Term Typically Offered: W
Prerequisite: Junior standing.

Principles of agricultural safety. Accident causation and prevention, hazard identification and abatement, laws and regulations. Machinery, electrical, chemical, livestock, shop and fire safety. Safety program development. 2 lectures, 1 activity.

BRAE 324. Principles of Agricultural Electrification. 4 units

Term Typically Offered: W
Prerequisite: MATH 119, PHYS 121.

Applications of DC/AC electricity in agriculture. National Electric Code regulations. The wiring of agricultural structures and electrical distribution. Series, parallel and series-parallel circuits, R-L-C circuits, electric motors, electronics. 3 lectures, 1 laboratory.

BRAE 328. Measurements and Computer Interfacing. 4 units

Term Typically Offered: W
Prerequisite: EE 321; EE 361; and CSC 231 or CSC 232 or CSC 234.

Transducers and engineering measurements in agricultural engineering. Covering transducer characteristics, signal processors and controllers, instrumentation techniques, and the use of the computer in the measurement and control of typical engineering problems. 3 lectures, 1 laboratory.

BRAE 331. Irrigation Theory. 3 units

Term Typically Offered: W
Prerequisite: BRAE 236 or BRAE 340; MATH 141.

Plant-water-soil relations examining evapotranspiration, plant stress, soil moisture depletion, irrigation frequency and depth, salinity management, infiltration, drainage and climate control. 3 lectures.

BRAE 332. Environmental Controls for Agricultural Structures. 4 units

Term Typically Offered: SP
Prerequisite: BRAE 232.

Design of internal environments to meet the needs of commodities, animals, and plants. Thermodynamic and psychrometric principles for agricultural structures. Heat transfer, insulation and refrigeration. Sensing, monitoring and controlling environmental factors affecting crop storage structures and animal housing. 2 lectures, 2 activities.

BRAE 333. Aquacultural Engineering. 3 units

Term Typically Offered: F
Prerequisite: Junior standing and MATH 118.

Application of aquacultural engineering principles for freshwater and marine food-production systems. Examination of system design constraints for maximizing productivity and minimizing environmental impacts, nutrient management, gas exchange and animal husbandry. Field trip required. 2 lectures, 1 laboratory.

BRAE 335. Internal Combustion Engines. 4 units

Term Typically Offered: W
Prerequisite: Junior standing.

Principles of operation of internal combustion engines. Theory of operation and diagnosis evaluation and repair of small engines, gasoline and diesel engines and economics of operation, use and repair. Power analysis and application. 3 lectures, 1 laboratory.

BRAE 337. Landscape Irrigation. 4 units

Term Typically Offered: W
Prerequisite: MATH 118.

Design of sprinkler and drip irrigation systems including: site characteristics, soil variables affecting water storage and infiltration rate, plant selection and hydrozones, hydraulics, nozzle spacing, selection of system components, back flow prevention, plumbing codes and cost estimating. Irrigation system evaluation and audit irrigation scheduling, and water budget. 3 lectures, 1 laboratory.

BRAE 339. Internship in Bioresource and Agricultural Engineering. 1-12 units

Term Typically Offered: F, W, SP
CR/NC
Prerequisite: Consent of internship instructor.

Students will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 6 units. Credit/No Credit grading only.

BRAE 340. Irrigation Water Management. 4 units

Term Typically Offered: F, W, SP
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

California water supply and budget; water rights and issues. Local, state and federal water institutions. Water measurement; basic hydraulics; irrigation systems; distribution uniformity and efficiency. Soil-plant-water relationships; soil moisture measurement; evapotranspiration; irrigation schedules; practical constraints affecting scheduling; salinity and drainage. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

BRAE 342. Agricultural Materials. 4 units

Term Typically Offered: F

Prerequisite: PHYS 121; SS 120 or SS 121; and MATH 119.

Physical properties of agricultural materials and their measurement. Strength of materials, material flow and transport, material deformation, shape and size classification, moisture relationships and biological interactions. Interactions between agricultural materials, the environment and equipment used to handle them. 3 lectures, 1 laboratory.

BRAE 343. Mechanical Systems Analysis. 4 units

Term Typically Offered: W

Prerequisite: BRAE 342.

Use of statics and dynamics to make original calculations, plans, sketches, graphics, drawings, schemes and layouts for the fabrication and construction of machines. 3 lectures, 1 laboratory.

BRAE 344. Fabrication Systems. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 343.

Fabrication systems including cutting, sawing, shearing, bending, welding, grinding, cleaning, painting and proper safety procedures. Experimental projects to include team design and construction, presentation, organization, and evaluation. 2 lectures, 2 laboratories.

BRAE 345. Aerial Photogrammetry and Remote Sensing. 3 units

Term Typically Offered: F, W

Prerequisite: MATH 118.

Concepts of photogrammetry and remote sensing. Object recognition, stereoscopic viewing, elevation determination, and scale. State-of-the-art techniques for collecting, processing, and interpreting remote sensing data. Digital image analysis techniques such as image enhancement, change detection, unsupervised and supervised classifications. 2 lectures, 1 laboratory.

BRAE 348. Energy for a Sustainable Society. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Study of how the transition can be made from fossil fuels to renewable energy sources including hydro, biomass, solar, wind, and energy conservation. Environmental, economic, and political consequences of a renewable energy-based sustainable society. 3 lectures, 1 activity. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

BRAE 349. Water for a Sustainable Society. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Historical, political, economic, socio-technical, and cultural dimensions of water sustainability. Overview of complex systems with an emphasis on individual choices and their impact on water sustainability. Exploration of core sustainability concepts; practices, barriers and goals related to water resources. Course offered online only. 4 lectures. Crosslisted BRAE/NR 349. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

BRAE 355. Drone Assisted Surveying. 4 units

Term Typically Offered: F, SP

Prerequisite: BRAE 237 or BRAE 239.

Integration of remote sensing, surveying, natural resource management, applied drone technology. Understanding laws, regulations, measurement concepts, and big data. Field applications using Unmanned Aerial Systems and Global Navigation Satellite Systems. Creation of maps and supporting documents for use in GIS. 2 lectures, 2 laboratories. Crosslisted as BRAE/NR 355.

BRAE 400. Special Problems. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems in agriculture. Total credit limited to 8 units, with a maximum of 4 units per quarter.

BRAE 403. Agricultural Systems Engineering. 4 units

Term Typically Offered: SP

Prerequisite: MATH 242 or MATH 244. Corequisite: STAT 312.

Engineering and economic principles combined with mathematical optimization techniques to evaluate parameters in agricultural production and processing systems. Project planning techniques, linear and nonlinear modeling, response surface methodology. Professional responsibilities in Agricultural Engineering including ethics, patents, copyrights, liability. 3 lectures, 1 laboratory.

BRAE 405. Chemigation. 1 unit

Term Typically Offered: F

Prerequisite: BRAE 236 or BRAE 340; or graduate standing.

Fertilizer and chemical injection through irrigation systems. Hardware, fertilizer compounds, and distribution uniformity. Matching chemicals and equipment to specific irrigation methods. Safety. 1 laboratory.

BRAE 414. Irrigation Engineering. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 331 or BRAE 340; BRAE 312 with a grade of C or better; or graduate standing.

Design of on-farm irrigation systems; micro, surface, and sprinkler irrigation systems; canals and pumps; economic and strategies of pipe design; pipeline protection. 3 lectures, 1 laboratory.

BRAE 418. Agricultural Systems Management I. 4 units

Term Typically Offered: F

Prerequisite: BRAE 203; AGB 310; and completion of GE Area A3 with a grade of C- or better; or graduate standing.

Project management of agricultural systems. Emphasis placed on a team approach to problem solution. Case studies and student projects used to explore the following topics: project leadership, project organization, communication, needs assessment, feasibility studies, cost analysis, decision making, solution implementation, and evaluation. 3 lectures, 1 laboratory.

BRAE 419. Agricultural Systems Management II. 4 units

Term Typically Offered: W

Prerequisite: BRAE 418.

Project management of agricultural systems. Emphasis placed on a team approach to problem solution. Case studies and student projects used to explore the following topics: project leadership, project organization, communication, needs assessment, feasibility studies, cost analysis, decision making, solution implementation, and evaluation. 2 lectures, 2 laboratories.

BRAE 421. Equipment Engineering I. 4 units

Term Typically Offered: F

Prerequisite: BRAE 152; CE 204; and ME 212.

Design of specialized agricultural components and equipment. 3 lectures, 1 laboratory.

BRAE 422. Equipment Engineering II. 4 units

Term Typically Offered: W

Prerequisite: BRAE 421.

Fabrication and construction of specialized agricultural components and equipment. 2 lectures, 2 laboratories.

BRAE 425. Computer Controls for Agriculture. 3 units

Term Typically Offered: SP

Prerequisite: BRAE 324.

Computer activated controls as applied to agricultural machinery, agricultural structures, processing and irrigation industries. Encompassing control logic to evaluate stability behavior of systems of computer interfacing, data input and control output. 2 lectures, 1 laboratory.

BRAE 428. Agricultural Robotics and Automation. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 328.

Agricultural applications of signal processing, control theories, machine vision and robot basics for agricultural production and processing. Approaches and constraints related to agricultural automation and the use of robotics in field applications. Engineering approach to problem-solving and experimental data analysis. Field trip required. 3 lectures, 1 laboratory.

BRAE 432. Agricultural Buildings. 4 units

Term Typically Offered: SP

Prerequisite: PHYS 121, BRAE 342, BRAE 343.

Selection of buildings, storage units, and related equipment for production agriculture. Economics and functionality of various designs and construction materials. Environmental factors affecting crop storage and animal housing. 3 lectures, 1 laboratory.

BRAE 433. Agricultural Structures Design. 4 units

Term Typically Offered: F

Prerequisite: BRAE 232, CE 204.

Structural analysis and design of agricultural service and processing buildings. Emphasis on use of wood, metals, and reinforced concrete in light construction. 3 lectures, 1 laboratory.

BRAE 434. Automotive Engineering for a Sustainable Future. 4 units

Term Typically Offered: W

Prerequisite: Junior standing in any engineering or physical science major.

Multidisciplinary investigation of automotive renewable fuels and electric/hybrid vehicles. Analyze and design related technologies and systems. Methods for complete-cycle energy and GHG analysis. Comparative emissions, efficiency, power output, and infrastructure requirements. Laboratory projects converting engines and vehicles to operate on alternative fuels or electric propulsion. 3 lectures, 1 laboratory. Crosslisted as BRAE/EE 434.

BRAE 435. Drainage. 4 units

Term Typically Offered: TBD

Prerequisite: BRAE 312 or BRAE 340; or graduate standing.

Relevant principles of hydrology and porous media flow. Flow nets, wells and ground water, design of simple surface and sub-surface drains. 3 lectures, 1 laboratory.

BRAE 436. Food and Agriculture Process Water Engineering. 4 units

Term Typically Offered: W

Prerequisite: one of the following: BIO 111, BIO 161, BOT 121, BRAE 213, or MCRO 221; and CHEM 125 or CHEM 128.

Theory and design of facilities for physical and chemical treatment of water used in agricultural practices to sanitize crops as they are harvested, and water used while processing the commodities. This course also includes the design of chemical and biological reactors. 3 lectures, 1 activity.

BRAE 438. Drip/Micro Irrigation. 4 units

Term Typically Offered: W

Prerequisite: BRAE 236 or BRAE 340; or graduate standing.

Drip/micro irrigation hardware and management. Emphasizes agricultural drip/micro irrigation with some landscape application. Filtration, emitters, chemical injection, agronomic constraints, and scheduling. Field trip(s) included. 3 lectures, 1 laboratory.

BRAE 440. Agricultural Irrigation Systems. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 340 or graduate standing.

On-farm irrigation system evaluation and management. Drip, micro-spray, furrow, border strip, sprinkler systems. Irrigation efficiency and uniformity. Pumping costs. For non-BRAE majors only. 3 lectures, 1 laboratory.

BRAE 447. Advanced Surveying with GIS Applications. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 239.

Field skills in precise mapping, high order control and terrestrial imagery. CAD mapping and design. Work with large datasets on regional surface models. Collect, manipulate data for GIS. Basics of boundary law and limitations of using land boundaries in GIS. 2 lectures, 2 laboratories.

BRAE 448. Bioconversion. 4 units

Term Typically Offered: TBD

Prerequisite: MATH 118 or equivalent.

Biological, thermal and physical techniques for converting biomass into useful energy forms for agriculture and industry. Laboratory exercises include experiments with anaerobic digestion of animal wastes into methane, ethanol fermentation of grains and composting of agricultural residues. Technical and economic feasibility of biofuels. 3 lectures, 1 laboratory.

BRAE 450. Solar Photovoltaic System Engineering. 4 units

Term Typically Offered: SP

Prerequisite: one of the following: PHYS 104; PHYS 118; PHYS 121; or PHYS 141; and junior standing.

Engineering principles, design, and installation of solar photovoltaic power systems including grid-tie and off-grid systems. Photonic energy conversion, solar module engineering, solar power electronics, photovoltaic site planning, mechanical and structural considerations, permit processes, government incentives, and analysis of financial and investment issues. Field trips required. 3 lectures, 1 laboratory. Crosslisted as BRAE/EE/HNRS 450.

BRAE 460. Senior Project Organization. 1 unit

Term Typically Offered: F

Prerequisite: Completion of GE Area A3 with a grade of C- or better.

Selection and organization of senior project. Involves time management, research techniques, budgeting and project presentation. Documentation of multidisciplinary team experience. 1 laboratory.

BRAE 461. Senior Project I. 2 units

Term Typically Offered: SP

Prerequisite: BRAE 460.

Solution of an engineering or systems management problem in agriculture. May involve research methodology, problem statement, analysis, synthesis, project design, construction, and evaluation. Project requires 150 hours with a minimum of faculty supervision.

BRAE 462. Senior Project II. 2 units

Term Typically Offered: TBD

Prerequisite: BRAE 461.

Solution of an engineering or systems management problem in agriculture. May involve research methodology, problem statement, analysis, synthesis, project design, construction, and evaluation. Project requires 150 hours with a minimum of faculty supervision.

BRAE 465. Senior Project Operation, Testing, and Safety. 2 units

Term Typically Offered: SP

Prerequisite: BRAE 419 or BRAE 422; and BRAE 460.

Final course in the senior design series. Preparation of an Operation, Maintenance and Safety manual for projects fabricated in the earlier courses. Develop a memorandum and video documenting the design, fabrication, and testing phases. Final oral presentation for each group. 1 lecture, 1 laboratory.

BRAE 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class Schedule will list topic selected. Total credit limited to 8 units. 1-4 lectures.

BRAE 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

BRAE 481. Advanced Agricultural Mechanics. 2 units

Term Typically Offered: SP

Prerequisite: Agricultural teacher candidates starting/returning from student teaching, senior or graduate standing or consent of instructor.

Advanced shop skills. Carpentry, electricity, plumbing, surveying, power mechanics, tractor equipment operation and maintenance. 1 lecture, 1 laboratory.

BRAE 485. Cooperative Education Experience in BioResource and Agricultural Engineering. 6 units

Term Typically Offered: SP

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience with an approved BioResource and Agricultural Engineering firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only.

BRAE 495. Cooperative Education Experience in BioResource and Agricultural Engineering. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full time work experience with an approved BioResource and Agricultural Engineering firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only.

BRAE 500. Individual Study. 1-3 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition.

Total credit limited to 6 units, repeatable in same term.

BRAE 532. Water Wells and Pumps. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 312 or BRAE 340 or CE 336 or ME 341.

Water well drilling, design, and development. Pump characteristics and system head. Series and parallel operation. Design of pump intakes.

Variable speed electric drives and engines. Pump testing. 3 lectures, 1 laboratory.

BRAE 533. Irrigation Project Design. 4 units

Term Typically Offered: W

Prerequisite: BRAE 312, BRAE 340 or equivalent (hydraulics/fluid mechanics course).

Advanced open channel and pipeline controls for unsteady flow.

Social aspects of improved water delivery to customers. Engineering solutions for modernizing irrigation projects, including open-channel flow measurement, advanced control structure design, determining capacities, and Supervisory Control and Data Acquisition (SCADA) systems. 3 lectures, 1 laboratory.

BRAE 570. Selected Advanced Topics in BioResource and Agricultural Engineering. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

BRAE 571. Selected Advanced Laboratory in Bioresources and Agricultural Engineering. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

BRAE 599. Thesis in BioResource and Agricultural Engineering. 1-9 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Systematic research of a significant problem in bioresource and agricultural engineering. Thesis will include problem identification, significance, methods, data analysis, and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Degree credit limited to 6 units.

Botany (BOT)

undefined

BOT Courses

BOT 121. General Botany. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

The anatomy, morphology, physiology, reproduction, diversity, and importance of plants. 3 lectures, 1 laboratory. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs).

BOT 311. Plants, People and Civilization. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one of the following courses: BIO 114, BIO 160, BIO 162 or BOT 121.

Human uses of plants for food, beverage, medicine, fiber, recreation, and rituals. Uses of plants by different cultures throughout the world and the social, economical, and environmental importance of plants in our lives. Field trip required. 3 lectures, 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

BOT 313. Taxonomy of Vascular Plants. 4 units

Term Typically Offered: W

Prerequisite: BIO 114 or BIO 162 or BOT 121.

Introduction to classification and identification of vascular plants, emphasizing major plant families; field and herbarium techniques. 2 lectures, 2 laboratories.

BOT 323. Plant Pathology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 162 or BOT 121.

Comprehensive study of the causes and effects of diseases of plants. Designed to lead to an understanding of plant pathology, and modern methods to control plant disease. 2 lectures, 2 activities. Crosslisted as BOT/PLSC 323. Formerly AEPS/BOT 323.

BOT 326. Plant Ecology. 4 units

Term Typically Offered: SP

Prerequisite: BIO 114, BIO 162, BIO 211, or BOT 121. Recommended: BIO 263 and STAT 217 or STAT 218.

Plant communities, population dynamics, and effects of the following environmental factors on plant growth and development: soil, water, temperature, light, atmosphere, topography, organisms, and fire. 3 lectures, 1 laboratory.

BOT 433. Field Botany: California Plant Diversity. 5 units

Term Typically Offered: SP

Prerequisite: BOT 313, or graduate standing in Biological Sciences.

Field studies of California's diverse vegetation. Identification of plants and plant communities in the field. Factors affecting distribution and ecological relationships. California geography, geology, and evolution of California flora. Several one day field trips and three weekend trips to California's deserts and mountains. Field trips required. 3 lectures, 2 laboratories.

Business (BUS)

undefined

BUS Courses

BUS 100. Student Orientation and College Success. 2 units

Term Typically Offered: F

Orientation to majors, minors, and concentrations for the development of a personalized four-year graduation plan. Skills for academic success: goal setting, time management, study skills, registration strategies, and overall adjustment to college life, including connection to a social peer network. 2 lectures.

BUS 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: F,W,SPSU

Prerequisite: Consent of area coordinator.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

BUS 204. Financial Literacy. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B4

2019-20 or earlier catalog: GE Area B1

Introduction to personal finance. Budgeting, savings, employee benefits, retirement planning, taxes, insurance, and real estate. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area B4.

BUS 206. Business Professionalism and Career Readiness. 2 units

Term Typically Offered: F, W, SP

Career development, personal branding, and internship preparation, with a focus on interpersonal communication, resume, cover letter, and interviewing skills. Career exploration for future concentration selection, including the formulation of a college leadership and career development plan. Course may be offered in classroom-based or online format. 2 lectures.

BUS 207. Legal Responsibilities of Business. 4 units

Term Typically Offered: F,W,SPSU

Examination of the American legal system and important legal principles for business operations, such as those involved with contracts, torts, agency, business organizations, and employment. Emphasis on how legal principles help define socially responsible conduct. Case studies. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 212. Financial Accounting for Nonbusiness Majors. 4 units

Term Typically Offered: F, W

Introduction to financial accounting theory and practice with an emphasis on financial statement preparation and analysis. Not open to Business majors. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 214. Financial Accounting. 4 units

Term Typically Offered: F,W,SPSU

Principles of financial accounting for Business majors. The course prepares students to understand and interpret financial statement information. Financial reporting standards are explored to give students an understanding of how financial events are reflected in financial statements. Not open to students with credit in AGB 214. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 215. Managerial Accounting. 4 units

Term Typically Offered: F,W,SPSU

Prerequisite: Demonstrated competency in electronic spreadsheet, word processing, and presentation applications; BUS 212 or BUS 214 or equivalent.

Applications of accounting for making business decisions. Content includes planning and control issues including cost behavior, budget preparation, performance reporting; addresses social responsibility and employee motivational and behavioral considerations. Preparation of spreadsheet applications useful for decision-making. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 220. Business Basics for Entrepreneurs. 4 units

Term Typically Offered: F, SP

Prerequisite: Entrepreneurship minors only.

Basic business concepts for non-business major entrepreneurs, including unit economics and simple financial statements, intellectual property, entrepreneurial marketing, information technology, team management, and business ethics. Course may be offered in classroom-based or online format. 4 lectures.

BUS 234. Introduction to Design Thinking. 4 units

Term Typically Offered: W

Prerequisite: Entrepreneurship minors only.

Introduction to the process of design thinking and human centered design, including design process, methodology, and implementation. Empathy, creativity, iterative prototyping, and contextual design of products and services. 4 lectures. Crosslisted as BUS/ENGR 234.

BUS 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

BUS 301. Global Financial Institutions and Markets. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ECON 222.

Role of private and public financial institutions in allocating capital globally and promoting international commerce. Financial institutions covered include the FED, IMF, World Bank, investment banks and others. Detailed exploration of the history and functions of these institutions. 4 lectures.

BUS 302. International and Cross Cultural Management. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A with grades of C- or better; completion of GE Area C2; completion of GE Area D1; one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs); and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Dimensions of culture and its variations within and across nations. Impact of culture on managing in a global context. Development of managerial competencies requisite to working in and supervising multicultural groups in international corporations. Frameworks for analyzing cultural and contextual influences on organizational behavior, culture shock and readjustment, expatriation and repatriation, cultural change and innovation, intercultural conflict, and ethical dilemmas. Case studies, behavioral simulations, self-assessments and fieldwork. 4 lectures.

BUS 303. Introduction to International Business. 4 units

Term Typically Offered: TBD

Prerequisite: A grade of C- or better in ECON 222.

Special terms, concepts, and institutions associated with the environment in which international companies operate. Students will be enabled to understand, analyze and offer solutions to global business problems. 4 lectures.

BUS 304. International Supply Chains. 4 units

Term Typically Offered: W

Prerequisite: Consent of instructor. Recommended: ECON 201 or ECON 221 or ECON 222.

Development of effective supply chains that cross national boundaries with specific examples of import/export between the United States and target country. Study tour to target country as an essential course activity. Pre-trip lectures, readings and assignments; on-the-road business tours, and post-trip import-export proposal. Conducted in English; no prior international business or travel experience required. Passport and Visa required. Field trip required. The Class Schedule will list country selected. 3 lectures, 1 activity.

BUS 306. Leadership Development and Career Success. 1 unit

Term Typically Offered: W, SP

CR/NC

Prerequisite: Junior standing. Recommended: BUS 206.

Leadership self-development, resilience/growth mindset and strategies for finding meaningful and enjoyable work for a fulfilled career and life after graduation. Advanced career preparation, networking, relationship building, influencing, opportunity building, and business etiquette. Credit/No Credit grading only. 1 activity.

BUS 310. Introduction to Entrepreneurship. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Role and impact of entrepreneurship and technology startups; characteristics and traits of entrepreneurs; opportunity identification and assessment; frameworks for building startups; the founding team; organizational and legal issues; business and value proposition models; acquiring resources; entrepreneurial risk; realizing and harvesting value. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as BUS/ENGR 310.

BUS 311. Managing Technology in the International Legal Environment. 4 units

Term Typically Offered: W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); completion of GE Area D1; and one course in GE Area D2.

Analysis of U.S. and international laws regarding technological innovations from economic, social and political perspectives. Copyrights, patents, trademarks, trade secrets, contracts, products liability and privacy. The Internet, computer programs and biotechnology. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

BUS 313. Customer Development. 4 units

Term Typically Offered: F, SP

Prerequisite: Completion of GE Area A with grades of C- or better; Entrepreneurship minors only.

Experiential approach to understanding the customer development process in the lean startup context. Design, implementation, and validation of repeatable and scalable business model strategies. Course may be offered in classroom-based or online format. 4 lectures.

BUS 319. Accounting Information Systems. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 214 or Accounting minors with credit in AGB 214.

Comprehensive coverage of manual and computerized accounting processes and internal controls. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 320. Federal Income Taxation for Individuals. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 215.

Federal income taxation and planning for individuals. Federal role of taxation in the business decision-making process. Issues related to individual income tax preparation and introduction to basic property transactions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 321. Intermediate Accounting I. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 214 and BUS 215.

Comprehensive coverage of financial reporting issues. Covers financial statements, revenue recognition, and assets other than investments. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 322. Intermediate Accounting II. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 321 with a grade of C- or better; Business majors must have formally declared their concentration to enroll.

Comprehensive coverage of financial reporting issues. Covers investments, liabilities, equities, and the Cash Flows Statement. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 323. Intermediate Accounting III. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 322.

Detailed examination of the technical and theoretical aspects of accounting for leases, pensions, income taxes, accounting changes and errors, business combinations, and major differences between the US Generally Accepted Accounting Principles and International Financial Reporting Standards. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 330. Funding and Managing Startup Companies. 4 units

Term Typically Offered: W, SP

Prerequisite: Entrepreneurship concentration, BUS 310, and BUS 342; or Entrepreneurship minor, BUS 220, and BUS 310.

Basics of entrepreneurial business financial management. Readings on financing startup and growing ventures. Forms and uses of equity and debt financing. Capitalization tables and exit analyses. Investor pitch process. Legal, governance and ethical issues in entrepreneurial financing and operations. Course may be offered in classroom-based or online format. 4 seminars.

BUS 342. Fundamentals of Corporate Finance. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 214 with a grade of C- or better, or consent of instructor; and STAT 252 or any 300 level statistics course.

Theory and applications of financing business operations. Financial management of current and fixed assets from internal and external sources. Analysis, planning, control, and problem solving. The use of technology in the form of financial calculators and/or spreadsheets. Course may be offered in classroom-based or online format. 4 lectures.

BUS 346. Principles of Marketing. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Completion of GE Area A with grades of C- or better.

Development of an understanding of the marketing process: identifying target markets; developing and launching products or services; and managing pricing, promotion, and distribution strategies. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 2 discussions.

BUS 347. Professional Selling Skills. 4 units

Term Typically Offered: F

Prerequisite: Sophomore standing.

Exploration and cultivation of skills in personal selling. Understanding customers, interpersonal relationships, and the influences of psychology, sociology, economics, and public policy on buyer/seller interactions. 4 lectures.

BUS 348. Technology-Based Professional Sales. 4 units

Term Typically Offered: W

Prerequisite: BUS 347; Sales minors only.

Strategy and technology used in the practice of professional selling. Social selling, customer relationship management (CRM), and insight into sales strategy through exploration of contemporary topics in professional sales. 4 lectures.

BUS 382. Leadership and Organizations. 4 units

Term Typically Offered: F, W

Prerequisite: Completion of GE Area A with grades of C- or better; completion of GE Area C2; completion of GE Area D1; one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs); and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Evaluation of macro dimensions of business organizations including environment, mission, goals, strategies, structure, people, and technology. Internal leadership processes at different organizational levels. Case analysis, experiential class activities. Application to business solutions in technology-oriented settings. 4 lectures.

BUS 384. Human Resources Management. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A with grades of C- or better; completion of GE Area C2; completion of GE Area D1; one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs); and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Introduction to functional areas of the discipline including staffing, compensation, employee development and labor relations. Additional workplace issues addressed include performance and human capital management, employer legal and social responsibility for employee wellbeing, managing a diverse/global workforce, and using human resource information systems. 4 lectures.

BUS 387. Organizational Behavior. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Completion of GE Area A with grades of C- or better; ECON 221; and BUS 207. Recommended: STAT 252.

Application of behavioral, social and organizational science concepts to management. Exploration of the interactions between individuals and the organizations in which they work and live. Individual, interpersonal, team, intergroup and organizational levels of analysis included in topics such as expectations, perception, communications, creativity, leadership style, cultural and ethical behavior, group dynamics, team effectiveness and work design. 4 lectures.

BUS 388. Cultivating Human Capital. 4 units

Term Typically Offered: SP

Prerequisite: BUS 384 and STAT 252.

Organizations' processes of selecting, training and developing employees. Issues related to human resources planning, recruitment, and selection. Needs assessment, including organization, person, and task or competency analysis. Designing, delivering and evaluating employee training and human resource development in knowledge-based organizations. 4 lectures. Formerly BUS 475.

BUS 389. Introduction to Business Negotiation for Entrepreneurs. 4 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Entrepreneurship minors only.

Negotiation theory and skills required for successful entrepreneurship. Emphasis on negotiation simulations and role playing, with hands-on experience in applying negotiation skills. 4 lectures.

BUS 391. Information Systems. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: ITP 125 for Industrial Technology and Packaging majors; or BUS 214 for all other majors.

Computer applications in business and industry. Information systems and integrated systems concepts, computer hardware and software, strategic uses of information systems, databases, data warehousing, decision support systems and artificial intelligence, network basics, electronic commerce, systems development, ethical use of information, employing technology in a socially responsible manner, and emerging trends and technologies in information systems. 4 lectures.

BUS 392. Business Application Development. 4 units

Term Typically Offered: F, SP

Prerequisite: BUS 391.

The fundamental concepts and models of application development needed to understand the key processes related to building functioning business applications and appreciate the complexity of application development. The concepts of computer programming, data structures, problem solving, programming logic, and fundamental design techniques. Up-to-date application development tools and technologies currently used by business enterprises. 4 lectures.

BUS 393. Database Systems in Business. 4 units

Term Typically Offered: W, SP, SU

Corequisite: BUS 392; Business and Economics majors must have formally declared their concentration to enroll.

Design, development, testing, and implementation of databases for business applications. Data modeling with entity relationship diagrams (ERD) and class diagrams (UML). Data normalization, data integrity, the effect of business rules on data normalization. Advanced queries using structured query language (SQL). Database application development culminating in a database project. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 394. Systems Analysis and Design. 4 units

Term Typically Offered: F, W

Prerequisite: BUS 391; Business and Economics majors must have formally declared their concentration to enroll.

Systems analysis and design. Systems development life cycle, requirements gathering, process modeling using data flow diagrams, use case analysis and diagramming, UI design. 4 lectures.

BUS 395. Information Systems Project Management. 4 units

Term Typically Offered: F, SP

Prerequisite: BUS 391; Business and Economics majors must have formally declared their concentration to enroll.

Introduction to key components of project management in the IS context, with focus on the technical, cultural, and interpersonal skills necessary to manage IS projects successfully. Project scope management, schedule and cost management, quality management, and risk management. 4 lectures.

BUS 396. Consumer Insights. 4 units

Term Typically Offered: F, W, SP

Prerequisite: For GRC Majors, GRC 361; for all other majors, BUS 346.

Process of individuals selecting, purchasing, using, or disposing of products, services, ideas, or experiences, based upon psychology, sociology, cultural anthropology, semiotics, and micro/macro economics. Consumer experience through analysis of the consumer journey and touch points. 4 lectures.

BUS 399. IT Infrastructure and Security Management. 4 units

Term Typically Offered: F, SP

Prerequisite: BUS 391; Business and Economics majors must have formally declared their concentration to enroll.

Fundamental concepts of networking and infrastructure management. Includes theoretical and practical discussion on TCP/IP, wired and wireless LAN, cloud computing, and information security. 4 lectures.

BUS 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Senior standing.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

BUS 401. General Management and Strategy. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 342, BUS 346, BUS 387, BUS 391, senior standing, and completion of one of the following: ITP 303, ITP 326, ITP 330, ITP 341, or ITP 371. Corequisite: BUS 411.

Application of interdisciplinary skills to business and corporate strategy analysis formulation and implementation of business, corporate and global level strategies. Consideration of interdependence between external environments and internal systems. Focus on responsibilities, tasks, and skills of general managers, including socially responsible behavior and governance. Case studies, group problem solving, experiential class activities. Capstone course of Business core curriculum. Course may be offered in classroom-based, online, or hybrid format. 4 seminars.

BUS 404. Governmental and Social Influences on Business. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: BUS 207 and ECON 222.

Analysis from legal, economic, political, and ethical perspectives, of the changing domestic and international environments of the business enterprise. Topics include administrative law, agencies and regulatory policy, antitrust law, public policy analysis, business-government relations, and corporate responsibility. Case studies. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 406. Managing Mergers, Acquisitions and Divestitures. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 342, BUS 346, and BUS 387.

Issues associated with analyzing, negotiating, and managing mergers, acquisitions and divestitures (MADS) using cross-cultural, interdisciplinary perspective. Rationale for decision to pursue MADS and processes for identifying targets; valuing and negotiating MADS; staffing and human resource management issues; strategic control and integration; and cross-cultural conflict and divided loyalties in domestic and international MADS. Lectures, case studies and simulation. 4 lectures.

BUS 408. Innovation and Entrepreneurship Through Disruptive Technologies. 4 units

Term Typically Offered: SP

Prerequisite: BUS 310.

Theory of disruptive innovation and its use in creating business and entrepreneurial opportunity. Basic technical underpinnings of disruptive technologies, including artificial intelligence, autonomous vehicles, Internet of Things, augmented and virtual reality, machine learning, and genetic engineering. 4 lectures.

BUS 409. Law of Real Property. 4 units

Term Typically Offered: SU

Prerequisite: Senior standing.

Legal problems of acquisition, ownership and transfer of real property. Contracts, agency, estates, and co-ownership, mortgages and deeds, covenants, conditions, and restrictions, easements, landlord-tenant, and zoning. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 410. The Legal Environment of International Business. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 207 and ECON 222.

U.S., foreign, and international law affecting international business transactions. U.S. and foreign cultural, ethical, and political norms and legal institutions, and their effect on law and business. 4 lectures.

BUS 411. Business Knowledge Exit Exam. 0 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Senior standing. Recommended: BUS 215 and BUS 404.

Assessment of BS Business Administration Program Learning Objective 1 (Apply knowledge to identify opportunities and solve business problems) through completion of an exam and the senior exit survey. Results will only be used to improve the curriculum. Credit/No Credit grading only. Course offered online only.

BUS 412. Advanced Managerial Accounting. 4 units

Term Typically Offered: SP

Prerequisite: BUS 215.

Product costing systems including hybrid costing systems, management control systems, cost allocation, activity based costing, cost information for decision making, new manufacturing environments, and strategic control systems. International dimension integrated in the course content. Course may be offered in classroom-based or online format. 4 lectures.

BUS 416. Volunteer Income Tax Assistance - Senior Project. 4 units

Term Typically Offered: W

Prerequisite: BUS 320 or equivalent, senior standing.

Training and practice in the preparation of state and federal individual income tax returns. Coverage of the deductions and credits applicable to individuals. Students provide free tax assistance and income tax preparation to community residents under the supervision of qualified professionals. 2 lectures, 2 activities.

BUS 417. Taxation of Corporations and Partnerships. 4 units

Term Typically Offered: F, W

Prerequisite: BUS 320 or equivalent.

Comparative study of the taxation of C corporations and flow-through tax entities, including S corporations, partnerships and limited liability companies. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 418. Listening to the Customer. 4 units

Term Typically Offered: F, W, SP

Prerequisite: For GRC Majors, GRC 361; for all other majors, BUS 346; Business majors must have formally declared their concentration to enroll.

Discovery and development of customer insights based on a project-oriented introduction to the research process. Development of research questions. Design and application of multiple research methods (e.g. secondary, observation, interview, focus group, survey research). Exploratory and confirmatory approaches leading to the analysis, interpretation, and presentation of results. 4 lectures.

BUS 419. Strategic Marketing Measurement. 4 units

Term Typically Offered: W, SP

Prerequisite: BUS 396; BUS 418; STAT 252.

Development of skills to gather, analyze, and report information critical for marketing decision making. Focus on primary data collection and analytical techniques (e.g. experimental design, descriptive statistics, cross-tabulation, ANOVA, and regression). Other methods may include data mining, GIS, and customer relationship management (CRM). 4 lectures.

BUS 421. Marketing Analytics and Business Intelligence. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 346; STAT 252 or STAT 302.

Analysis of customer information using a broad range of tools and techniques. Application of analytic findings to marketing decision-making. Integration of data into reporting platforms that emphasize return on marketing investment. Course may be offered in classroom-based or online format. 4 lectures.

BUS 422. Accounting for Government and Not-For-Profit Entities. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 321.

Accounting and reporting by state and local governments and not-for-profit entities. State and local governmental topics include: fund structures, budgetary accounting, the modified accrual basis of accounting, reporting concepts and practices, contributions, restricted resources, endowments. Course may be offered in classroom-based or online format. 4 lectures.

BUS 423. Digital Marketing Metrics and Management. 4 units

Term Typically Offered: F, SP

Prerequisite: BUS 396 and BUS 418.

Measurement and optimization of digital marketing. Return on investment, lifetime value of the customer, customer acquisition costs, search engine marketing, paid search, display advertising, website analytics, email marketing, social media marketing, online reputation, mobile marketing, and new media marketing. Course may be offered in classroom-based or online format. 4 lectures.

BUS 424. Accounting Ethics. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 321.

Study of professional responsibilities and oversight within the accounting profession. Corporate fraud in accounting. Current accounting and auditing events. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 425. Auditing. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 322.

Survey of the auditing environment including institutional, ethical, and legal liability dimensions. Introduction to audit planning, assessing materiality and audit risk, collecting and evaluating audit evidence, considering the internal control structure, substantive testing, and reporting. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 430. Internship/Cooperative Education. 2-12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Approval of area chair; junior standing; and a Cal Poly cumulative GPA of at least 2.5 without being on academic probation.

Work experience in business, government, or non-profit sector that provides an opportunity to explore career interests while applying knowledge and skills learned in the classroom in a work setting. Periodic written progress reports, final report, and periodic evaluation by work supervisor required. Credit/No Credit grading. Major credit limited to 4 units; total credit limited to 12 units.

BUS 431. Security Analysis and Portfolio Management. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 342; BUS 391; ECON 339 or STAT 324. Business majors must have formally declared their concentration to enroll.

In-depth analysis of equity market and its instruments. Detailed study of leading stock valuation models. Impact of changes in the firm's fundamentals and in macroeconomic factors on stock prices. Brief introduction to equity and index derivatives. 4 lectures.

BUS 433. International Finance. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 431 or BUS 439.

Financial management of international business. International capital and money markets, international financial institutions, special problems in evaluating direct foreign investment, and financial techniques used in international business operations. 4 lectures.

BUS 434. Real Estate Finance. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 439.

Analyses of real estate financing techniques and funding sources for development projects. Effects of federal, state, and local taxes on real estate investments. In-depth investigation and computer analyses of real estate investment projects. 4 lectures.

BUS 435. Real Estate Investment. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 434.

Intensive investigation and computer analysis of real estate investment opportunities. Problems in real estate and property management. 4 lectures.

BUS 436. Entrepreneurial Finance. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 215 and BUS 342.

Process of financing new and fast-growing firms. Readings on the venture capital process, from seed capital through the initial public offering. Valuation of firms seeking venture capital, and those planning their initial public offering. Valuing convertible securities. Real options valuation. Course may be offered in classroom-based or online format. 4 seminars.

BUS 437. Retirement and Estate Planning. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 431 and BUS 439.

Retirement planning and employee benefits; Social Security and Medicare; types of retirement plans; qualified plan characteristics; distribution options; and group insurance benefits. Trusts, power of attorney, and probate. 4 lectures.

BUS 438. Advanced Corporate Finance. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 431 and BUS 439.

Corporate finance with an emphasis on managing the corporation to create shareholder value. Detailed treatment of topics such as capital budgeting, capital structure, economic value-added, corporate distribution policy, financial distress, and mergers and acquisitions. 4 lectures.

BUS 439. Fixed Income Securities Market. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 342 and BUS 391; Business majors must have formally declared their concentration to enroll.

Development of analytical skills for properly valuing fixed income securities. Bond pricing, yields, and volatility; interest rate term structure and yield curve; securities, market structure, and analytical techniques; bond portfolio strategies and an introduction to interest rate derivatives. 4 lectures.

BUS 441. Computer Applications in Finance. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 438.

A combination lecture/computer lab course focusing on computer acquisition of financial data and the subsequent application of financial theory and analysis to this data so as to facilitate financial decision making. 4 lectures.

BUS 442. Introduction to Futures and Options. 4 units

Term Typically Offered: W

Prerequisite: BUS 431.

An in-depth analysis of derivatives markets and instruments. Emphasis on the valuation of futures, options, swaps, and other derivative securities. 4 seminars.

BUS 443. Case Studies in Real Estate Finance. 4 units

Term Typically Offered: SP

Prerequisite: BUS 431 or BUS 434.

Analytical and decision-making techniques in applying Financial Real Estate theory to business and property management valuation. Real estate valuation techniques and their application to real estate investment. Incorporates case studies, databases, and specialized real estate valuation software, such as ARGUS. 4 lectures.

BUS 444. Financial Engineering and Risk Management. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 442.

Advanced course synthesizing concepts from corporate finance, derivative securities, statistics, and computer science. Emphasis on both computer programming in a matrix programming language (Matlab) to solve practical risk management and valuation problems, and analytical training in the area of stochastic calculus, and its application to derivative security pricing. Practical applications of derivatives for controlling risk in an international corporate environment. 4 lectures.

BUS 445. Ethics and Behavior Finance. 4 units

Term Typically Offered: F, W

Prerequisite: BUS 342.

Contemporary theoretical and empirical issues including agency theory, reputation building, game theory, and financial ethics. Discussion of the application of ethics theory to financial decisions. May include lectures, case analyses, student presentations, and guest speakers. 4 lectures.

BUS 446. International Marketing. 4 units

Term Typically Offered: W

Prerequisite: BUS 346.

Development of an understanding of global marketing strategy. Acquisition of information about international markets and its use to describe customers, understand markets, and make marketing mix decisions. 4 lectures.

BUS 448. The Finance of Mergers and Acquisitions. 4 units

Term Typically Offered: SP

Prerequisite: BUS 438.

Comprehensive coverage of financial aspects concerning mergers and acquisitions. Valuation of companies, strategic and other motivations underlying mergers, structuring of transactions, deal tactics and strategy, leveraged buyouts, and cross-border mergers. Most suitable for careers in corporate finance, and investment banking. 4 lectures.

BUS 450. Current Topics in Marketing. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 396 and BUS 418.

Selected topics in emerging areas of marketing. Intended for students in the Marketing Management concentration who want to learn and acquire in-depth knowledge and skills. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

BUS 451. New Product Development and Launch. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 418 and STAT 252. Recommended: BUS 396.

Project-based skills for developing new products and planning for their launch. Major phases of product development: product innovation strategy, idea generation and screening, concept development and testing, technology drivers. Introduction to product launch, including segmentation, targeting, positioning, pricing, and branding. 4 lectures.

BUS 452. Product Management. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 396 and BUS 418.

Development of individual and project-based skills in managing products in the growth, maturity, and decline stages of their life cycles. Emphasis on distribution, pricing, and communication strategies required to maintain distinctive product advantages. May include developing a comprehensive communication plan. 4 lectures.

BUS 453. Digital and New Media Marketing. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 396 or BUS 418.

Definitions and tools of digital and new media marketing communications including social media audits and governance. Planning integrated marketing communications across digital tools and new media channels that reflect a client organization's strategy for managing its identity and reputation. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 454. Marketing Projects. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 396 and BUS 418.

Client-based course providing an opportunity to apply marketing abilities. Teams draw upon research, analytical, and strategic marketing skills to develop an actionable plan that addresses a critical marketing challenge faced by an organization. Deliverables include research findings and written and verbal presentation to the organization and instructor. 4 lectures.

BUS 455. Marketing Strategy. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Three of the following: BUS 419, BUS 421, BUS 423, BUS 430, BUS 450, BUS 451, BUS 452, BUS 453.

Integration of key marketing concepts using tools such as computer simulations, readings, and/or case studies. Development and implementation of strategic and tactical decisions for companies and brands. 4 lectures.

BUS 458. Solving Big World Challenges. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area A with grades of C- or better.

Apply human-centered design practices to address a social or an environmental challenge, specific to a local community. Achieve revenue-generating social impact through innovative business models. Practice team competencies including problem-solving, interviewing, brainstorming, prototyping, and written, visual, and oral communication. 4 lectures. Crosslisted as BUS/COMS 458.

BUS 459. Social Media's Role in Integrated Marketing Communications. 4 units

Term Typically Offered: SP

Prerequisite: BUS 453; JOUR 331; JOUR 342; GRC 338 or GRC 377 or JOUR 390.

Integrative project experience in social media marketing and/or integrative marketing communications campaign: research target markets, identify appropriate social media and other media channels. Field trips required. 4 seminars.

BUS 461. Senior Project I. 2 units

Term Typically Offered: F,W,SP,SPSU

Prerequisite: Senior standing.

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time.

BUS 462. Senior Project II. 2 units

Term Typically Offered: F,W,SP,SPSU

Prerequisite: Senior standing.

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time.

BUS 463. Senior Project: Low Income Taxpayer Clinic. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing; BUS 320; Graduation Writing Requirement; and approval of the Instructor.

Acquire fundamental knowledge of federal tax laws and procedures in a clinical setting. Practice with multiple authoritative accounting, auditing and tax databases, conduct legal research, and business writing. Resolve real world accounting, auditing and tax controversies for Low Income Taxpayer Clinic clients.

BUS 464. Applied Senior Project Seminar. 4 units

Term Typically Offered: F,W,SP,SPSU

Prerequisite: Senior standing.

Selection and analysis of business problems and opportunities in directed individual or group-based projects. Problems typical to those which graduates could encounter in their fields of employment. Formal report required. 4 seminars.

BUS 466. Sales Practicum. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 348.

Capstone course for the Sales minor, students explore building and maintaining relationships, apply selling skills, and prepare themselves for a career in professional selling. 4 seminars.

BUS 468. Blockchain in Business. 4 units

Term Typically Offered: SP

Prerequisite: BUS 392 or CSC 101 or CSC 232 or ECON 395.

Blockchain technology in business, with application examples in management (including HR, marketing and accounting), operation systems (manufacturing, supply chain and other service systems), finance (including stock trading, real estate transactions and P2P payment systems) and entrepreneurship. 4 lectures. Crosslisted as BUS/ITP 468.

BUS 469. Foundations of Financial Technology. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 342; BUS 391; and ECON 339 or STAT 324.

Introduction to financial technology and its landscapes. Theoretical foundations including machine-learning, blockchain, cryptocurrencies, and platforms as well as a set of industry cases studies and practices. Course may be offered in classroom-based or online format. 4 lectures.

BUS 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

BUS 471. Managing and Rewarding Employee Performance. 4 units

Term Typically Offered: SP

Prerequisite: BUS 384 and STAT 252.

Managing and compensating employee performance. Motivation theories, performance measures, evaluation and feedback systems/practices, planning for performance improvement. Advantages and challenges of pay-for-performance systems. Design and management of total compensation systems. Compensation systems as a factor in employee development and organizational performance. 4 lectures.

BUS 474. Independent Study in Accounting. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 322.

Individual investigation, research, study or survey of selected topics in accounting, auditing or taxation. Total credit limited to 8 units, repeatable in the same term. The Class Schedule will list topic selected.

BUS 476. Leading Social Innovation in Organizations. 4 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Fundamentals and practice of leading social innovation in existing and new organizations. Emphasis on collective action tools and processes that support social initiatives with positive impact. 4 lectures.

BUS 477. Management Consulting and Change Management. 4 units

Term Typically Offered: W

Prerequisite: BUS 382 or BUS 387.

Analysis of development and trends in the field of organization change and development. Application of behavioral and organizational science knowledge and social technology to growth and change of organizations for improving effectiveness and sustainability. Principles of management consulting. 4 seminars.

BUS 480. People Analytics. 4 units

Term Typically Offered: W

Prerequisite: BUS 384 or BUS 387; and STAT 252 or equivalent.

Data-driven approach to human resource practices with emphasis on the strategic use of analytics to drive effective practice and support decision-making; use of appropriate data sources and techniques for testing HR-related questions; considerations for collection and use of human data. 4 lectures.

BUS 487. Launching and Growing the Technology Start-Up. 4 units

Term Typically Offered: W

Prerequisite: BUS 310 and consent of instructor.

Topics in entrepreneurial settings, focusing on technology startups. Frameworks, analytical skills, and decision-making tools used in growing entrepreneurial businesses. Field trip required. 4 lectures.

BUS 488. Building a Startup Skill Set. 4 units

Term Typically Offered: F

Prerequisite: BUS 310; BUS 418; Business majors must have declared their concentration to enroll. Recommended: BUS 330.

Process of evolving a startup's business model, focusing on product-market fit; go-to-market strategies; revenue streams; cost structure; partnerships; key activities; and key resources. Exploration of a personal entrepreneurial pathway. 4 seminars.

BUS 489. Negotiation. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 387.

Theory and practice of negotiation in a variety of professional and managerial contexts (e.g., labor relations, business acquisitions, compensation, business disputes) and in one-on-one, group, and team-based arrangements. Includes impact of culture, ethics, dispute resolution, coalitions and use of creativity to develop integrative solutions. 4 lectures.

BUS 490. Data Visualization. 4 units

Term Typically Offered: W, SP

Prerequisite: BUS 497.

Fundamentals and practice of data visualization with an emphasis on storytelling within organizations. Theoretical focus on human cognition and perception. Application of principles through software tools. 4 lectures.

BUS 491. Decision Support Systems. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 391, STAT 251 or equivalent; Business and Economics majors must have formally declared their concentration to enroll.

Modeling organizational systems and processes such as computer networks, transportation systems, manufacturing systems, retail systems, etc. Developing computer simulation models and animation of systems to provide decision support in selecting system design alternatives. Applying quantitative methods to model uncertainty and conduct statistical performance analysis. 4 lectures.

BUS 492. Technology-Supported Collaboration. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 387 and BUS 391.

Collaboration from multiple perspectives, applying best practices and empirically-supported insights toward successful collaboration in organizational settings. Theories of teams, collaboration, and the technologies to support these processes. Application of techniques for leadership, problem solving, communications, virtual collaboration, and collaboration technologies. 4 lectures.

BUS 493. User Experience Analysis and Design. 4 units

Term Typically Offered: SP

Prerequisite: BUS 394.

Fundamentals of User Experience Analysis and Design. Best practices in mobile/web/desktop user interfaces. Persona development. Prototyping using software tools. Includes theoretical and practical discussion of user experience analysis and design in business settings. 4 lectures.

BUS 495. Software Testing. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 392.

Theory and practice of software testing, including state-of-the-art practices, design issues, staffing issues, test management issues, and other related areas. Software testing tools utilized for applications testing, and test management. 4 lectures.

BUS 496. Electronic Commerce. 4 units

Term Typically Offered: TBD

Prerequisite: BUS 392.

Focus on the technology of electronic commerce, including programming, development environments and security, through a series of lectures, guest speakers, demonstrations, exercises and case studies. Networking, client/server computing, and web/database design concepts. Working e-commerce application required at end of course. 4 lectures.

BUS 497. Business Analytics. 4 units

Term Typically Offered: W, SP, SU

Prerequisite: BUS 393 and STAT 252.

Introduction to the concepts and applications of business analytics, using business case study and problem-solving approach. Data warehouse design and implementation. Supervised learning techniques for classification and prediction. Unsupervised learning techniques for dimension reduction and pattern recognition. Text analytics. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

BUS 498. Directed Topics in Information Systems. 4 units

Term Typically Offered: F, SP

Prerequisite: BUS 392.

Specialized Information Systems (IS) topic selected from the IS areas of current interest. Intended for advanced IS concentration students who want to learn and acquire in-depth IS knowledge and skills. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 lectures.

BUS 499. Data Communications and Networking. 4 units

Term Typically Offered: F, W

Prerequisite: BUS 391; Business and Economics majors must declare their concentrations in order to enroll.

Combines the fundamental concepts of data communications and networking with practical applications in business. Provides a basic understanding of the technical and managerial aspects of business telecommunication. Introduction to data communications and applications and technical fundamentals, and to network products, technologies, applications, and services. 4 lectures.

Chemistry (CHEM)

undefined

CHEM Courses

CHEM 101. Introduction to the Chemical Sciences. 1 unit

Term Typically Offered: F

CR/NC

Prerequisite: BCHEM/CHEM majors only.

Introduction to the chemistry and biochemistry disciplines. Orientation, advising, career opportunities and introduction to the faculty. Designed for first-year CHEM and BCHEM majors. Credit/No Credit grading only. 1 lecture.

CHEM 110. World of Chemistry. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area B1

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B3

2019-20 or earlier catalog: GE Area B4

Prerequisite: MATH 96, or MATH 115, or appropriate Math Placement Level.

The fundamentals of chemical cause/effect and structure/function relationships. The basic principles of chemistry and their applications to solving human problems in areas such as toxicology, environmental science, agriculture, nutrition, forensics and medicine. Not open for major credit in Biochemistry or Chemistry. Not open to students with credit in CHEM 111, CHEM 124, or CHEM 127. 3 lectures, 1 laboratory. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs).

CHEM 124. General Chemistry for Physical Science and Engineering I. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area B1

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B3

2019-20 or earlier catalog: GE Area B4

Prerequisite: MATH 118 or MATH 330. Recommended: High school chemistry or equivalent.

Introduction to atomic theory, chemical reactions, bonding, stoichiometry, nomenclature, gas laws, thermochemistry, molecular structure, and intermolecular forces. Intended primarily for students in engineering and/or physical sciences. Not open to students with credit in CHEM 127. Credit will be granted in only one of the following courses: CHEM 110, CHEM 124, or CHEM 127. 3 lectures, 1 laboratory. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs).

CHEM 125. General Chemistry for Physical Science and Engineering II. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B1

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B3

2019-20 or earlier catalog: GE Area B4

Prerequisite: CHEM 124, or AP Chemistry score of 5.

Topics include solution chemistry, thermodynamics, kinetics, equilibrium (including acids and bases), electrochemistry, and nuclear chemistry. Not open to students with credit in CHEM 128. 3 lectures, 1 laboratory. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs).

CHEM 126. General Chemistry for Physical Science and Engineering III. 4 units

Term Typically Offered: SP

Prerequisite: CHEM 125 with a grade of C- or better or consent of instructor.

Topics in equilibrium, kinetics, acid-base chemistry, and molecular structure, contextualized within major sub-disciplines of chemistry. Not open to students with credit in CHEM 129. 3 lectures, 1 laboratory.

CHEM 127. General Chemistry for Agriculture and Life Science I. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B1

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B3

2019-20 or earlier catalog: GE Area B4

Prerequisite: MATH 118 or MATH 330. Recommended: High school chemistry or equivalent.

Introduction to atomic theory, chemical reactions, bonding, stoichiometry, nomenclature, gas laws, thermochemistry, molecular structure, and intermolecular forces. Intended primarily for students in agriculture and life sciences. Not open to students with credit in CHEM 124. Credit will be granted in only one of the following courses: CHEM 110, CHEM 124, or CHEM 127. 3 lectures, 1 laboratory. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs).

CHEM 128. General Chemistry for Agriculture and Life Science II. 4 units

Term Typically Offered: W, SP

Prerequisite: CHEM 127 or AP Chemistry score of 5.

Continuation of CHEM 127. Colligative properties, colloids and solutions, oxidation-reduction reactions, electrochemistry, kinetics, equilibria, and thermodynamics. Not open to students with credit in CHEM 125. 3 lectures, 1 laboratory.

CHEM 129. General Chemistry for Agriculture and Life Science III. 4 units

Term Typically Offered: F, SP

Prerequisite: CHEM 128.

Continuation of CHEM 128. Acid and base equilibria, buffers, transition elements, solubility, complex ions, hybrid orbital theory, molecular orbital theory, and nuclear chemistry. Laboratory study of the chemical properties and semi-micro qualitative analysis of the representative group elements of the periodic table. Not open to students with credit in CHEM 126. 3 lectures, 1 laboratory.

CHEM 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: TBD

Prerequisite: CHEM 111, CHEM 124, or CHEM 127 and consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CHEM 201. Undergraduate Research. 1-2 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Consent of instructor.

Research under faculty supervision. Credit/No Credit grading only. Total credit limited to 10 units.

CHEM 202. Orientation to Biotechnology. 2 units

Term Typically Offered: F, W

Prerequisite: Completion of a course with a BIO, BOT or MCRO prefix and a course with a CHEM prefix.

Introduction to the diversity of fields in biotechnology. Applications in agriculture, nutrition, medicine and environmental problems. 1 lecture, 1 activity. Crosslisted as BIO/CHEM 202.

CHEM 203. Undergraduate Seminar I. 1 unit

Term Typically Offered: W, SP

CR/NC

Prerequisite: CHEM 126.

Introduction to basic scientific literature and scientific presentation skills. Targeted advising and preparation for research and career opportunities. Designed for second-year students majoring in Biochemistry or in Chemistry. Credit/No Credit grading only. 1 seminar.

CHEM 212. Introduction to Organic Chemistry. 5 units

Term Typically Offered: TBD

Prerequisite: CHEM 111, CHEM 124 or CHEM 127.

Structure, isomerism, nomenclature, fundamental reactions of major functional groups and applications of organic chemicals in agriculture, medicine, industry, and the home. CHEM 212 accepted in lieu of CHEM 312, but not for upper division credit. Not open to students with credit in CHEM 312, CHEM 216/316. 4 lectures, 1 laboratory.

CHEM 216. Organic Chemistry I. 5 units

Term Typically Offered: F, W

Prerequisite: CHEM 126 or CHEM 129 with a grade of C- or better or consent of instructor.

Fundamental concepts and laboratory skills of organic chemistry. Structure, bonding, nomenclature, isomerism, stereochemistry and physical properties of organic compounds. Introduction to spectroscopy. Reactions and mechanisms of alkanes, alkenes and alkyl halides. Fundamental laboratory techniques in organic chemistry. Not open to students with credit in CHEM 316. 4 lectures, 1 laboratory.

CHEM 217. Organic Chemistry II. 3 units

Term Typically Offered: W, SP

Prerequisite: CHEM 216 with a grade of C- or better or consent of instructor. Corequisite: CHEM 221 for Chemistry and Biochemistry majors; or CHEM 220 for non-Chemistry and non-Biochemistry majors.

Properties and reactions of carbonyl compounds, alcohols, ethers, amines and carbohydrates with an in-depth treatment of the reaction mechanisms. Introductory concepts and applications of infrared and NMR spectroscopy. Not open to students with credit in CHEM 317. 3 lectures.

CHEM 218. Organic Chemistry III. 3 units

Term Typically Offered: F, SP

Prerequisite: CHEM 217 with a grade of C- or better or consent of instructor. Corequisite: CHEM 324 for Chemistry and Biochemistry majors; or CHEM 223 for non-Chemistry and non-Biochemistry majors.

Properties and reactions of alkynes, heterocyclic and aromatic compounds with an in-depth treatment of the mechanisms of the reactions. Introductory concepts and applications of ultraviolet spectroscopy and mass spectrometry. Not open to students with credit in CHEM 318. 3 lectures.

CHEM 220. Organic Chemistry Laboratory For Life Sciences II. 1 unit

Term Typically Offered: W, SP

Corequisite: CHEM 217.

Laboratory experiments exploring reactions in organic chemistry, applying fundamental laboratory techniques covered in CHEM 216. Not open to Chemistry and Biochemistry majors. 1 laboratory.

CHEM 221. Organic Chemistry Laboratory II. 2 units

Term Typically Offered: W, SP

Prerequisite: major in Chemistry or Biochemistry. Corequisite: CHEM 217.

Laboratory experiments exploring reactions in organic chemistry, applying fundamental laboratory techniques covered in CHEM 216. 2 laboratories.

CHEM 223. Organic Chemistry Laboratory for Life Sciences III. 1 unit

Term Typically Offered: F, SP

Corequisite: CHEM 218.

Practice in multi-step organic synthesis, enzymatic organic chemistry, biomimetic organic chemistry. Not open to Biochemistry or Chemistry majors. 1 laboratory.

CHEM 231. Quantitative Analysis. 5 units

Term Typically Offered: TBD
Prerequisite: CHEM 126 or CHEM 129.

Theory and application of chemical equilibrium to analytical problems. Survey of important analytical methods with stress placed on the theory and application associated with titrimetric and spectrophotometric analysis. 3 lectures, 2 laboratories.

CHEM 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CHEM 302. Marine Chemistry. 3 units

Term Typically Offered: SP
Prerequisite: CHEM 216 or CHEM 312.

Introduction to chemical processes in the ocean including chemical oceanography and marine chemical ecology. 3 lectures.

CHEM 303. Undergraduate Seminar II. 1 unit

Term Typically Offered: F, W, SP
CR/NC
Prerequisite: CHEM 203 and CHEM 218.

Advanced exploration of more sophisticated scientific literature and scientific presentation skills. Targeted advising and preparation for research and career opportunities. Designed for third-year CHEM and BCHM majors. Credit/No Credit grading only. 1 seminar.

CHEM 308. Genetic Engineering Technology. 4 units

Term Typically Offered: W
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); and one of the following courses: CHEM 110, CHEM 124, or CHEM 127.

Introduction to the biology, methodology, and techniques used in genetic engineering. Potential benefits and problems in application within agriculture, nutrition, medicine and environmental context, including the underlying ethical questions. Not open to students with credit in CHEM 373, or to Biological Sciences, Marine Sciences, or Microbiology majors. 4 lectures. Crosslisted as BIO/CHEM 308. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

CHEM 312. Organic Chemistry: Fundamentals and Applications. 5 units

Term Typically Offered: F,W,SP,SU
Prerequisite: CHEM 125 or CHEM 128.

Structure, isomerism, nomenclature, fundamental reactions of major functional groups and applications of organic chemicals in agriculture, medicine, industry, and the home. Not open to students with credit in CHEM 212 or CHEM 216/316. 4 lectures, 1 laboratory.

CHEM 314. Biochemistry: Fundamentals and Applications. 5 units

Term Typically Offered: F, W, SP
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7
Prerequisite: Junior standing; completion of GE Area A with grades C- or better; completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs); completion of GE Area B2; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one of the following courses: CHEM 212, CHEM 216, CHEM 312, or CHEM 316.

Chemistry of biomolecules including carbohydrates, proteins, lipids, vitamins, enzymes and hormones. Basic molecular biology with applications to biotechnology and genetic engineering. Practical intermediary metabolism of prokaryotic and eukaryotic systems. 4 lectures, 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

CHEM 324. Organic Chemistry Laboratory III. 2 units

Term Typically Offered: F, SP
Prerequisite: major in Chemistry or Biochemistry. Corequisite: CHEM 218.

Practice in multiple step organic synthesis, column chromatography, vacuum distillation, enzymes as chemical reagents, inert atmosphere techniques, introduction to FT NMR spectroscopy and mass spectrometry, survey of organic chemical literature. 2 laboratories.

CHEM 331. Quantitative Analysis. 5 units

Term Typically Offered: F, SP, SU
Prerequisite: CHEM 126 or CHEM 129.

Theory and application of chemical equilibrium to analytical problems. Survey of important analytical methods with stress placed on the theory and application associated with titrimetric and spectrophotometric analysis. 3 lectures, 2 laboratories.

CHEM 341. Environmental Chemistry: Water Pollution. 3 units

Term Typically Offered: TBD
Prerequisite: CHEM 126 or CHEM 129; and CHEM 212 or CHEM 312; or CHEM 216 or CHEM 316.

Chemical aspects of water and water pollution: alkalinity; acid deposition, particularly relating to lake and stream acidification and forest decline; drinking water treatment and trihalomethanes; wastewater treatment; detergents, builders, and eutrophication; pesticides; other toxic organic compounds such as PCBs and dioxin; hazardous wastes; toxic elements such as Pb, Hg, Sn, Cd, and Se. 3 lectures.

CHEM 349. Chemical and Biological Warfare. 4 units

Term Typically Offered: F, SP
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; CHEM course in GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs); BIO or MCRO course in GE Area B2; and completion of GE Area B4 with a grade of C- or better in one course (GE Area B1 for students on the 2019-20 or earlier catalogs).

History, development, and use of chemical and biological warfare (CBW). Chemical and biological disarmament. Production and destruction of CBW agents. CBW terrorism. Ethics of CBW. 2 lectures, 2 seminars. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

CHEM 351. Physical Chemistry I. 3 units

Term Typically Offered: F, W

Prerequisite: CHEM 126 or CHEM 129; MATH 143; PHYS 122 or PHYS 132.

Basic physical chemistry for the study of chemical and biochemical systems. Kinetic-molecular theory, gas laws, principles of thermodynamics. 3 lectures.

CHEM 352. Physical Chemistry II. 3 units

Term Typically Offered: W, SP

Prerequisite: CHEM 351.

Application of physical chemistry to chemical and biochemical systems. Electrochemistry, kinetics, viscosity, surface and transport properties. 3 lectures.

CHEM 353. Physical Chemistry III. 3 units

Term Typically Offered: F, SP

Prerequisite: CHEM 352.

Principles and applications of quantum chemistry. Chemical bonding and molecular structure. Spectroscopy and diffraction. 3 lectures.

CHEM 356. Physical Chemistry Laboratory. 2 units

Term Typically Offered: F, W, SP

GWR

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and CHEM 231/331. Corequisite: CHEM 352.

Experimental studies of gases, solutions, thermochemistry, chemical and phase equilibria, electrochemistry, chemical and enzyme kinetics, computational methods and applications to chemistry and biochemistry. Written communication of scientific results using applicable literature and databases. 2 laboratories. Fulfills GWR.

CHEM 357. Physical Chemistry III Lab. 1 unit

Term Typically Offered: F, SP

Corequisite: CHEM 353.

Experimental and computational investigations of quantum chemistry, spectroscopy, symmetry and statistical chemistry. 1 laboratory.

CHEM 369. Biochemical Principles. 5 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades C- or better; completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs); one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); BIO 161; and CHEM 217 or CHEM 317.

Chemistry and function of major cellular constituents: proteins, lipids, carbohydrates, nucleic acids, and membranes. Mechanisms of protein function and regulation and enzyme catalysis. 4 lectures, 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

CHEM 372. Metabolism. 4 units

Term Typically Offered: F, SP

Prerequisite: CHEM 371.

Intermediary metabolism of carbohydrates, lipids, amino acids and nucleotides, regulation and integration of metabolic pathways, bioenergetics, photosynthesis, electron transport, nitrogen fixation, biochemical function of vitamins and minerals. 4 lectures.

CHEM 373. Molecular Biology. 3 units

Term Typically Offered: W, SP

Prerequisite: CHEM 371.

Structure of nucleic acids and chromosomes. Mechanisms and regulation of nucleic acid and protein synthesis. Molecular biology techniques. 3 lectures.

CHEM 377. Chemistry of Drugs and Poisons. 3 units

Term Typically Offered: W, SP

Prerequisite: CHEM 313 or CHEM 371.

Introduction to pharmacology and toxicology: history, sources, development and testing, physical and chemical properties, biochemical and physiological effects, mechanisms of action, and the therapeutic uses and toxicology of common drugs and poisons. 3 lectures.

CHEM 400. Special Problems for Advanced Undergraduates. 1-3 units

Term Typically Offered: TBD

Prerequisite: Junior standing and consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 3 units per quarter. 1-3 laboratories.

CHEM 401. Advanced Undergraduate Research. 1-2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Research under faculty supervision. Total credit limited to 10 units. 6 units may be applied to approved chemistry electives.

CHEM 403. Undergraduate Seminar III: Senior Project. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: CHEM 303 and CHEM 352.

Culminating experience with high level scientific literature and scientific presentation skills. Targeted advising and preparation for research and career opportunities. Designed for fourth-year CHEM and BCHM majors. 1 seminar.

CHEM 405. Advanced Physical Chemistry. 3 units

Term Typically Offered: TBD

Corequisite: CHEM 353.

Selected advanced topics in physical chemistry, which may include statistical mechanics, computational chemistry, nonequilibrium thermodynamics, lasers in chemistry, solid-state and/or advanced spectroscopy. Total credit limited to 6 units. 3 lectures.

CHEM 414. Advanced Organic Chemistry - Mechanisms. 3 units

Term Typically Offered: W
Prerequisite: CHEM 218 or CHEM 318.

A mechanistic study of organic reactions; correlation of structure with reactivity; reaction intermediates and species involved in reactions; methods of probing reaction mechanisms. 3 lectures.

CHEM 418. Neurochemistry. 3 units

Term Typically Offered: F
Prerequisite: BIO 161 and CHEM 217.

Introduction to the chemistry of neurotransmission. Emphasis on molecular makeup and function of voltage gated ion channels; receptors and enzymes involved in signal transduction; biosynthesis, storage, release, reuptake, and breakdown of major neurotransmitters. Mechanism of action of agonists and antagonists, and their effects on the central and peripheral nervous systems. 3 lectures.

CHEM 420. Advanced Organic Chemistry - Synthesis. 3 units

Term Typically Offered: SP
Prerequisite: CHEM 218/318.

Modern methods of organic synthesis. Carbon-carbon bond forming reactions, functional group transformations, protecting groups, strategies of total synthesis of natural products. 3 seminars.

CHEM 428. Nutritional Biochemistry. 3 units

Term Typically Offered: TBD
Prerequisite: CHEM 371.

Nutritional aspects of biochemistry. Topics include essential and energy providing nutrients, vitamins and minerals, deficiencies, degenerative and genetic diseases of metabolism, hormones and brain chemistry, other current topics. Emphasis on current research and controversy. 3 lectures. Formerly CHEM 528.

CHEM 432. Physical Biochemistry. 3 units

Term Typically Offered: SP
Prerequisite: CHEM 371. Recommended: CHEM 351.

Principles of biochemistry and physical chemistry applied to structure and function of biomacromolecules. Emphasis on the techniques used in the study of protein/ligand binding, macromolecular structure and dynamics, and on understanding current literature. 3 lectures.

CHEM 439. Instrumental Analysis. 5 units

Term Typically Offered: W
Prerequisite: CHEM 231/331, CHEM 354. Recommended: CHEM 353.

Theory, practice and method selection of modern instrumental analytical techniques, including spectroscopic, electrochemical, chromatographic and thermal methods. Current industrial applications. Laboratory work emphasizes optimization of experimental parameters. 3 lectures, 2 laboratories.

CHEM 441. Bioinformatics Applications. 4 units

Term Typically Offered: F, SP
Prerequisite: BIO 302, BIO 303, BIO 351, or CHEM 373.

Introduction to new problems in molecular biology and current computer applications for genetic database analyses. Use of software for: nucleic acid, genome and protein sequence analysis; genetic databases, database tools; industrial applications in bioinformatics; ethical and societal concerns. 3 lectures, 1 laboratory. Crosslisted as BIO/CHEM 441.

CHEM 444. Polymers & Coatings I. 3 units

Term Typically Offered: F
Prerequisite: CHEM 212/312 or CHEM 216/316.

Physical properties of polymers and coatings and their measurement. Molecular weight averages, glass transition, thermodynamics of polymers. Viscoelastic properties, rheology, molecular weight determination. Thermal analysis, spectroscopic analysis, mechanical testing. 3 lectures.

CHEM 445. Polymers & Coatings II. 3 units

Term Typically Offered: W
Prerequisite: CHEM 217/317 and CHEM 444.

Introduction to polymerization methods and mechanisms. Chemistry of initiators, catalysts and inhibitors, kinetics of polymerization. Uses of representative polymer types. Synthesis, film formation, structure and properties of polymers commonly used in coatings and adhesives. 3 lectures.

CHEM 446. Surface Chemistry of Materials. 3 units

Term Typically Offered: SP
Prerequisite: CHEM 125 or CHEM 128; CHEM 351, MATE 380, or ME 302.

Surface energy. Capillarity, solid and liquid interface, adsorption. Surface areas of solids. Contact angles and wetting. Friction, lubrication and adhesion. Relationship of surface to bulk properties of materials. Applications. 3 lectures. Crosslisted as CHEM/MATE 446.

CHEM 447. Polymers and Coatings Laboratory I. 2 units

Term Typically Offered: F
Corequisite: CHEM 444.

Experimental techniques of producing and characterizing coatings. Polymer characterization and analysis. Molecular weight analysis using viscometry, light scattering, and gel permeation chromatography. Thermal analysis using differential scanning calorimetry, thermal mechanical analysis and dynamic mechanical analysis. Polymer rheology. Infrared, Raman and FT-NMR spectroscopy. Atomic force microscopy. 2 laboratories.

CHEM 448. Polymers and Coatings Laboratory II. 2 units

Term Typically Offered: W
Prerequisite: CHEM 447. Corequisite: CHEM 445.

Polymer synthesis using solution, suspension, bulk, emulsion techniques. Synthesis of chain growth polymers using free radical, anionic, cationic, and other catalysts. Synthesis of step-growth polymers. Kinetics of polymer reactions. Synthesis of resins used in modern coatings. 2 laboratories.

CHEM 449. Polymers and Coatings Internship. 2 units

Term Typically Offered: F,W,SP, SU
Prerequisite: CHEM 444.

Selected students will spend up to 12 weeks with an approved polymers and coatings firm engaged in production or related business. Time will be spent applying and developing production and technical skills and abilities in the polymers and coatings industry.

CHEM 450. Polymers and Coatings III. 3 units

Term Typically Offered: SP

Prerequisite: CHEM 444 or CHEM 544.

Formulation of modern coatings. Raw materials including resins, solvents, pigments, and additives. Formulation principles for solvent-borne and coatings, waterborne, powder, radiation cure and architectural coatings. Regulatory issues; VOC's. Coating properties, film formation, film defects, application methods, color and color acceptance. Not open to students with credit in CHEM 550. 3 lectures.

CHEM 451. Polymers and Coatings Laboratory III. 2 units

Term Typically Offered: SP

Prerequisite: CHEM 447 or CHEM 547. Corequisite: CHEM 450.

Recommended: CHEM 445 or CHEM 545; CHEM 448 or CHEM 548; CHEM 446.

Preparation and characterization of coatings - solvent based and waterborne. Thermoplastic and thermosetting coatings. Coating film preparation methods. Applications of spectroscopy, scanning probe microscopy, thermal analysis, rheology in characterizing coatings. VOC, long-term exposure testing. Measurement of appearance (color, gloss). Not open to students with credit in CHEM 551. 2 laboratories.

CHEM 454. Functional Polymeric Materials. 4 units

Term Typically Offered: SP

Prerequisite: CHEM 212 or CHEM 216 or CHEM 312 or CHEM 316; CHEM 351 or MATE 380; or graduate standing.

Structure-property-processing correlations of functional polymeric materials. Additive group contribution methodologies for predicting and determining physical properties. Semi-empirical approaches for estimating and evaluating the values of physical properties from chemical structures. 4 lectures.

CHEM 458. Advanced Organic Chemistry: Spectroscopy. 3 units

Term Typically Offered: SP

Prerequisite: CHEM 324.

Separation, purification, and identification of organic molecules using chemical and instrumental methods, including nuclear magnetic resonance, infrared and ultraviolet spectroscopy and mass spectrometry, and techniques in high-resolution FT-NMR. 1 lecture, 2 laboratories.

CHEM 459. Undergraduate Seminar. 2 units

Term Typically Offered: F,W,SP,SU

Corequisite: CHEM 218 or CHEM 318 and junior standing.

Oral presentation of current developments in chemistry based on current literature. Searching for, organizing and presenting developments from current literature in chemistry and biochemistry. Preparation for employment and for independent work, including senior project, in chemistry and biochemistry. 2 seminars.

CHEM 461. Senior Project Report. 1 unit

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Completion of a senior project report under faculty supervision. Minimum 30 hours time commitment.

CHEM 463. Honors Research. 1 unit

Term Typically Offered: F,W,SP,SU

Prerequisite: Junior standing and consent of instructor.

Advanced laboratory research. Results are presented in a poster session or other public forum. Total credit limited to 2 units with a maximum of 1 unit per quarter. 1 laboratory.

CHEM 465. College Teaching Practicum. 1-2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Junior standing, CHEM 231/331 (or permission of instructor), evidence of satisfactory preparation in chemistry; department chair approval required.

Teaching assignment in an undergraduate college classroom. Includes teaching and related activities under the direction of a permanent faculty member in the Department of Chemistry and Biochemistry. Total credit limited to 4 units.

CHEM 466. Learning Assistant Seminar. 2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Junior standing and consent of instructor.

Pedagogical instruction and introduction to education research for Chemistry Learning Assistants. Effective questioning, the effect of explanatory knowledge on student learning, student misconceptions in chemistry, collaborative problem solving techniques in chemistry, studio curriculum development, content in the general chemistry curriculum. Total credit limited to 4 units. Credit/No Credit grading only. 2 seminars.

CHEM 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: F

Prerequisite: CHEM 351, CHEM 217 or CHEM 317.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CHEM 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

CHEM 474. Protein Techniques Laboratory. 3 units

Term Typically Offered: F, W, SP

Prerequisite: CHEM 371.

Experiments in protein purification and analysis from recombinant sources. Ion-exchange and affinity chromatography, electrophoresis and blotting. UV, chemical, immune, and fluorescent detection. Enzyme kinetic analysis. 1 lecture, 2 laboratories.

CHEM 475. Molecular Biology Laboratory. 3 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 161, and grade of C- or better in BIO 351 or CHEM 373 or consent of instructor.

Introduction to techniques used in molecular biology and biotechnology; DNA extraction, characterization, cloning, Southern blotting, reverse transcription, polymerase chain reaction, and sequencing analysis. 1 lecture, 2 laboratories. Crosslisted as BIO/CHEM 475.

CHEM 476. Gene Expression Laboratory. 3 units

Term Typically Offered: SP

Prerequisite: BIO/CHEM 475 with a grade of C- or better or consent of instructor; CHEM 313 or CHEM 371, or graduate standing in Biological Sciences.

Heterologous gene expression of a recombinant protein in a microbial system: gene cloning, construction of expression plasmid, DNA sequence analysis, transformation of microbial host, selection and analysis of transformed host cells, expression and purification of recombinant protein. 1 lecture, 2 laboratories. Crosslisted as BIO/CHEM 476.

CHEM 477. Biochemical Pharmacology. 3 units

Term Typically Offered: TBD

Prerequisite: CHEM 218 or CHEM 318.

Consideration of current selected topics in pharmacology and drug targeting. 3 lectures.

CHEM 481. Inorganic Chemistry. 3 units

Term Typically Offered: F

Prerequisite: CHEM 352 and CHEM 231/331.

A systematic study of chemical and physical properties of inorganic compounds based on periodic groupings with emphasis on chemical bonding and structure. Topics will include coordination chemistry and kinetics, organometallic chemistry, advanced acid-base relationships and bonding theories plus other selected topics. 3 lectures.

CHEM 484. Inorganic Chemistry Laboratory. 2 units

Term Typically Offered: F

Corequisite: CHEM 481.

Laboratory techniques in inorganic chemistry. Synthetic and analytic techniques as applied to inorganic and organometallic chemistry. 2 laboratories.

CHEM 485. Cooperative Education Experience. 6 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. 2 units only applicable to approved chemistry electives. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only.

CHEM 495. Cooperative Education Experience. 12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. 2 units only applicable to approved chemistry electives. Major credit limited to 4 units; total credit limited to 24 units. Credit/No Credit grading only.

CHEM 500. Special Problems for Graduate Students. 1-3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing and consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter.

CHEM 544. Polymer Physical Chemistry and Analysis. 3 units

Term Typically Offered: F

Prerequisite: CHEM 212/312 or CHEM 216/316 or equivalent; CHEM 351 or equivalent.

Physical properties of polymers and coatings and their measurement; molecular weight averages, glass transition, thermodynamics of polymers, viscoelastic properties, rheology; molecular weight determination, thermal analysis, spectroscopic analysis, mechanical testing, atomic force microscopy. Special individual project. Not open to students with credit in CHEM 444. 3 lectures.

CHEM 545. Polymer Synthesis and Mechanisms. 3 units

Term Typically Offered: W

Prerequisite: CHEM 544.

Polymerization methods and mechanisms; chemistry of initiators, catalysts and inhibitors; use of representative types; synthesis, structure and properties of polymers commonly used in coatings and adhesives. Special individual project. Not open to students with credit in CHEM 445. 3 lectures.

CHEM 547. Polymer Characterization and Analysis Laboratory. 2 units

Term Typically Offered: F

Corequisite: CHEM 544.

Polymer characterization and analysis. Molecular weight analysis using viscometry, light scattering, and gel permeation chromatography. Thermal analysis using differential scanning calorimetry, thermal mechanical analysis and dynamic mechanical analysis. Polymer rheology. Infrared, Raman and FT-NMR spectroscopy. Atomic force microscopy. Special individual project. Not open to students with credit in CHEM 447. 2 laboratories.

CHEM 548. Polymer Synthesis Laboratory. 2 units

Term Typically Offered: W

Prerequisite: CHEM 547. Corequisite: CHEM 545.

Polymer synthesis using solution, suspension, bulk, emulsion techniques. Synthesis of chain growth polymers using free radical, anionic, cationic, and other catalysts. Synthesis of step-growth polymers. Kinetics of polymer reactions. Synthesis of resins used in modern coatings. Special individual project. Not open to students with credit in CHEM 448. 2 laboratories.

CHEM 550. Coatings Formulation Principles. 3 units

Term Typically Offered: SP

Prerequisite: CHEM 444 or CHEM 544.

Formulation of modern coatings. Raw materials including resins, solvents, pigments, and additives. Formulation principles for solvent-borne and high solids coatings, water-borne coatings, powder coatings, radiation cure coatings and architectural coatings. Regulatory issues; VOC's. Coating properties, film formation, film defects, application methods, color and color acceptance. Special individual project. 3 lectures.

CHEM 551. Coatings Formulation Laboratory. 2 units

Term Typically Offered: SP

Corequisite: CHEM 550.

Laboratory formulation of modern coatings. Formation of pigment dispersions. Formulation of solvent-borne and high solids coatings, water-borne coatings, powder coatings, radiation cure coatings and architectural coatings. VOC measurements. Measurement of coating properties, film formation, film defects, application methods, color and color acceptance, hiding, gloss. Accelerated weathering. Special individual project. 2 laboratories.

CHEM 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures.

CHEM 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

CHEM 590. Graduate Seminar in Polymers and Coatings. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing in the Polymers and Coatings program or consent of instructor.

Problems and topics in polymers and coatings selected according to the interest and needs of the students enrolled. Total credit limited to 3 units. 1 seminar.

CHEM 598. Graduate Project. 3 units

Term Typically Offered: F,W,SPSU

Prerequisite: CHEM 545, CHEM 547, CHEM 548, CHEM 550, CHEM 551.

Supervised industrial graduate internship in polymers and coatings science. Provides students with industrial research experience. Requires approval of graduate advisor. Students engage in industrial research and development at an approved industry, make regular reports back to graduate advisor, and present formal report and seminar on work each quarter. Total credit limited to 9 units.

CHEM 599. Graduate Thesis. 3 units

Term Typically Offered: F,W,SPSU

Prerequisite: CHEM 545, CHEM 547, CHEM 548, CHEM 550, CHEM 551.

Directed graduate research in specialized advanced topics related to polymers and coatings science, leading to a graduate thesis of suitable quality. Requires approval of graduate advisor. Students are expected to work independently and report weekly to faculty advisor. Total credit limited to 9 units.

Child Development (CD)

undefined

CD Courses

CD 102. Orientation to the Child Development Major. 2 units

Term Typically Offered: F

Prerequisite: CD majors only.

Introduction to the child development major, self-assessments, career opportunities, university and community resources, and the program at Cal Poly. Course may be offered in classroom-based or online format. 2 lectures.

CD 131. Observing and Interacting with Children. 4 units

Term Typically Offered: F, W, SP

Observation methods and guidance techniques for adults working with children in family, community, and educational settings. 3 lectures, 1 activity.

CD 200. Special Problems. 1-4 units

Term Typically Offered: TBD

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 6 units, with a maximum of 4 units per quarter.

CD 207. Children's Learning and Development in Educational Settings. 4 units

Term Typically Offered: TBD

Prerequisite: Sophomore standing; PSY 201 or PSY 202 or admission to the university with the intent to enter the MSTEP Program.

Study of theories and research about the development and learning of children and young adolescents within diverse backgrounds, and application to teaching in public school settings. Observations/interactions with children in school settings. 3 lectures, 1 activity. Participation in public schools requires mandated fingerprint clearance. Crosslisted as CD/EDUC 207.

CD 230. Preschool Laboratory. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CD 131 and CD/PSY 256.

Preliminary teaching experience with children in a preschool laboratory setting. Participant planning, execution and evaluation of age-appropriate activities. Observation is used as the basis for planning for the development of the whole child. 2 lecture, 2 laboratories.

CD 254. Family Psychology. 4 units

Term Typically Offered: F, W, SP
Prerequisite: PSY 201 or PSY 202.

Introduction to research and theory on family relationships and behavior across the lifespan. Contextual influences, diversity of family forms, and topics such as love, mate selection, marital quality, parenting, gender, household work, divorce, and remarriage. 4 lectures. Crosslisted as CD/PSY 254.

CD 256. Developmental Psychology. 4 units

Term Typically Offered: F, W
Prerequisite: PSY 201 or PSY 202.

Introduction to the scientific study of development with emphasis on the lifespan, from infancy to old age. Basic research and concepts in understanding social, emotional, cognitive, contextual, and diversity influences on development. 4 lectures. Crosslisted as CD/PSY 256.

CD 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CD 302. Developmental Science Technology Lab. 2 units

Term Typically Offered: F, W, SP
Prerequisite: CD 102 and CD/PSY 256. Co-requisite: Any 300-400 level CD course.

Technology applications (e.g., websites, film, podcasts, blogs) as they relate to communication of research and theory in developmental science. Digital tools used by developmental researchers and professionals when working with children, youth, and families. 2 laboratories.

CD 304. Infant and Toddler Development. 4 units

Term Typically Offered: W, SP
Prerequisite: CD/PSY 256.

Human development from conception through the second year of life. Examination of theory and research in multiple domains of development. Consideration of environments and activities which enhance the emerging capabilities of infants and toddlers. 4 lectures.

CD 305. Early and Middle Childhood Development. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CD/PSY 256 or CD/EDUC 207.

In-depth study of theory and research on development in early and middle childhood, especially within physical, cognitive, social, and emotional domains. Consideration of case studies and current practices in light of theoretical perspectives and current research. Course may be offered in classroom-based or online format. 4 lectures.

CD 306. Adolescence. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CD/PSY 256 or CD/EDUC 207.

Psychological analysis of the years from prepubescence to young adulthood. Current research on behavior and development during adolescence with emphasis on physical, affective, cognitive, sociocultural, historical, family, peer and school aspects of life during the post-child, pre-adult years. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as CD/PSY 306.

CD 329. Research Methods in Child Development. 4 units

Term Typically Offered: F, W
Prerequisite: PSY 256, STAT 217.

Introduction to research methods in child development. Critically evaluating research literature, generating research questions, and conducting observations and interviews with children and adolescents. 3 lectures, 1 activity.

CD 350. Developmental Issues in Education. 4 units

Term Typically Offered: W, SP
Prerequisite: CD/EDUC 207 or PSY 256.

Current issues and research concerning how children and youth develop and learn in school. Topics may include motivation, views of intelligence, teacher and student relations, constructivist learning environments, socioemotional learning, school climates, home-school connections. 4 lectures.

CD 351. Learning in Out-of-School Time. 4 units

Term Typically Offered: W, SP
Prerequisite: CD/PSY 256 or CD/EDUC 207.

How children and youth develop and learn in settings and activities outside of formal schooling, such as everyday family activities, informal learning institutions (e.g., museums), nature, and organized extracurricular activities. Research findings and theoretical perspectives on how activity in such settings supports development and learning. 4 lectures.

CD 356. Behavioral Disorders in Childhood. 4 units

Term Typically Offered: F, SP
Prerequisite: PSY 201 or PSY 202; CD/PSY 256 or CD 305; and junior standing.

Applications of psychological principles to childhood behavioral disorders. Aggression, delinquency, stress reactions, motivational, perceptual-attentional deficiencies, psychoses, anxiety disorders, biological dysfunctions, and social, emotional and intellectual disabilities. Course may be offered in classroom-based or online format. 4 seminars. Crosslisted as CD/PSY 356. Formerly CD 456.

CD 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: TBD
Prerequisite: Junior standing.

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 6 units, with a maximum of 4 units per quarter.

CD 411. Children, Adolescents & Technology. 4 units

Term Typically Offered: TBD

Prerequisite: CD 329; and two of the following: CD 304, 305, or CD 306.

Examination of research and theory on how use of digital technologies (e.g., electronic toys, television, video games, virtual reality, educational technologies, assistive technologies, social media) relates to children's and adolescents' development across domains. 4 lectures. Formerly CD 413.

CD 417. Interpersonal Relationships in Childhood and Adolescence. 4 units

Term Typically Offered: SP

Prerequisite: CD 304, CD 305 or CD 306; or CD/PSY 256 and PSY 305.

Current theories and research on the development of interpersonal relationships in childhood and adolescence. Topics may include parent-child relationships, peer relationships in childhood, intimate relationships in adolescence. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures. Crosslisted as CD/PSY 417.

CD 424. Children's Development in Diverse Cultures. 4 units

Term Typically Offered: F, W

Prerequisite: Two of the following: CD 304, CD 305, CD 306; junior standing or consent of instructor.

Examination of research on child and adolescent development in diverse families and community settings. Topics include close examination of cultural communities in different countries (cross-cultural) and in the United States (multicultural) using sociocultural frameworks. 4 lectures.

CD 431. Assessing Children's Development and Environments. 4 units

Term Typically Offered: TBD

Prerequisite: CD 304 or CD 305 or PSY 419 or PSY 420 or PSY 421; and CD 329 or PSY 329.

Current developmental and environmental assessments used in care and educational settings and in prevention programs and research. Practice using, creating, and evaluating child assessments. 3 lectures, 1 activity. Crosslisted as CD/PSY 431.

CD 448. Research Internship. 5 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: CD 230 and CD 329.

Faculty-supervised research experience on various topics related to child and adolescent development. Student apprenticeship with a department faculty member engaging in a research project. Credit/No Credit grading only. Formerly CD 333.

CD 449. Advanced Research Internship. 5 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: CD 333 or CD 448.

Faculty-supervised research experience on various topics related to child and adolescent development. Student apprenticeship with a department faculty member to conduct aspects of a research project. Credit/No Credit grading only. Formerly CD 433.

CD 450. Perspectives on Child and Adolescent Development. 4 units

Term Typically Offered: F, SP

Prerequisite: CD 304, CD 305, CD 306, CD 329 and senior standing.

Advanced study of theoretical perspectives and research on the development of children and adolescents and the implications for current practice and policy. 4 seminars. Formerly CD 401.

CD 453. Supervised Fieldwork Internship. 5 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Psychology and Child Development majors only; CD 230, PSY 323, junior standing and consent of instructor.

Faculty supervised fieldwork experience. Role of professional apprentice is experienced and analyzed by each student. Credit/No Credit grading only. Formerly CD 330.

CD 454. Advanced Supervised Fieldwork Internship. 5 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: CD 330 or CD 453; and consent of instructor; Psychology and Child Development majors only.

Faculty-supervised preprofessional experience in a career-related setting which complements the CD 330 internship. Such roles as master teacher, caseworker, therapeutic intern, administrative aide or program specialist are experienced and analyzed by each student. Credit/No credit grading only. Formerly CD 430.

CD 460. Child Abuse and Neglect. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202 and junior standing.

Issues in child maltreatment, including definitions and forms, causes, consequences, assessment, reporting, treatment, and prevention. Possible links among research, intervention, and public policy will be emphasized. 4 seminars. Crosslisted as CD/PSY 460.

CD 461. Senior Project Seminar. 2 units

Term Typically Offered: F, W

Prerequisite: Senior standing; CD 329; and Psychology and Child Development majors only.

Senior project expectations and skills. Students identify appropriate topics, methods and content for the senior project; to be presented in progress reports. Conduct literature reviews. 2 seminars.

CD 462. Senior Project. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CD 461.

Completion of a project under faculty supervision.

CD 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

Chinese (CHIN)

undefined

CHIN Courses

CHIN 101. Elementary Mandarin Chinese I. 4 units

Term Typically Offered: F

Beginning Mandarin Chinese. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing and introduction to Chinese culture. Not open to students with credit in CHIN 141. 4 lectures.

CHIN 102. Elementary Mandarin Chinese II. 4 units

Term Typically Offered: W

Prerequisite: CHIN 101, CHIN 141, or appropriate score on placement exam or consent of instructor.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing and introduction to Chinese culture. Not open to students with credit in CHIN 142. 4 lectures.

CHIN 103. Elementary Mandarin Chinese III. 4 units

Term Typically Offered: SP

Prerequisite: CHIN 102, CHIN 142, or appropriate score on placement exam or consent of instructor.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing and introduction to Chinese culture. Not open to students with credit in CHIN 143. 4 lectures.

CHIN 141. Elementary Mandarin Chinese I Study Abroad. 4 units

Term Typically Offered: SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: Acceptance into the Cal Poly Global Program.

Beginning Mandarin Chinese. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in CHIN 101. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

CHIN 142. Elementary Mandarin Chinese II Study Abroad. 4 units

Term Typically Offered: SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: CHIN 101, CHIN 141, or appropriate score on placement exam; and acceptance into the Cal Poly Global Program.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in CHIN 102. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

CHIN 143. Elementary Mandarin Chinese III Study Abroad. 4 units

Term Typically Offered: SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: CHIN 102, CHIN 142, or appropriate score on placement exam; and acceptance into the Cal Poly Global Program.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in CHIN 103. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

CHIN 201. Intermediate Mandarin Chinese I. 4 units

Term Typically Offered: F

2019-20 or earlier catalog: GE Area C5

Prerequisite: CHIN 103, CHIN 143, or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Mandarin Chinese within an intercultural context. Not open to students with credit in CHIN 241. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

CHIN 202. Intermediate Mandarin Chinese II. 4 units

Term Typically Offered: W

2019-20 or earlier catalog: GE Area C5

Prerequisite: CHIN 201, CHIN 241, or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Mandarin Chinese within an intercultural context. Not open to students with credit in CHIN 242. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

CHIN 203. Intermediate Mandarin Chinese III. 4 units

Term Typically Offered: SP

2019-20 or earlier catalog: GE Area C5

Prerequisite: CHIN 202, CHIN 242, or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Mandarin Chinese within an intercultural context. Not open to students with credit in CHIN 243. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

CHIN 241. Intermediate Mandarin Chinese I Study Abroad. 4 units

Term Typically Offered: SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: CHIN 103, CHIN 143, or appropriate score on placement exam; and acceptance into the Cal Poly Global Program.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Mandarin Chinese. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in CHIN 201. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

CHIN 242. Intermediate Mandarin Chinese II Study Abroad. 4 units

Term Typically Offered: SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: CHIN 201, CHIN 241, or appropriate score on placement exam; and acceptance into the Cal Poly Global Program.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Mandarin Chinese. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in CHIN 202. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

CHIN 243. Intermediate Mandarin Chinese III Study Abroad. 4 units

Term Typically Offered: SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: CHIN 202, CHIN 242, or appropriate score on placement exam; and acceptance into the Cal Poly Global Program.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Mandarin Chinese. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in CHIN 203. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

City and Regional Planning (CRP)

undefined

CRP Courses

CRP 201. Basic Graphic Skills. 4 units

Term Typically Offered: F

Basic techniques used in graphic communication for representation of the real world on two-dimensional planes. Use of scale, drawing conventions, orthographic and isometric projections, perspective drawings. Basic design and site analysis skills. Sketching, delineation and rendering including the use of black and white and color techniques. 4 laboratories.

CRP 202. Urban Design Studio I. 4 units

Term Typically Offered: W

Sustainability Focused

Prerequisite: CRP 201.

Exploring elements and principles of environmental design. Understanding the form and character of the designed urban environment. Introduction to problem analysis and problem solving in environmental design. Implications of design decisions and solutions on urban context. Assignments of object, project and system scale in an urban context. 4 laboratories.

CRP 203. Urban Design Studio II. 4 units

Term Typically Offered: SP

Prerequisite: CRP 202 and CRP 204.

Applications of basic design fundamentals and skills to the design of environments through design exercises applied to planning. Problem analysis and problem solving skills as applied to environmental design issues. 4 laboratories.

CRP 204. Theories and Methods of Urban Design. 3 units

Term Typically Offered: W

Prerequisite: CRP 201. Corequisite: CRP 202.

Definition/nature of urban design: a typology of procedures and products. Urban design as a field between planning, architecture, and landscape architecture. Visual assessment and townscape movement. Environmental perception, behavior and spatial fit. Typo-morphology and the architecture of the city. 1 lecture, 2 activities.

CRP 211. Cities: Form, Culture and Evolution. 4 units

Term Typically Offered: W

Historical overview of the evolution of cities - how the form and function of cities evolved among different societies from antiquity to contemporary times. Includes early cities in Mesopotamia, Central America; Greece and Rome; Renaissance, Baroque; and North and South America. Course may be offered in classroom-based or online format. 4 lectures.

CRP 212. Introduction to Urban Planning. 4 units

Term Typically Offered: F, W, SP

Sustainability Related

Understanding the issues of contemporary urban growth and change. Development of theories of urban planning and design. Introduction to zoning, planning regulations and codes, and professional practice. Relationship of environmental design disciplines, citizen groups, and individuals to urban planning. Course may be offered in classroom-based or online format. 4 lectures.

CRP 213. Population, Housing and Economic Applications. 4 units

Term Typically Offered: F

Collection, organization, and presentation of information and data related to population, housing and employment. Analytical applications to estimate population over time, housing demand by type and income and employment by standard classification. Application of urban economic theory related to jobs and housing. 3 lectures, 1 laboratory.

CRP 214. Land Use and Transportation Studies. 4 units

Term Typically Offered: SP
Prerequisite: CRP 212.

How cities and regions work. Relationship between human activities and patterns of land use and circulation. Spatial analysis and location theories. Methods for conducting studies to describe, analyze, and map land uses. Regional-scale transportation analysis, traffic impact studies, and multimodal transportation plans. 3 lectures, 1 activity.

CRP 215. Planning for and with Multiple Publics. 4 units

Term Typically Offered: SP
USCP
Prerequisite: Completion of GE Area D1. Recommended: ES 112.

How the social/spatial relationships among racial/ethnic and gender groups are expressed in terms of human settlement patterns, civic involvement and everyday negotiations. Ways in which segregation and marginalization are expressed in western and non-western contexts. 4 lectures. Crosslisted as CRP/ES 215. Fulfills USCP.

CRP 216. Representing the City. 2 units

Term Typically Offered: F
Introduction to the understanding and the representation of the city through different analog and digital media. 1 lecture, 1 laboratory.

CRP 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CRP 303. Digital Cities. 4 units

Term Typically Offered: F, W, SU
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Areas D1 and D2.

Explores digital technology changing the way we plan, design, build, govern, and live in cities. Assess technologies for knowing, digitizing, and engaging citizens in city development, governance, and planning and managing cities. Opportunities to explore technology initiatives in community building. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

CRP 314. Planning Theory. 4 units

Term Typically Offered: W
Prerequisite: CRP 212.

Theories of planning. Role of planner in society, purpose of planning, administrative framework in which planning takes place. Alternative approaches to planning, values, ethics in planning. Activities aimed at exploring communicative and participatory aspects of planning theory. 3 lectures, 1 activity.

CRP 315. Fiscal and Project Feasibility. 4 units

Term Typically Offered: W
Prerequisite: One course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Analysis of the revenue streams and costs involved in project development. Impact analysis of costs and revenues on private and public sectors included. Construction of pro-formas for various project types. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

CRP 325. Reflections on Biking, Walking and the City. 4 units

Term Typically Offered: TBD
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Study of the design of cities for walking and bicycling and its importance to the future of transportation and the resilience of cities. Reflection on how bicycles and pedestrians shape the urban environment through literature, music, policy, and design practices. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

CRP 334. Cities in a Global World. 4 units

Term Typically Offered: W
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Examination of the changes in the social and spatial organization of urban settlements in the twenty-first century caused by the urbanization and globalization processes. Comparative analysis of the traditional and contemporary cities around the globe. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

CRP 336. Introduction to Environmental Planning. 4 units

Term Typically Offered: F
Sustainability Focused
Prerequisite: CRP 212.

Examination of the challenges that arise when human and natural systems interact and the tools planners have to manage this interaction. Relevant principles from a variety of disciplines are used to assess environmental problems and identify solutions in human-dominated systems. 4 lectures.

CRP 341. Urban Design Studio III. 4 units

Term Typically Offered: SP
Prerequisite: CRP 203; CRP 213; and CRP 214.

Urban design theories and methods related to planning and urban development. Integration of circulation, environmental, land-use, and design aspects. Infill or new development projects at the scale of a neighborhood, large PUD, complex circulation corridor, small town or planned community. 4 laboratories.

CRP 342. Environmental Planning Methods. 4 units

Term Typically Offered: W
Sustainability Related
Prerequisite: CRP 336.

Case studies and applications of theory and methods to regional and environmental systems. Interrelationships between natural, economic, and social and political systems. Application of California Environmental Quality Act and environmental impact assessment methods. Environmental equity and sustainable bioregions. 2 lectures, 2 laboratories.

CRP 351. Introduction to Emergency Management in California. 3 units

Term Typically Offered: TBD
Prerequisite: Completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs) or GE Area D.

Emergency management emphasizing the Standardized Emergency Management System (SEMS) and Emergency Operations Center (EOC) operations. Earthquake hazard used as the case to explore potential wide geographic impacts, multiple secondary hazards, and multidisciplinary problem-solving methods in natural disasters faced by local governments and communities. 2 lectures, 1 activity. Crosslisted as CRP/NR 351.

CRP 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CRP 401. Disaster Recovery. 3 units

Term Typically Offered: TBD
Prerequisite: CRP/NR 351.

Strategies and procedures for public sector management of recovery from disasters. Understanding the role of, and relationship between, federal, state and local agencies to provide assistance to individuals and communities in the post-disaster environment. Issues in the recovery process. 2 lectures, 1 activity. Crosslisted as CRP/NR 401.

CRP 402. Contemporary Urban Design. 4 units

Term Typically Offered: TBD
Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs) and CRP 341; or graduate standing.

Study of contemporary urban design through the detailed examination of major city/country case studies. Analysis of the cultural, social and political factors influencing the practice of urban design and its major trends in different countries. 4 lectures.

CRP 404. Environmental Law. 4 units

Term Typically Offered: TBD
Sustainability Related
Prerequisite: Junior standing.

Detailed examination of the law governing use and protection of natural resources with focus on the legal institutions entrusted with the public duty of protecting the environment. 4 lectures. Crosslisted as CRP/NR 404.

CRP 408. Water Resource Law and Policy. 4 units

Term Typically Offered: TBD
Prerequisite: Junior standing.

Detailed examination of the various legal systems of water use, regulation and management in California and the United States. Discussion on the key concepts and principles of state, federal and interstate water quantity and quality control; focusing on issues and problems, why conflicts occur and how solutions evolve. 4 lectures. Crosslisted as CRP/NR 408.

CRP 409. Planning Internship. 2 units

Term Typically Offered: F, SP
CR/NC
Prerequisite: Consent of instructor.

Work experience as a supervised employee in a planning-related agency or private firm. Prior contract specifying the product of internship required between student, agency and faculty. Sixty hours work experience for two units of credit. Credit/No Credit grading.

CRP 410. Community Planning Laboratory I. 4 units

Term Typically Offered: F
Sustainability Related
Prerequisite: CRP 336, CRP 341 or consent of instructor.

Application of planning theory and methods to the analysis and creation of community plans. Interrelationships in the natural and built environments related to land use, circulation, social and other conditions. Includes field trips and individual, team and interdisciplinary approaches. 4 laboratories.

CRP 411. Community Planning Lab II. 4 units

Term Typically Offered: W
Sustainability Related
Prerequisite: CRP 342, CRP 410, or consent of instructor.

Continuation of CRP 410. Application of planning theory and methods to the analysis and creation of community plans. Interrelationships in the natural and built environments related to land use, circulation, social and other conditions. Includes field trips and individual, team and interdisciplinary approaches. 4 laboratories.

CRP 412. Plan Implementation. 4 units

Term Typically Offered: SP
Sustainability Focused
Prerequisite: CRP 212.

Theory and practice of plan implementation. Regulation and nonregulatory approaches to plan implementation, including development regulation, economic development, growth management, habitat conservation planning, capital improvement planning, redevelopment programs, and transportation system management. The California Specific Plan will serve as the course model. 4 lectures.

CRP 420. Land Use Law. 4 units

Term Typically Offered: W
Prerequisite: CRP 212 and upper division standing.

Public controls protecting natural environmental systems. Land use and environmental controls. Review of control mechanisms. State and federal legislation. Legal implications of controls, public planning and policy issues. 4 lectures.

CRP 426. Planning Healthy Communities. 4 units

Term Typically Offered: W

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of two lower division GE Area D courses.

Introduction to advanced topics on the relationship between the built environment and public health, assessment methods, and planning approaches to creating healthier communities. 4 lectures.

CRP 428. International Planning and Development. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing. Recommended: CRP 334.

Comparative assessment of planning for international development to improve the quality of life of people in cities and regions around the world. Critical analysis of theories and practices underlying programs and projects and their pertinence to the United States. 4 lectures.

CRP 430. Professional Planning Practice. 3 units

Term Typically Offered: F

Prerequisite: CRP 212.

Relationships of planning organizations to other governmental bodies, public agencies and citizen groups. Working in a public planning agency and private practice. Current topics in planning practice. 3 lectures.

CRP 435. Transportation Theory. 4 units

Term Typically Offered: F

Prerequisite: CRP 212, senior standing, or graduate standing.

Circulation and transportation elements of the General Plan. Transportation planning theory, methods and tools related to systematic analysis of city and regional transportation problems including environmental impact assessment. Application of techniques for assessing transportation systems, gravity models, route selections, land use models and relationship to transportation. 3 seminars, 1 activity.

CRP 440. Climate Action Planning. 4 units

Term Typically Offered: W

Sustainability Focused

Prerequisite: Junior standing or graduate standing.

Introduction of the planning role in reducing greenhouse gas emissions and adapting to climate change. Basic climate science, greenhouse gas emissions inventories, politics of climate change, and federal/state policy. Focus on development and implementation of local climate action plans. 4 lectures.

CRP 442. Housing and Planning. 4 units

Term Typically Offered: F

Sustainability Related

Prerequisite: Junior standing.

Understanding housing issues, policies and programs from a planning perspective. Analysis of the economic underpinnings of land markets and housing markets, housing plans, finance, public programs, affordable housing. Course may be offered in classroom-based or online format. 4 seminars.

CRP 445. Planning and Urban Ecology. 4 units

Term Typically Offered: TBD

Sustainability Focused

Prerequisite: Upper division or graduate standing.

Introduction to urban ecology as an organizing framework for addressing environmental problems. Provides the opportunity to explore an urban ecological research question through quantitative stream assessment and qualitative social survey data collection and analysis. 3 lectures, 1 laboratory.

CRP 446. Development Review and Entitlement. 4 units

Term Typically Offered: SP

Prerequisite: Upper division standing or graduate standing.

Application of zoning regulations, subdivision ordinances, design standards, building codes, exactions, fees, and related requirements within the development review process leading to land use entitlement. Land development is evaluated from permit application submittal to condition compliance during the plan check, construction, and operational phases of a project. 4 lectures.

CRP 448. Principles of Urban Design. 4 units

Term Typically Offered: W

Prerequisite: Junior standing or graduate standing.

Introduction to philosophies and theories of urban design. Holistic comprehension of forces generating the city form. Exploration of evaluation criteria and critical analysis of the built environment. Cultural, economic, political, behavioral, visual, perceptual, and morphological aspects of urban form. 4 seminars.

CRP 452. Community Design Methods. 4 units

Term Typically Offered: TBD

Prerequisite: CRP 201 and CRP 202, Upper division or graduate standing.

Introduction to community design as an interdisciplinary subject. Focus on the active involvement of end-users in the creation and management of built environments. Principles and techniques of participatory design and planning, including charrettes, design games and participatory technologies. Demonstration of participatory techniques through case studies and application. 3 lectures, 1 laboratory.

CRP 455. Transportation Policy and Planning. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing or graduate standing.

Key issues driving transportation policy and planning, and reflecting interconnections between transportation technology and land use. Variations in choices, transportation technology and land use dependency. Financing, emerging technologies, impacts, and changing paradigms. 2 lectures, 2 discussions.

CRP 456. Web Technologies for Planning. 2 units

Term Typically Offered: SP

Prerequisite: CRP 212, or graduate standing.

Introduction to the use of web technologies for planning and community engagement. Includes web publishing, mapping, surveys, video, collaboration and social media tools. Course may be offered in classroom-based or online format. 2 lectures.

CRP 457. GIS Applications in Planning. 3 units

Term Typically Offered: F

Prerequisite: Junior standing or graduate standing.

GIS applications using computer-based systems in gathering, managing and analyzing information pertinent to planning. Development of skills in systematic data acquisition, processing and maintenance with applied planning problems within the convenient medium of GIS and general information systems. 2 seminars, 1 laboratory.

CRP 458. Hazard Mitigation Planning & Resilient Design. 4 units

Term Typically Offered: TBD

Sustainability Related

Prerequisite: Completion of GE Area D2; completion of GE Upper Division B; or graduate standing.

Creation of safer, more resilient cities through systematic application of urban disaster risk reduction and regeneration planning principles and methods. Integration of insights from the design, resource management, and urban administration professions for minimizing disaster losses and improving recovery activities. 4 lectures.

CRP 461. Senior Project I. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CRP 341, CRP 342.

Research and problem analysis in planning. Selection and completion of a project under faculty supervision. Projects typical of problems addressed in planning practice. Project results presented in a formal report. To be completed in two quarters. Minimum 120 hours time.

CRP 462. Senior Project II. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CRP 410.

Research and problem analysis in planning. Selection and completion of a project under faculty supervision. Projects typical of problems addressed in planning practice. Project results presented in a formal report. To be completed in two quarters. Minimum 120 hours time.

CRP 463. Senior Project Professional Practice. 4 units

Term Typically Offered: SP

Prerequisite: CRP 410 and senior standing.

Practical applications of city and regional planning theory and practice solving problems related to the built environment. Assembly of project documents and reports that meet the senior project requirement. 4 seminars.

CRP 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CRP 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

CRP 500. Individual Study. 2-3 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing with minimum of 12 core units.

Independent research, studies, or surveys of selected subjects. Total credit limited to 9 units.

CRP 501. Foundations of Cities and Planning. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing.

Origins and evolutionary stages of settlement patterns and the use of land and natural environment. Changing spatial structure in the development of cities and regions. Beginnings and the historical development of the planning profession. 4 lectures.

CRP 504. Sustainable Communities. 4 units

Term Typically Offered: F

Sustainability Focused

Prerequisite: Graduate standing.

Introduction to the theory and practice of sustainable communities. Addresses creating communities that foster economic and environmental health, social equity, and citizen participation. Promotes comprehensive planning through urban design, transportation, environment, and community development. Includes hands-on learning and field study. 3 seminars, 1 laboratory.

CRP 509. Professional Development. 1-3 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing.

Professional development course, including environmental assessment workshop, applied research workshop, internship seminar, and other events. Total credit limited to 3 units. Credit/No Credit grading only. 1-3 activities.

CRP 510. Planning Theory. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or consent of instructor.

Theory of planning. Development of contemporary planning thought from varying sources and perspectives. Political and social context of planning. Alternative professional roles, and planning processes. Values and ethical issues in planning. 4 seminars.

CRP 512. Introduction to Visual Communication and GIS. 4 units

Term Typically Offered: W

CR/NC

Prerequisite: Graduate standing.

Introduction to geographic information systems (GIS) as a tool for analyzing and managing spatial information pertinent to planning. Introduction to various drawing media and delineation techniques for planners, including three-dimensional visualization and graphic skills. Integration of visual and digital media in presentations. Credit/No Credit grading only. Course may be offered in classroom-based, online, or hybrid format. 4 laboratories.

CRP 513. Planning Research and Analysis. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing.

Application of research design to planning issues. Comparison of case study, comparative and problem-solving methods. Primary and secondary data sources, including field survey techniques. 4 seminars.

CRP 516. Demographic and Analytic Tools. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing or consent of instructor.

Problem recognition, data selection, analysis and synthesis with applications of system design, statistical techniques and symbolic modeling to urban design and regional growth and development policies. 3 seminars, 1 laboratory.

CRP 518. Policy Development. 4 units

Term Typically Offered: F

Sustainability Related

Prerequisite: CRP 501.

Analysis of the social, economic, environmental, political contexts of public policy decisions. Public policy issues and use of concepts and tools related to monitoring and assessment. 4 lectures.

CRP 520. Feasibility Studies. 4 units

Term Typically Offered: TBD

Prerequisite: CRP 501 or consent of instructor.

Fundamental analysis for assessing feasibility of public and private development projects. Principles and techniques for analyzing markets and assessing cash flow for individual projects. Economic, fiscal and tax impacts as factors determining public participation in private projects. 4 seminars.

CRP 525. Plan Implementation. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor.

Theory and practice of plan implementation. Regulatory and non-regulatory frameworks for plan implementation. Growth management, development regulation, capital improvement programs, redevelopment. 4 seminars.

CRP 530. Planning Agency Management. 4 units

Term Typically Offered: SP

Prerequisite: CRP 501 or graduate standing.

Preparation for professional practice in public planning agencies and private firms. Applications of organization theory to planning agencies and firms. Work programs, staff development, budgets, contracting, proposal preparation, conflict management. Relationships with other agencies and firms, clients, public and media. 4 seminars.

CRP 535. Land Use and Planning Law. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing, or consent of instructor.

The role of law in the planning and regulation of land use. Constitutional constraints on land use regulation. Legal and policy issues for environmental protection and public administration. Relevant legislation and case law. 4 lectures.

CRP 545. Principles of Environmental Planning. 4 units

Term Typically Offered: W

Sustainability Focused

Prerequisite: Graduate standing or consent of instructor.

Environmental planning as a field of inquiry and action. Several parallel streams of knowledge are pursued: environmental planning theory; ecological process and assessment in human-dominated settings; environmental impact assessment; and the review and application of environmental planning tools. 3 seminars, 1 laboratory.

CRP 552. Community and Regional Planning Studio I. 4 units

Term Typically Offered: F

Prerequisite: CRP 501, CRP 525, or consent of instructor.

Application of planning theory and methods to community and regional planning projects. Structured for research, analysis, synthesis, and implementation practice. Interrelationships of natural and built environments, transportation systems, and economic and social conditions at various planning scales. Includes field trips and individual, team and interdisciplinary approaches. 2 seminars, 2 laboratories.

CRP 553. Project Planning and Design Studio. 4 units

Term Typically Offered: SP

Prerequisite: CRP 512 or consent of instructor.

Project-scale planning problems. Arranging structures, circulation systems, utilities and plant material on natural and urban sites to support human activity while minimizing disruption to natural systems. Includes planned unit developments, waterfronts, hillsides, campuses and commercial centers. Field trips. 4 laboratories.

CRP 554. Community and Regional Planning Studio II. 4 units

Term Typically Offered: W

Prerequisite: CRP 552.

Application of planning theory and methods to community and regional planning projects. Structured for research, analysis, synthesis, and implementation practice. Interrelationships of natural and built environments, transportation systems, and economic and social conditions at various planning scales. Includes field trips, and individual, team and interdisciplinary approaches. 2 seminars, 2 laboratories.

CRP 556. Community and Regional Planning Studio III. 4 units

Term Typically Offered: SP

Prerequisite: CRP 554, or consent of instructor.

Application of planning theory and methods to community and regional planning projects. Individual faculty-assigned laboratory work leading to the completion of a professional quality project focused on a real-world planning task. Structured for research, analysis, synthesis and implementation practice. 3 seminars and supervised work.

CRP 570. Selected Topics in Planning. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected planning topics. Total credit limited to 12 units. 4 seminars.

CRP 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

CRP 596. Professional Project. 2-4 units

Term Typically Offered: F, W, SP

Prerequisite: CRP 513, and consent of the graduate program coordinator.

Individual research under the supervision of the faculty, leading to completion of a professional project based on a real world planning task or carefully constructed simulation. Must be taken in all quarters requiring supervision; minimum of 6 units required for degree. Total credit limited to 8 units.

CRP 599. Thesis. 2-4 units

Term Typically Offered: F, W, SP

Prerequisite: CRP 513, and consent of the graduate program coordinator.

Individual research under the general supervision of the faculty, leading to a graduate thesis. Must be taken in all quarters requiring supervision; minimum of 6 units required for degree. Total credit limited to 8 units.

Civil Engineering (CE)

undefined

CE Courses

CE 111. Introduction to Civil Engineering. 1 unit

Term Typically Offered: F

CR/NC

Broad overview of the field of civil engineering, including professional societies and their student chapters, professional licensing and registration, professional codes of ethics, the elements of engineering design, and the scope of analysis and design activities undertaken by private- and public-sector civil design professionals. Credit/No Credit grading only. 1 lecture.

CE 112. Design Principles in Civil Engineering. 2 units

Term Typically Offered: W

Brief introduction to the different technical areas of civil engineering, including engineering design process, basic design principles and failure scenarios, professionalism and licensing in Civil Engineering. 2 lectures.

CE 113. Computer Aided Drafting in Civil Engineering. 2 units

Term Typically Offered: F, W, SP

Computer-aided drawing (CAD) and related software to display and quantify engineering designs. Elements of engineering design drawings. Related topics in information technology. Course may be offered in classroom-based or online format. 2 laboratories.

CE 200. Special Problems. 1-2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit/No Credit grading only.

CE 204. Mechanics of Materials I. 3 units

Term Typically Offered: F, W, SP

Prerequisite: ME 211.

Stresses, strains, and deformations associated with axial, torsional, and flexural loading of bars, shafts, and beams. Analysis of elementary determinate and indeterminate mechanical and structural systems. 2 lectures, 1 activity.

CE 207. Mechanics of Materials II. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CE 204.

Combined stress states including torsion, axial, shear, moment, and pressure vessel loadings. Principle stress/strain states. Basic failure criteria. Analysis of beam forces, moments, deflections, and rotations. Introduction to stability concepts including column buckling. 1 lecture, 1 activity.

CE 208. Mechanics of Materials. 5 units

Term Typically Offered: F, W

Prerequisite: ME 211.

Stresses, strains, and deformations associated with axial, torsional, and flexural loading of bars, shafts, and beams. Combined stress states including torsion, axial, shear, moment, and pressure vessel loadings. Principle stress/strain states and basic failure criteria. Stability concepts including column buckling. Not open to students with credit in CE 204. 3 lectures, 2 laboratories.

CE 222. Introductory Experiments in Transportation Engineering. 1 unit

Term Typically Offered: F, W, SP

Application of urban transportation planning, design, and operations principles. Introduction to Engineering Economics in the context of transportation projects. Collect field traffic operations data and conduct analysis and report conclusions from collected data. Field trip required. 1 laboratory.

CE 251. Programming Applications in Engineering. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CE 113; MATH 244; and CE 204 or CE 208 (CE 208 may be taken concurrently).

Concepts from basic programming theory introduced in the context of engineering applications. Topics include the application of programming constructs to demonstrate finite precision calculations, linear systems, linear programming, basic nonlinear systems, plotting, statistics, least squares, approximations, and solve related problems from civil and environmental engineering. 2 activities.

CE 259. Civil Engineering Materials. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CE 204 or CE 208 (CE 208 may be taken concurrently). Corequisite: CE 113.

Experimental determination of mechanical properties of concrete, asphalt, and soils as required for engineering applications. Experimental verification of assumptions made in mechanics of materials procedures. Use of strain measuring devices. Preparation of technical reports. 2 laboratories.

CE 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CE 321. Fundamentals of Transportation Engineering. 3 units

Term Typically Offered: F, W, SP

Sustainability Related

Prerequisite: PHYS 141; CE 259 or CM 113; or graduate standing.

The characteristics and functions of highway, air, rail, transit and other modes of urban and intercity transportation. Fundamentals of transportation design, operations, and planning. Evaluation of costs, benefits, and environmental considerations. 3 lectures.

CE 322. Fundamentals of Transportation Engineering Laboratory. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: CE 222. Corequisite: CE 321.

Application of urban transportation planning and operations principles and the design of highway facilities. Experimentation with properties of pavement materials through laboratory/field testing as well as preparation of testing reports. Field trip required. 1 laboratory.

CE 336. Water Resources Engineering. 4 units

Term Typically Offered: F, W, SP

Sustainability Related

Prerequisite: ME 341 or ENVE 264. Concurrent: CE 337.

Hydraulics of pipe flow. Open channel flow, groundwater, and hydrology. 4 lectures.

CE 337. Hydraulics Laboratory. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: ME 341 or ENVE 264. Concurrent: CE 336.

Application of basic fluid dynamic principles to various mechanical systems. Exposure to experimental problems and techniques with guided laboratory projects related to civil engineering discipline. 1 laboratory.

CE 352. Structural Engineering. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CE 207 or CE 208. Corequisite: CE 251.

Introduction to concepts of structural engineering including ASCE7 loads, vertical and lateral load path, flexible and rigid diaphragms, determinate vs indeterminate systems, and the use of computer programs to solve structural engineering problems. 3 lectures, 1 laboratory.

CE 355. Reinforced Concrete Design. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CE 259 and CE 352.

Analytical and design principles of reinforced concrete in designing civil engineering systems. Origin of code requirements. Fundamentals of proportioning. Details of elements and structural systems. 3 lectures, 1 laboratory.

CE 356. Structural Steel Design. 4 units

Term Typically Offered: F, SP

Prerequisite: CE 352.

Design and behavior of the elements of steel structures. Design and analysis of bolted, welded and eccentric connections. Proportioning of members and connections. Introduction to plastic design, end plate connection, composite construction, shear connections and design of composite beams. 3 lectures, 1 laboratory.

CE 371. Construction Management and Project Planning. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ARCE 106, CE 259 or CM 113.

Theory and practice of planning, scheduling, estimating, and reporting for construction projects. Fundamentals of scheduling logic including critical path, deterministic, and probabilistic scheduling; including the impact of constraints. Identifying resources and estimating time requirements for design activities and project operations. Not open to Architectural Engineering or Construction Management majors. 3 lectures, 1 activity. Crosslisted as CE/CM 371.

CE 381. Geotechnical Engineering. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CE 207 or CE 208; ME 341 or ENVE 264. Concurrent: CE 382 (CE majors only).

Engineering geology, elementary mass-volume relations, clay-water interaction, soil classification, soil compaction, geostatic stress distributions, 1-D and 2-D steady-state flow, shear strength under drained and undrained conditions. 4 lectures.

CE 382. Geotechnical Engineering Laboratory. 1 unit

Term Typically Offered: F, W, SP

Corequisite: CE 381.

Use of standard laboratory test methods to determine physical, mechanical, and hydraulic properties of soil. 1 laboratory.

CE 400. Special Problems. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CE 403. Civil Engineering Design Competition. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: CE 207 or CE 208.

Design, build, test, and present a solution to a civil engineering problem posed by a student design competition. Total credit limited to 4 units. 1 laboratory.

CE 404. Applied Finite Element Analysis. 4 units

Term Typically Offered: F

Prerequisite: BMED 410, and CE 207 or CE 208; or CE 406; or ME 328.

Finite element based solutions to engineering problems with an emphasis on elastostatic problems in structural mechanics. The power and pitfalls associated with the finite element method highlighted through practical modeling assignments. Introduces the use of commercial finite element codes. 3 lectures, 1 laboratory. Crosslisted as BMED/CE/ME 404.

CE 406. Structural Analysis. 5 units

Term Typically Offered: F

Prerequisite: CE 352.

Structural analysis of frames, trusses, and combined systems. Modern structural analysis theorems are presented along with discussion of their relation to classical methods. Specific topics include virtual forces, virtual displacements, compatibility, constraints and matrix formulations. Course may be offered in classroom-based or online format. 4 lectures, 1 laboratory.

CE 407. Structural Dynamics. 4 units

Term Typically Offered: W

Prerequisite: CE 406 and ME 212.

Effect of vibration and transient loads on structural elements. Dynamics load factors, support motion, damping and natural frequencies of multidimensional structural systems. Modal analysis. 3 lectures, 1 laboratory.

CE 413. Advanced Civil Computer-Aided Site Design. 2 units

Term Typically Offered: F, W

Prerequisite: BRAE 239; CE 113 or CM 115; and CE 321.

Apply advanced CAD software to develop design techniques and convey the completed design on a set of plans; site coordination, basic road design, grading, and utility design. Course may be offered in classroom-based or online format. 2 laboratories.

CE 415. Advanced Building Information Modeling for Civil Engineering. 4 units

Term Typically Offered: F, W

Prerequisite: CE/CM 371.

Building Information Modeling (BIM) approach to design, optimize, construct, and manage vertical structures. BIM based quantity take-off, clash detection, 4D modeling, and reality capturing using a 3D laser scanner. Course may be offered in classroom-based or online format. 2 lectures, 2 laboratories.

CE 421. Traffic Engineering. 4 units

Term Typically Offered: F

Prerequisite: CE 321.

Principles of traffic circulation on highway systems and other modes. Traffic control. Traffic data collection and analysis. Capacity analysis. Traffic modeling. New technologies. 3 lectures, 1 laboratory.

CE 422. Highway Geometrics and Design. 4 units

Term Typically Offered: W

Prerequisite: CE 321.

Alignment location and safe geometric design of highways. Earthwork and drainage related to highway. Theory and practice in design of alignments, highway cross-sections, intersections, interchanges, and freeways in urban and rural areas. Application of advanced computer software to highway geometrics. 2 lectures, 2 laboratories.

CE 423. Intelligent Transportation Systems. 4 units

Term Typically Offered: SP

Prerequisite: CE 321 or graduate standing.

Specification and operation of Intelligent Transportation Systems (ITS). Traffic surveillance and control systems including applications to freeways, urban streets, rural highways, and public transportation. Standards include the National Architecture for ITS. 3 lectures, 1 laboratory.

CE 424. Public Transportation. 4 units

Term Typically Offered: W

Sustainability Related

Prerequisite: CE 321.

Interdisciplinary aspects of public transportation problems, systems-team design approach to solutions. History and present state of public transportation; role of public transportation in urban environment; legislative, political, social, and economic aspects of public transportation systems. Methodology and procedures for transit planning. Review of transit studies. 3 lectures, 1 laboratory.

CE 425. Introduction to Railway Engineering. 4 units

Term Typically Offered: SP

Prerequisite: CE 321.

Introduction to railroad and railway system analysis and design. Railroads, rail transit and high speed rail applications. Track foundation design for various conditions. Approaches to railway analysis and design and an introduction to railway traffic control and signaling. 4 lectures.

CE 429. Highway Pavement Designs. 4 units

Term Typically Offered: F, SP

Prerequisite: CE 259 or CM 113; CE 381 or ARCE 421; and CE 321.

Theories, principles, and procedures in the structural design of highway pavements. Design of flexible and rigid pavements. Performance of flexible and rigid pavements in the field and the characterization of pavement materials. Practical and direct exposure to laboratory testing of pavement materials. 3 lectures, 1 laboratory. Formerly CE 521.

CE 431. Coastal Hydraulics I. 4 units

Term Typically Offered: W

Prerequisite: ME 341 or ENVE 264.

Waves and their characteristics, types of waves, water wave theories, orbital velocities, refraction of waves, wave diffraction, wave reflection, application of linear theory to wave forces on cylindrical structures, submerged pipelines and vertical flat barriers (sea walls), wave uprush, rubble mound breakwaters. 4 lectures.

CE 432. Coastal Hydraulics II. 4 units

Term Typically Offered: SP

Prerequisite: CE 431.

Reformed breaker height determination, wave runup analysis using a reformed breaker height. Wave setback analysis. Pile height determination. Criteria for types of breaking waves. Revetment analysis, rip-rap revetment design, wave forces on pilings. 4 lectures.

CE 433. Open Channel Hydraulics. 4 units

Term Typically Offered: F
Prerequisite: CE 336.

Analysis and characteristics of flow in open channels; critical flows; uniform flow; gradually varied flow; channel design problems, channel transitions and controls. Rapidly varied flow; hydraulic jump and energy dissipaters. Unsteady flows, waves and wave propagation, flood routing. Applications of numerical methods in hydraulic engineering. 4 lectures.

CE 434. Groundwater Hydraulics and Hydrology. 4 units

Term Typically Offered: W, SP
Prerequisite: CE 336.

Differential equations of groundwater flow, Darcy's Law, solutions of the steady and unsteady flow, differential equations for confined and unconfined flows. Pumping test design. Groundwater models, leaky aquifers. Saltwater intrusion. 4 lectures.

CE 435. Engineering Hydrology. 4 units

Term Typically Offered: F
Prerequisite: CE 336.

Analysis of hydrologic cycle components such as precipitation, infiltration and evaporation. Rainfall-runoff analysis to determine peak flows and runoff hydrographs. Hydrologic river and reservoir routings and their applications for flood plain management. Application of frequency analysis methods to determine design rainfalls and design flows. 4 lectures.

CE 436. Heavy Civil Temporary Structures and Shoring. 4 units

Term Typically Offered: W
Prerequisite: ARCE 315 or CE 352; and CM 314.

Design and construction of retaining walls, concrete formwork, falsework, scaffolding, ramps, platform, bracing, and guying as applied to heavy civil projects. Field trip may be required. 2 lectures, 2 laboratories. Crosslisted as CE/CM 436.

CE 437. Heavy Civil Projects and Equipment. 4 units

Term Typically Offered: SP
Prerequisite: CM 314.

Heavy civil projects logistics, construction, operations, planning, management, workflow and sequencing, equipment management, fleet configuration and maintenance, equipment productivity and cost optimization. 2 lectures, 2 laboratories. Crosslisted as CE/CM 437.

CE 440. Hydraulic Systems Engineering. 4 units

Term Typically Offered: F, W
Prerequisite: CE 336.

Water and wastewater flows. Design of water distribution systems, transmission and storage reservoirs, wastewater collection systems, and storm water systems. Pumps and pump systems, flow measurements. Water sources for municipal supply. 3 lectures, 1 laboratory.

CE 454. Integrated Structural Design. 4 units

Term Typically Offered: W
Prerequisite: CE 355, CE 356, and CE 455.

Structural analysis and integrated system design of reinforced concrete, concrete block masonry, structural steel, and timber structures. Loading standards, code design methods, connection design. Comprehensive design projects. 2 lectures, 2 laboratories.

CE 455. Design of Timber Structures. 4 units

Term Typically Offered: F
Prerequisite: CE 352.

Analysis and design of timber structures with emphasis on construction methodology, and material behavior. Topics include physical and mechanical properties of structural lumber and glued laminated timber; lateral load paths; diaphragms; connections; shear wall design; and combined load design. 3 lectures, 1 activity.

CE 457. Bridge Engineering. 4 units

Term Typically Offered: SP
Prerequisite: CE 355. Corequisite: CE 356.

Fundamentals of the structural analysis and design of highway bridges. Construction materials in bridges. Loads on highway bridges. Load path and distribution in bridge superstructure. Design of reinforced concrete, pre-stressed concrete, and composite bridges. 3 lectures, 1 laboratory.

CE 459. FRP Strengthening of Reinforced Concrete Structures. 4 units

Term Typically Offered: TBD
Prerequisite: CE 355.

Flexural and shear strengthening reinforced and prestressed concrete members using fiber reinforced polymer composite plates and laminates; seismic repair and rehabilitation of columns, slabs, beams and structures. Focus on design philosophy and design methodology, based on the current understanding of FRP-strengthening techniques. Not open to students with credit in CE 556. 3 lectures, 1 laboratory.

CE 465. Civil Engineering Professional Practice. 1 unit

Term Typically Offered: F
Prerequisite: Senior standing and consent of instructor.

Advising for Senior Design Project and examination of the non-technical and professional issues engineering design professionals regularly encounter. Topics include: communications styles and assertiveness, technical communications (oral and written), lifelong learning, contemporary civil engineering issues, leadership, ethics, and personal and project management. Course may be offered in classroom-based or online format. 1 activity.

CE 466. Senior Design Project I. 3 units

Term Typically Offered: W
Prerequisite: CE 321, CE 322, CE 336, CE 337, CE 355, CE 371, CE 381, CE 382, and CE 465.

Work on multi-disciplinary teams to complete an integrated civil design project. Focus on formal instruction, through project based learning, on selected topics in geotechnical, structural, transportation, and water resources engineering design. Non-technical topics include team building, technical communications, and professional practice skills that must be mastered to become a successful design professional. 2 lectures, 1 laboratory.

CE 467. Senior Design Project II. 3 units

Term Typically Offered: SP

Prerequisite: CE 466.

Continuation of work on multi-disciplinary teams to complete an integrated civil design project started in CE 466. Focus of formal instruction on selected topics in construction, geotechnical, structural, transportation, and water resources engineering design culminating with oral and written presentations of Senior Design projects. 2 lectures, 1 laboratory.

CE 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CE 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

CE 474. Environmental Compliance and Permitting. 2 units

Term Typically Offered: W

Prerequisite: Senior standing.

Fundamentals of State and Federal environmental laws essential to getting Civil Engineering projects permitted. 2 lectures.

CE 475. Civil Infrastructure and Building Systems. 4 units

Term Typically Offered: F, W

Sustainability Focused

Prerequisite: Senior standing in CE or ARCE.

Principles and practices for the sustainable design, fabrication, and installation of systems for the civil infrastructure and building; including structural, air/gas, water/wastewater, electrical, and control systems. Methods and materials used for fabrication and installation; including cost and schedule considerations. 4 lectures. Crosslisted as ARCE/CE 475.

CE 481. Analysis and Design of Shallow Foundations. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CE 381 and CE 382.

Evaluation of shear strength for foundation design. Analysis of bearing capacity for generalized conditions. Design of reinforced concrete spread footings. Stress distributions beneath loaded areas. Immediate settlement, consolidation settlement, rate of consolidation, and creep. 4 lectures.

CE 486. Introduction to Geological Engineering. 4 units

Term Typically Offered: W

Prerequisite: CE 381, CE 382, and GEOL 201.

Identification and characterization of consolidated geologic materials for the purpose of civil analysis and design. Interpretation of geologic maps, cross sections, and reports. Interpretation of aerial photographs. Engineering considerations important in dealing with transported soils. 4 lectures.

CE 488. Engineering Risk Analysis. 4 units

Term Typically Offered: F

Prerequisite: Senior standing and STAT 312; or graduate standing.

Introduction to the basic concepts of probability theory, statistics, and decision theory as they pertain to problems in civil and environmental engineering. Emphasis placed on the use of probabilistic modeling, Bayesian statistics, risk analysis, and decision theory. 4 lectures.

CE 493. Cooperative Education Experience. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units.

CE 494. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units.

CE 495. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

CE 500. Individual Study. 1-3 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair, graduate advisor and supervising faculty member.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 4 units.

CE 501. Advanced Matrix Analysis of Structures. 4 units

Term Typically Offered: F

Prerequisite: CE 406.

Matrix terminology and operations. Matrix procedures for analysis of two-dimensional frameworks. Development of stiffness, flexibility and mixed methods. Development of algorithms and programs for use in the analysis of structural frameworks. Discussion of modeling issues and limitations. 3 lectures, 1 laboratory.

CE 504. Finite Element Analysis. 4 units

Term Typically Offered: SP

Prerequisite: CE/ME 404 and CE 511/ME 501 or consent of instructor.

Finite element theory and application with a focus on computer implementation of the method. Strong, weak and variational formulations, physical and isoparametric spaces, error estimates, numerical integration, finite element algorithms, and programming architecture. 3 lectures, 1 laboratory. Crosslisted as CE/ME 504.

CE 511. Continuum Mechanics and Elasticity. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Introduction to continuum mechanics. Kinematics, stress, and balance laws. Constitutive theory for isotropic and anisotropic solids and viscous fluids. Applications including design of beams and pressure vessels, stress concentrations, fiber-reinforced composites, and non-homogeneous biological materials. Course offered in hybrid format with classroom-based and online learning. 4 lectures. Crosslisted as CE 511/ME 501.

CE 513. Inelastic Stress Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: ME 501 or CE 511.

Perfectly plastic and work hardening materials; von Mises and Tresca yield, isotropic and kinematic hardening flow rules, boundary-value problems. Finite elasticity: kinematics, Cauchy- and Green-elasticity, invariance, constraints, Neo-Hookean and Mooney-Rivlin materials, experimental approaches, non-uniqueness, anisotropy, residual stress, thermoelasticity, boundary-value problems. Course offered in hybrid format with classroom-based and online learning. 4 lectures. Crosslisted as CE 513/ME 503.

CE 523. Transportation Systems Planning. 4 units

Term Typically Offered: F

Sustainability Related

Prerequisite: CE 321 or graduate standing.

Planning of urban and regional multimodal transportation systems. Modeling of transportation networks and travel demand. Travel survey design. Urban data systems. Evaluation of alternatives based on economic, social, technological, and other factors. 2 lectures, 2 laboratories.

CE 525. Airport Planning and Design. 4 units

Term Typically Offered: TBD

Prerequisite: CE 321 or graduate standing.

Historical background of aviation and airport development; financing; estimating demand; aircraft characteristics; airport capacity; airspace and air traffic control; site selection; airport configuration; geometric design of landing area; planning and development of terminal areas; lighting; pavement design and drainage. 3 lectures, 1 laboratory.

CE 526. Transportation Safety. 4 units

Term Typically Offered: W

Prerequisite: CE 321, CE 322, STAT 312.

Introduction to nature and extent of transportation safety problem worldwide and in the United States. Several sub-areas of transportation safety: road safety, human factors, vehicle safety; crash data collection and management; safety planning; hot spot identification; methodologies for conducting transportation accident studies; statistical applications to accident data; predictive model building; "before-after" studies; countermeasure design. 3 lectures, 1 laboratory.

CE 527. Sustainable Mobility. 4 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: CE 321 or CRP 435 or consent of instructor.

Presentation and analysis of concepts and designs for sustainable mobility from a global-to-local, interdisciplinary perspective, including pedestrians, bicyclists, and public transportation. Addresses economy, environment, and equity (social issues) through lectures, panels, excursions and a planning/design project in San Luis Obispo County. 3 lectures, 1 laboratory.

CE 528. Transportation Economics and Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: CE 321 or graduate standing.

Principles of engineering systems analysis and applications to transportation using examples from different modes. Identification of transportation benefits, costs, user and non-user impacts, transportation cost models, pricing, and optimization. 3 lectures, 1 laboratory.

CE 529. Modeling and Simulation in Transportation. 4 units

Term Typically Offered: SP

Prerequisite: CE 321 or graduate standing.

Theory and operation of transportation systems, the systems approach, simulation techniques. Use of available software packages. Simulation model development, calibration and use. 2 lectures, 2 laboratories.

CE 533. Advanced Water Resources Engineering. 4 units

Term Typically Offered: SP

Prerequisite: CE 336 or graduate standing.

Matrix and simulation methods in hydrology, statistical studies in hydrology and their applications to civil engineering problems. Generalized hydrologic characteristics. Hydrologic simulation, computer applications, urban and small watershed hydrology, macroscopic and microscopic approach. Storm water management models. Hydrologic design. 4 lectures.

CE 536. Computer Applications in Water Resources with Geographic Info Systems (GIS). 4 units

Term Typically Offered: W

Prerequisite: CE 336 or graduate standing.

Modeling, design and analysis of water, wastewater, stormwater systems. Integration of water resource systems with Geographic Information Systems (GIS). 3 lectures, 1 laboratory.

CE 537. Groundwater Contamination. 4 units

Term Typically Offered: F

Prerequisite: CE 434. Corequisite: ENVE 331.

Sources and types of groundwater contamination, contamination transport mechanisms. Sorption and other chemical reactions. Numerical modeling of contaminant transport. Nonaqueous phase liquids. Groundwater remediation and design. 4 lectures.

CE 538. Urban Water Systems. 4 units

Term Typically Offered: SP

Prerequisite: CE 440 or graduate standing.

Integration of water delivery, wastewater collection, drainage systems, and associated treatment components in urbanizing areas. Relationships between surface and groundwater elements of water sources and disposal. Use of current design models to quantify the benefits of non-traditional options. 4 lectures.

CE 539. Environmental Hydraulics. 4 units

Term Typically Offered: W

Prerequisite: CE 336 or graduate standing.

Application of fluid mechanics principles to environmental flows. Emphasis on advection, dispersion, stratification and mixing effects. Stratified flows, turbulent jets and plumes, wastewater and thermal diffusers, cooling ponds and channels, control of environmental problems. 4 lectures.

CE 552. Analysis and Seismic Design of Reinforced Concrete. 4 units

Term Typically Offered: TBD

Prerequisite: CE 454. Recommended: Concurrent enrollment in CE 557.

Emphasis placed on reinforced concrete behavior and seismic design. Topics include moment curvature analysis and plastic hinge modeling, strut and tie, design of structural walls, design of concrete moment frames and seismic detailing. 4 lectures.

CE 553. Ductile Design of Steel Structures. 4 units

Term Typically Offered: W

Prerequisite: CE 356 and senior or graduate standing. Recommended: CE 454 and CE 407.

Plastic analysis and capacity design principle; design of ductile steel structures including moment frames, concentrically braced frames, eccentrically braced frames, buckling-restrained braced frames, and steel plate shear walls according to the AISC Seismic Provisions for Structural Steel Buildings. 3 lectures, 1 activity.

CE 555. Advanced Civil Engineering Materials Laboratory. 2 units

Term Typically Offered: F

Prerequisite: CE 259 or graduate standing.

Fundamental properties of new and advanced materials. Experimental techniques. Fracture characteristics and composite response of cement matrix composites. New materials and products to advanced applications such as automation. 2 laboratories.

CE 556. Advanced Fiber Reinforced Polymer (FRP) Strengthening of Reinforced Concrete Structures. 4 units

Term Typically Offered: W

Prerequisite: CE 355.

Flexural and shear strengthening reinforced and pre-stressed concrete members using FRP composite laminates and plates; seismic repair and rehabilitation of columns, beams, slabs and whole structures. Design philosophies based on the current ACI 440 and the most up to date research in FRP composites. Durability, fire protection and blast mitigation of structures utilizing FRP laminates. Not open to students with credit in CE 459. 3 lectures, 1 laboratory.

CE 557. Seismic Analysis and Design. 4 units

Term Typically Offered: SP

Prerequisite: CE 407.

Extension of the basic principles of structural dynamics to analysis of civil structures and nonstructural components to earthquake loading. Code based (ASCE/SEI 7) earthquake resistant design. 3 lectures, 1 laboratory.

CE 559. Prestressed Concrete Design. 4 units

Term Typically Offered: SP

Prerequisite: CE 355 or graduate standing.

Advanced analysis, design and behavior of prestressed and precast concrete elements and structures. Origin of code requirements. Detailed design of prestressed concrete components of civil engineering systems for buildings and highway construction. Creep and shrinkage of concrete and relaxation of steel applied to prestressing losses. 4 lectures.

CE 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 seminars.

CE 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

CE 572. Engineering Project Management. 4 units

Term Typically Offered: W

Prerequisite: CE 465.

Principles and techniques of managing projects from conceptual phase through project definition, design and construction, to closeout. Emphasis on project management aspects of scope definition, estimates and budgeting, control systems, procurement, design coordination, construction phases, and leadership skills. 3 lectures, 1 laboratory.

CE 581. Advanced Geotechnical Engineering. 4 units

Term Typically Offered: SP

Prerequisite: CE 481 or graduate standing.

Advanced topics in saturated flow, unsaturated flow, and consolidation. Stress-strain-deformation response of soils under both drained and undrained loading. Conventional and advanced laboratory strength testing. 3 lectures, 1 laboratory.

CE 583. Geotechnical Earthquake Engineering. 4 units

Term Typically Offered: SP

Prerequisite: CE 481 or graduate standing.

Introduction to engineering seismology and ground motion evaluation. Dynamic behavior of soils. Seismic site response analysis. Soil liquefaction evaluation methods and mitigation techniques. Seismic stability of slopes and retaining walls. Computer-aided analysis. 4 lectures.

CE 584. Lateral Support Systems. 4 units

Term Typically Offered: TBD

Prerequisite: CE 481 or graduate standing.

Classical and modern earth pressure theories. Lateral earth pressure calculations for general subsurface conditions. Analysis and design of reinforced concrete cantilever walls, sheetpile walls, soldier-pile walls, tie-back walls, and mechanically-stabilized earth. Computer-aided analysis and design. 4 lectures.

CE 585. Slope Stability Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: CE 481 or graduate standing.

Analysis of stability by planar, circular arc, piecewise-linear, and composite-surface techniques. Analysis of earth-fill dams and reservoirs for static, steady flow, sudden drawdown, and seismic loading conditions. Field instrumentation. Methods for slope remediation and stabilization. Computer-aided analysis. 4 lectures.

CE 586. Analysis and Design of Deep Foundations. 4 units

Term Typically Offered: W

Prerequisite: CE 481 or graduate standing.

Bearing capacity and settlement analysis of drilled shafts and driven piles. Analysis and design of single piles and pile groups for vertical, lateral, and combined loading. Construction procedures, field inspection, and load-testing. Computer-aided analysis and design. 4 lectures.

CE 587. Geoenvironmental Engineering. 4 units

Term Typically Offered: SP

Prerequisite: CE 381.

Principles for containment applications. Engineering properties of soils and geosynthetics and their interaction with contaminants and wastes; analysis of geosynthetics used in containment facilities; liners; covers; leachate and gas collection systems; contaminant transport; and monitoring systems. 4 lectures.

CE 588. Ground Improvement. 4 units

Term Typically Offered: TBD

Prerequisite: CE 381, CE 382, and CE 481.

Ground improvement applications investigated for modification of geomechanical and hydraulic properties of soils. Engineering properties of soft ground and high water content materials; mechanical, chemical, and thermal stabilization investigated for foundation and environmental remediation applications. 4 lectures.

CE 589. Geosynthetics Engineering. 4 units

Term Typically Offered: TBD

Prerequisite: CE 481.

Geosynthetics applications within civil engineering. Design content for geotechnical, geoenvironmental, and transportation applications. Manufacturing processes, material properties, interaction with soils, and service conditions. 4 lectures.

CE 591. Graduate Seminar I. 1 unit

Term Typically Offered: F

Prerequisite: Graduate standing.

Preparation for graduate studies and engineering careers. Further development of oral and written communication skills. 1 seminar.

CE 592. Graduate Seminar II. 1 unit

Term Typically Offered: W

Prerequisite: CE 591 and graduate standing.

Current research activities and analysis/design philosophies in civil and environmental engineering practice. Development of oral and written presentation skills. 1 seminar.

CE 593. Cooperative Education Experience. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

CE 594. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

CE 595. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only.

CE 596. Comprehensive Examination. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Graduate standing. Recommended: Student should be in the final quarter of completing graduate coursework (45 units of 400 and 500 level coursework) and prepared to take the MS exam.

Comprehensive exam for a non-thesis master's student. The comprehensive examination assesses the student's ability to integrate knowledge, show critical and independent thinking, and demonstrate mastery of the subject matter. Timing of the comprehensive exam shall be scheduled with the faculty advisor per department guidelines.

CE 599. Design Project (Thesis). 1-9 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing.

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis.

College of Liberal Arts (CLA)

undefined

CLA Courses

CLA 100. College Success Seminar. 1 unit

Term Typically Offered: F

CR/NC

Academic planning and resources, career exploration, extracurricular activities, and time management skills to support first year students' transitions to Cal Poly and the College of Liberal Arts. Support network to facilitate personal and academic success. Credit/No Credit grading only. 1 lecture.

Communication Studies (COMS)

undefined

COMS Courses

COMS 100. Introduction to the Communication Studies Major. 2 units

Term Typically Offered: F, W

CR/NC

Preparation for the Communication Studies major. Overview of areas of study and key terms. Planning for fulfilling major requirements and choosing courses. Background on potential careers. Promotion of a learning community and resources for student success. Credit/No Credit grading only. 2 lectures.

COMS 101. Public Speaking. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area A1

2019-20 or earlier catalog: GE Area A2

Introduction to the principles of oral communication and the tradition of public speaking in political and social life. Practical experience in the development, presentation, and critical analysis of speeches to inform and to persuade. Not open to students with credit in COMS 102. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as COMS/HNRS 101. Fulfills GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

COMS 102. Principles of Oral Communication. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area A1

2019-20 or earlier catalog: GE Area A2

Introduction to the fundamentals and principles which underlie effective oral communication. Practical experience in various types of speaking situations: informative speaking, persuasive speaking, and panel discussion. Not open to students with credit in COMS 101. 4 lectures. Crosslisted as COMS/HNRS 102. Fulfills GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

COMS 126. Argument and Advocacy. 4 units

Term Typically Offered: F

2020-21 or later catalog: GE Area A3

2019-20 or earlier catalog: GE Area A3

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for student on the 2019-20 or an earlier catalog). Recommended: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for student on the 2019-20 or an earlier catalog).

The nature of critical thinking as applied in oral and written argument. Study of inductive and deductive reasoning. Analysis of reasoning, argument, forms of support and fallacies of argument and language. Instruction in and practical experience in crafting sound persuasive arguments and engaging in oral argumentation. Course may be offered in classroom-based or hybrid format. 4 lectures. Fulfills GE Area A3 with a grade of C- or better.

COMS 145. Reasoning, Argumentation, and Writing. 4 units

Term Typically Offered: W, SP

2020-21 or later catalog: GE Area A3

2019-20 or earlier catalog: GE Area A3

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for student on the 2019-20 or an earlier catalog). Recommended: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for student on the 2019-20 or an earlier catalog).

The principles of reasoning in argumentation. Examination of rhetorical principles and responsible rhetorical behavior. Application of these principles to oral and written communications. Effective use of research methods and sources. 4 lectures. Fulfills GE Area A3 with a grade of C- or better.

COMS 201. Advanced Public Speaking. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

Further consideration of the principles of public address. Advanced practice in manuscript, extemporaneous, and impromptu speaking. 4 lectures.

COMS 205. Rhetorical Studies. 4 units

Term Typically Offered: W, SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Recommended: COMS 100.

Introduction to rhetorical theory from classical to contemporary works. Explores the role of rhetoric in shaping reality and motivating human action. Students consider the ethics and effects of rhetoric and apply theories to critically analyze everyday discourses. 4 lectures.

COMS 206. Communication Theory. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Survey of human communication theories including interpersonal, small group, organizational, persuasion, nonverbal, intercultural, and media. Philosophical foundations for understanding communication from social science perspectives. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Formerly COMS 311.

COMS 208. Performance, Literature, and Culture. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Prerequisite: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs); and completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs).

Concepts and skills related to the performance of literature and performance as a theoretical and analytical method. Emphasis placed on understanding culture and the importance of diversity in human communication. Students develop and apply critical, analytical, performative, and communicative skills. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

COMS 211. Interpersonal Communication. 4 units

Term Typically Offered: F, W, SP

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

Prerequisite: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

Introduction to the interaction process in two-person (dyadic) communication settings. Emphasis on the functions of varying messages in the initiation, development, maintenance and termination of personal and professional relationships. 4 lectures. Fulfills GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

COMS 213. Organizational Communication. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A2 with a grade of C- or better.

Introduction to communication within the organization and between the organization and its environment. Effects of networks, superior/subordinate message patterns, team building, climate, message flow patterns and distortion on organizational effectiveness. 4 lectures.

COMS 215. Media Studies. 4 units

Term Typically Offered: W, SP

Prerequisites: Completion of GE Area A with grades of C- or better.

Recommended: COMS 100.

Foundational content on one of the largest sub-disciplines in the field of Communication Studies. Combines social scientific and critical cultural approaches. Topics include mass communication history, media's role within modern society, media effects, and media literacy. 4 lectures.

COMS 217. Small Group Communication. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

Theories, principles and skills for small group communication and teamwork. Topics include creativity, failure, problem-solving, (dis)functional decision-making, group development, leadership, power, norms, conflict management, and group presentation. 4 lectures.

COMS 226. Applied Argumentation. 4 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Intermediate level course in the theory and practice of everyday argument. Select theories of argumentation, and practical experience arguing in a wide variety of contexts. 4 lectures.

COMS 250. Forensic Activity. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

Introduction to competitive debate activities. Research, analysis, and debating about contemporary issues. Any student who wishes to receive academic credit for participation in such activities during the quarter should enroll. Total credit limited to 6 units. Course may be offered in classroom-based, online, or hybrid format. 2 laboratories.

COMS 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

COMS 301. Business and Professional Communication. 4 units

Term Typically Offered: W, SP

Prerequisite: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

Communication skills and functions for all levels of organizational employees. Interviewing, oral briefings, motivational and conference speaking. 4 lectures.

COMS 308. Group Performance of Literature. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

Examination and experience in the various modes of group performance of literature: Readers Theatre, Chamber Theatre, Story Theatre. Scripting; directing; performing and critiquing of group performance of literature. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

COMS 312. Quantitative Research Methods in Communication Studies. 4 units

Term Typically Offered: F, W, SP

Prerequisites: Junior standing; COMS 206; STAT 217 or STAT 218; and Communication Studies major.

Exploration of communication research strategies and methodologies. Basic methods of designing quantitative research in communication studies. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

COMS 313. Qualitative Research Methods in Communication Studies. 4 units

Term Typically Offered: F, W, SP

Prerequisites: Junior standing; COMS 206; STAT 217 or STAT 218; and Communication Studies major only.

Exploration of ontology, epistemology, methodology, and representation inherent to qualitative inquiry. Emphasis on the following approaches: case study, grounded theory, (auto)ethnography, phenomenology, focus groups, narrative, participatory action research. 4 lectures.

COMS 316. Intercultural Communication. 4 units

Term Typically Offered: F,W,SPSU

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Cultural aspects of communication within and among diverse groups. Particular focus on U.S. culture and history and the diversity of ethnic, subcultural, and co-cultural groups. Development of nuanced understanding of the role of culture and communication in human thought, behavior, and interaction. Not open to students with credit in COMS 416. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

COMS 317. Technology and Human Communication. 4 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Impact of technological change upon human communication. Past, present, and future technological developments that have affected how humans communicate. Emphasis on new communication technologies. 4 lectures.

COMS 319. Critical Cultural Studies and Communication. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing and completion of GE Area A with grades of C- or better.

Analysis and integration of theories and methods of Cultural Studies as an interdisciplinary mode of critical qualitative inquiry. Emphasis on the role of communication in differential power relations, particularly on issues of identity, struggle, and representation in a diverse culture. 4 lectures.

COMS 320. Intergroup Communication. 4 units

Term Typically Offered: F,W,SPSU

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Theoretical and practical communication issues regarding socially constructed aspects of identity; concentrating on gender, race, sexuality, social class, ability, age, and language through the lens of social constructionism. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

COMS 322. Persuasion. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A with grades of a C- or better.

Theory of persuasion with particular emphasis upon social psychological principles of influence. Analysis of various forms of persuasion, social influence and propaganda. 4 lectures.

COMS 330. Classical Rhetorical Theory. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A with grades of a C- or better.

Early development of rhetorical theory in Greco-Roman civilization. Analysis of the canons of rhetoric. Rhetorical thought of Sophists, Isocrates, Plato, Aristotle, Cicero and Quintilian. 4 lectures.

COMS 331. Contemporary Rhetorical Theory. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing and completion of GE Area A with grades of C- or better.

Rhetoric's role in contemporary culture. Issues: political advocacy; science, technology and mass persuasion; ethics and rhetoric. Representative theorists: Burke, Weaver, Richards, Toulmin and McLuhan. 4 lectures.

COMS 332. Rhetorical Criticism. 4 units

Term Typically Offered: F, W, SP

Prerequisites: Junior standing; and completion of GE Area A with grades of C- or better. Recommended: COMS 205 and COMS 330.

Theory and method used in the analysis and evaluation of rhetorical discourse. Study of critical essays. Practice in interpreting and evaluating persuasive discourse. 4 lectures.

COMS 350. Advanced Forensic Activity. 2 units

Term Typically Offered: F, W, SP

Prerequisite: COMS 250.

Advanced development of argumentation and debate skills. Focus on preparation and presentation of intramural exhibition debates. Optional participation in intercollegiate debates. Course may be offered in classroom-based, online, or hybrid format. 2 laboratories.

COMS 351. Speech and Debate Team. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor. Recommended: Previous competitive debate experience. Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs); and completion of GE Area A3 with a grade of C- or better; and COMS 250.

Advanced participation in competitive intercollegiate speech activities. Intercollegiate tournament competition, judging speech competition and other communication-related public service on campus and in the community. Field trip may be required. Total credit limited to 8 units. Course offered in hybrid format with classroom-based and online learning. 2 laboratories. Crosslisted as COMS/HNRS 351.

COMS 384. Media Effects. 4 units

Term Typically Offered: W, SP, SU

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: COMS 206 and COMS 215.

Effects of media on individuals and society. Influence of mass media message producers and content on perceptions of social norms, violence, sexuality, gender, race, and ethnicity. Empirical approaches in media studies and literacy development. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

COMS 385. Media Criticism. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and completion of GE Area A with grades of C- or better. Recommended: COMS 205 and COMS 215.

Theory and method used in analyzing media from critical, rhetorical, and cultural perspectives. Practice in interpreting and evaluating news, advertising, prime-time television, the Internet, and other mass-mediated texts, with special attention to relationships among media, identity, and political action. 4 lectures.

COMS 386. Communication, Media, and Politics. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: COMS 218 or POLS 112.

Political communication and the U.S. mass media system, including role of the media in democratic society; news norms, government regulation of media, and media ownership; the changing media landscape and implications for news construction, polarization, and selective exposure; and incivility and bias. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

COMS 387. Sports Communication. 4 units

Term Typically Offered: F, SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Examination of the interrelationship between sports and community including participant, sports organization, sports media, and sports fan. Explores how these interrelationships reinforce social values, challenge social norms, and social identities relevant to sports and cultural values. 4 lectures. Crosslisted as COMS/JOUR 387.

COMS 390. Environmental Communication. 4 units

Term Typically Offered: F

Sustainability Focused

Prerequisite: Junior standing and completion of GE Area A with grades of C- or better. Recommended: Completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs) or GE Area B2.

Recent developments in the field of environmental communication, including how and with what effect environmental messages are transmitted among scientists, policymakers, and the public. Critical/rhetorical and mediated perspectives that inform contemporary understandings of the human-nature relationship are addressed. 4 lectures.

COMS 395. Science Communication. 4 units

Term Typically Offered: F

Sustainability Related

Prerequisite: Completion of GE Area A with grades of C- or better and completion of one GE Area B course.

Examination of science communication in a variety of contexts. Issues covered may include: scientific journal articles, boundary-work, information deficit models, public understanding/awareness of science, accommodated science, mediated science, popular science. 4 lectures. Crosslisted as COMS/ISLA 395.

COMS 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor and junior standing.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

COMS 404. Video Games & Society. 4 units

Term Typically Offered: F

Prerequisites: Junior standing and completion of GE Area A with grades of C- or better.

Influence of video games on individuals and society. Emphasis on why people play video games, how games influence players, and broader cultural impacts of gaming. Examines franchises, characters, gamers, avatars, gamification, and digital interactions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

COMS 413. Advanced Organizational Communication. 4 units

Term Typically Offered: W

Prerequisite: Junior standing. Recommended: COMS 213 or COMS 301.

Describing and measuring the organization's human message system. Planning and implementing communication training and development for the organization. New functions, careers and opportunities for the communication professional. 4 lectures.

COMS 418. Health Communication. 4 units

Term Typically Offered: F

Prerequisite: Junior standing and completion of GE Area A with grades of C- or better.

Communication in health contexts. Topics include interpersonal communication (e.g., health professional/patient), group and organizational communication (e.g., health-related groups), and mass communication (e.g., persuasive health campaigns). Open to all majors and valuable to laypersons who are consumers of health care, and pre-health professionals. 4 lectures.

COMS 420. Nonverbal Communication. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area A with grades of C- or better.

Influence of kinesic, proxemic, artifactual, olfactory, paralinguistic and environmental factors in human communication. Theory, research and practice in nonverbal communication. 4 lectures.

COMS 421. Gender and Communication. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing and completion of GE Area A with grades of C- or better.

Explores the theory and practice of how gender is created, maintained, and transformed through communication; examines how gender roles are enacted and interpreted in various public and private contexts. 4 lectures.

COMS 422. Rhetorics of Science, Technology, and Medicine. 4 units

Term Typically Offered: W

Prerequisite: Junior standing and completion of GE Area A with grades of C- or better.

Examination of rhetorical strategies and persuasive techniques used within scientific, technical, and medical discourses. Topics include genre features of scientific articles, rhetorical topoi in scientific discourse, pop-culture depictions of science, the scientific ethos, and risk communication. 4 lectures.

COMS 428. Family Communication. 4 units

Term Typically Offered: W

Prerequisite: Completion of GE Area A with grades of C- or better; and COMS/PSY 212.

Communication theory and practice within family structures. Examination of relationship communication in marital/partnership, parent/child, intergenerational, and sibling relationships. Topics include family communication regarding identity, attachment, conflict, relational dialectics, storytelling/narratives, family transitions, cultural influences, and family support. 4 lectures.

COMS 430. The Dark Side of Interpersonal Communication. 4 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area A with grades of C- or better; and COMS 211.

In-depth exploration of concepts, theories, and research associated with interpersonal communication traditionally considered negative and destructive (e.g., jealousy, infidelity, stalking, gossip, revenge, bullying) to understand the potentially (dys)functional aspects of interpersonal communication behaviors and processes. Course may be offered in classroom-based or online format. 4 lectures.

COMS 435. American Political Rhetoric. 4 units

Term Typically Offered: F, W

Prerequisite: Junior standing.

Role of oratory in American political and social history since Lincoln. Historical and rhetorical analyses of important political speeches delivered by presidents, activists, demagogues, and leaders of social movements. 4 lectures.

COMS 450. Internship: Communication Studies. 2-4 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Junior standing, 2.5 GPA, and consent of instructor.

Supervised practicum and application of principles and theories of communication in organizational settings. Total credit limited to 8 units. Credit/No Credit grading only.

COMS 458. Solving Big World Challenges. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area A with grades of C- or better.

Apply human-centered design practices to address a social or an environmental challenge, specific to a local community. Achieve revenue-generating social impact through innovative business models. Practice team competencies including problem-solving, interviewing, brainstorming, prototyping, and written, visual, and oral communication. 4 lectures. Crosslisted as BUS/COMS 458.

COMS 460. Undergraduate Seminar. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Junior standing; COMS 312 or COMS 313; COMS 332 or COMS 385; and Communication Studies major.

Preparation and design for senior project; exploration of scholarship related to project ideas. Credit/No Credit grading only. Course may be offered in classroom-based, online, or hybrid format. 1 seminar.

COMS 461. Senior Project. 3 units

Term Typically Offered: F, W, SP

Prerequisite: COMS 460; for COMS majors only.

Completion of approved project under faculty supervision. Project results are presented in a formal written report. Minimum 90 hours total time.

COMS 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Junior standing and completion of GE Area A with grades of C- or better.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

COMS 485. Cooperative Education Experience. 6 units

Term Typically Offered: SU

CR/NC

Prerequisite: 2.5 GPA and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only.

Computer Engineering (CPE)

undefined

CPE Courses

CPE 100. Computer Engineering Orientation. 1 unit

Term Typically Offered: F

CR/NC

Introduction to the computer engineering discipline. Success skills and curricular information. Career paths and opportunities. Professional aspects of engineering and computer science. Interaction with upper division students, alumni, faculty and staff. Introduction to computer software and hardware. Credit/No Credit grading only. 1 lecture.

CPE 101. Fundamentals of Computer Science. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Appropriate Math Placement Level; or MATH 117 with a grade of C- or better; or MATH 118 with a grade of C- or better; or consent of instructor.

Basic principles of algorithmic problem solving and programming using methods of top-down design, stepwise refinement and procedural abstraction. Basic control structures, data types, and input/output. Introduction to the software development process: design, implementation, testing and documentation. The syntax and semantics of a modern programming language. Credit not available for students who have taken CSC/CPE 108. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 101.

CPE 123. Introduction to Computing. 4 units

Term Typically Offered: F, W

Prerequisite: Basic computer literacy.

Use of a supportive software development environment to design, develop, and test applications in a selected topic domain that demonstrates the potential of careers in computing. An introduction to computing and to the selected topic domain. The Class Schedule will list topic selected. No programming experience required. Not for students with credit in CPE/CSC 103 or CPE/CSC 203. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 123.

CPE 133. Digital Design. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: An orientation course in student's major (EE 111 and EE 151; or CPE 100) and CPE/CSC 101.

Number systems, Boolean algebra, Boolean functions, and function minimization. Analysis and design of combinational and sequential digital logic circuits. Hardware Description Language (HDL) concepts and applications digital design and synthesis in FPGAs. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 133.

CPE 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CPE 202. Data Structures. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 101 with a grade of C- or better; or consent of instructor.

Introduction to data structures and analysis of algorithms. Abstract datatypes. Specification and implementation of advanced data structures. Theoretical and empirical analysis of recursive and iterative algorithms. Software performance evaluation and testing techniques. Not open to students with credit in CSC/CPE 108. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 202.

CPE 203. Project-Based Object-Oriented Programming and Design. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 202 with a grade of C- or better or consent of instructor.

Object-oriented programming and design with applications to project construction. Introduction to class design, interfaces, inheritance, generics, exceptions, streams, and testing. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 203.

CPE 225. Introduction to Computer Organization. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 202.

Introduction to computer systems. Simple instruction set architecture and the computer hardware needed to implement that architecture. Machine and assembly language programming. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 225.

CPE 233. Computer Design and Assembly Language Programming. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CPE/EE 133.

Design and implementation of digital computer circuits via CAD tools for programmable logic devices (PLDs). Basic computer design with its datapath components and control unit. Introduction to assembly language programming of an off-the-shelf RISC-based microcontroller. Not open to students with credit in CPE/EE 229. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 233.

CPE 290. Selected Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CPE 315. Computer Architecture. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC/CPE 102 and CSC/CPE 103, or CSC/CPE 202 and CSC/CPE 203; and one of the following: CSC 225, CPE/EE 229, or CPE/EE 233.

In-depth study of the instruction set architecture and hardware design of a specific CPU. Introduction to pipelines, input/output and multi-processors. Computer abstractions and performance measurement. Not open to students with credit in CPE 333. 3 lectures, 1 laboratory.

CPE 316. Microcontrollers and Embedded Applications. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CPE 357. Corequisite: EE 211 or EE 215.

Introduction to microcontrollers and their applications as embedded devices. Hardware/software tradeoffs, microcontroller selection, use of on-chip and off-chip peripherals, interrupt driven real-time operation, A/D conversion, serial and parallel communications, watch-dog timers, and low power operation. Not open to students with credit in CPE 329 or CPE 336. 3 lectures, 1 laboratory.

CPE 321. Introduction to Computer Security. 4 units

Term Typically Offered: F, W
Prerequisite: CPE/CSC 357.

Survey of topics in computer system and network security, including protection, access control, distributed access control, operating system security, applied cryptography, network security, firewalls, secure coding practices, and case studies from real-world systems. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 321.

CPE 327. Digital Signals and Systems. 3 units

Term Typically Offered: F, W
Prerequisite: EE 212 or EE 215; and MATH 244. Concurrent: CPE 367.

Signal and system description and analysis, with emphasis on discrete-time signals and linear time-invariant (LTI) systems. Sampling theorem. Frequency spectrum, Convolution and its application to LTI systems. The z transform, discrete-time Fourier transform, and discrete Fourier transform. Introduction to digital filters. 3 lectures. Crosslisted as CPE/EE 327.

CPE 328. Discrete Time Signals and Systems. 3 units

Term Typically Offered: F, W, SP
Prerequisite: BMED 355 or EE 228. Concurrent: CPE/EE 368.

Discrete-time systems and analysis, with emphasis on linear time-invariant (LTI) systems. Sampling theorem. Classification of discrete-time systems. Convolution and its application to LTI systems. The z transform, discrete-time Fourier transform, and discrete Fourier transform. Introduction to digital filters. Not open to students with credit in CPE 327. 3 lectures. Crosslisted as CPE/EE 328.

CPE 329. Microcontroller-Based Systems Design. 4 units

Term Typically Offered: F, SP
Prerequisite: CPE/EE 233; EE 307 and EE 347.

Design, implementation and testing of microcontroller-based systems. Hardware and C software for embedded systems to sense and actuate external devices. I/O common embedded systems to interface I/O devices and protocols. Analysis of power consumption. Ethics. Not open to students with credit in CPE/EE 336. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 329.

CPE 333. Computer Hardware Architecture and Design. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CPE 101, CPE 233.

Study of a hardware design of a specific CPU. Pipelining, input/output, multi-processors, and performance measurement. Implementation of CPU architectural and computer components using hardware-description languages and development board platforms. Not open to students with credit in CPE 315. 3 lectures, 1 laboratory.

CPE 336. Microprocessor System Design. 4 units

Term Typically Offered: F, SP
Prerequisite: CPE/EE 233.

Introduction to microcontrollers and integrated microprocessor systems. Hardware/software trade-offs, system economics, and functional configurations. Interface design, real-time clocks, interrupts, A/D conversion, serial and parallel communications, watch-dog timers, low power operation, event-based inter-peripheral communication, and assembly and higher-level language programming techniques. Architecture and design of sampled data and low-power systems. Not open to students with credit in CPE/EE 329. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 336.

CPE 345. Quantum Computing. 4 units

Term Typically Offered: SP
Prerequisites: MATH 206 or MATH 244; and CHEM 353 or PHYS 211.

Quantum mechanical wave functions. Principle of superposition and entanglement. States of one or more quantum bits. Quantum gates and circuits. Application of quantum gates on simulators and quantum computers. Quantum computer architectures. Quantum algorithms. Ethics of quantum computing. 3 lectures, 1 activity. Crosslisted as CPE/PHYS 345.

CPE 350. Capstone I. 4 units

Term Typically Offered: F

Corequisite: CPE 316 or EE 329.

Definition and specification of a system to be constructed in CPE 450; requirements elicitation techniques, research and data gathering methods; project planning, time and budget estimating; project team organization. Ethics and professionalism. 3 lectures, 1 laboratory.

CPE 357. Systems Programming. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC/CPE 102 and CSC/CPE 103 with a grade of C- or better or consent of instructor, or CSC/CPE 202 and CSC/CPE 203 with a grade of C- or better or consent of instructor; and CSC 225 or CPE/EE 229 or CPE/EE 233.

C programming language from a system programming perspective. Standard C language including operators, I/O functions, and data types in the context of system functions. Unix commands, shell scripting, file system, editors. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 357.

CPE 367. Digital Signals and Systems Laboratory. 1 unit

Term Typically Offered: F, W

Prerequisite: EE 242 or EE 245. Concurrent: CPE 327.

Laboratory work pertaining to discrete-time signals and linear systems; including frequency response and Fourier spectral analysis, signal sampling and aliasing, digital signal processing techniques, and digital filter design and implementation. 1 laboratory. Crosslisted as CPE/EE 367.

CPE 368. Signals and Systems Laboratory. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: BMED 355 or EE 228. Concurrent: CPE/EE 328.

Laboratory work pertaining to linear systems, including Fourier analysis, time and frequency responses, and system transfer function. Not open to students with credit in CPE 367. 1 laboratory. Crosslisted as CPE/EE 368.

CPE 400. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: F,W,SP, SU

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

CPE 414. Robotic Systems Integration. 4 units

Term Typically Offered: TBD

Prerequisite: CPE/EE 329 or CPE/CSC 357 or ME 305.

Integration of sensors, actuators, chassis, and Linux-based computational platforms into functioning autonomous robotic systems. Embedded Linux system programming, inter-process software communication, basic sensor fusion techniques, Pulse Width Modulation (PWM) motor actuation, and web-based interfacing for remote system way-pointing and monitoring. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 414.

CPE 416. Autonomous Mobile Robotics. 4 units

Term Typically Offered: TBD

Prerequisite: CPE/EE 329 or CPE 316; or CPE 315 and CPE/CSC 357.

Theory and application of concepts relevant to autonomous mobile robots. Sensor and actuator interfacing, programming mobile robots, mobile robot configurations, software architectures and algorithms. 3 lectures, 1 laboratory.

CPE 419. Applied Parallel Computing. 4 units

Term Typically Offered: F, SP

Prerequisite: CPE/CSC 357. Corequisite: CSC 248 or CSC 348.

Recommended: CPE 315.

Introduction to applied parallel computing paradigms: software models, resource allocation, performance measurement, and data sharing. Emphasis on massively parallel computation and performance improvement for a real-world application of significant scope. 3 lectures, 1 laboratory.

CPE 422. Network Security. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 364 or CPE 464.

Introduction to network security, including denial of service, botnets, access control, routing attacks, transport layer attacks, tunneling mechanisms, VPNs, IDS, firewalls, penetration testing, key distribution, email security, jamming, and wireless security. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 422.

CPE 425. Wireless Security. 4 units

Term Typically Offered: TBD

Prerequisite: CPE/CSC 321. Recommended: CSC 300 or PHIL 323; CSC 364 or CPE 464.

Comprehensive overview of wireless networks and system security. Security issues and solutions in emerging wireless access networks and systems as well as multi-hop wireless networks. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 425.

CPE 426. Introduction to Hardware Security. 4 units

Term Typically Offered: SP

Prerequisite: CPE 315 or CPE 333; and CPE 233.

An introduction to hardware security from embedded systems to secure VHDL design. Topics may include digital rights management, hardware based trojans, hardware implementation of cryptography, sidechannel attacks, secure communication protocols, hardware based overflow detection, physical device verification, and physically unclonable functions. 3 lecture, 1 laboratory.

CPE 428. Computer Vision. 4 units

Term Typically Offered: W

Prerequisite: CPE 327 or CPE/CSC 357 or EE 328 or ME 305.

Introduction to the concepts of 2D and 3D computer vision: low-level image processing methods such as filtering and edge detection; feature extraction; segmentation and clustering; stereo vision; appearance-based and model-based algorithms. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 428.

CPE 431. Compiler Construction. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 430.

Intermediate code representations, memory management, functions and parameter passing, code transformations and optimizations, code generation, register allocation. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 431.

CPE 432. Digital Control Systems. 3 units

Term Typically Offered: F

Prerequisite: EE 302 and EE 342; or CPE 327 and CPE 367. Concurrent: CPE/EE 472. Recommended: EE 328 and EE 368.

Theory and applications of digital computers in linear control systems. Analysis and design of microprocessor-based controls. Introduction of continuous and discrete transform methods for design of closed-loop dynamic systems. Applications in robotics, automotive, aircraft and industrial process control. 3 lectures. Crosslisted as CPE/EE 432.

CPE 439. Introduction to Real-Time Operating Systems. 4 units

Term Typically Offered: TBD

Prerequisite: CPE/EE 329 or CPE 316.

Theory, design and implementation of real-time operating system-based embedded systems. Scheduling algorithms, operating system resources, peripheral device interfacing and embedded system architecture. Resource management issues in a resource-limited (microcontroller-based) environment. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 439.

CPE 441. Computer-Aided Design of VLSI Devices. 4 units

Term Typically Offered: F

Prerequisite: EE 307 and EE 347. Recommended: EE 308 and EE 348, for students interested in analog design.

Design of VLSI circuits using state-of-the-art CAD software. Design issues and algorithms related to design using CAD. Full custom design through automated design and a major multi-week chip design project in lab. 3 lectures, 1 laboratory. Crosslisted as CPE 441/EE 431.

CPE 442. Real Time Embedded Systems. 4 units

Term Typically Offered: F

Prerequisite: CPE/EE 329 or CPE/EE 336 or CPE 316.

Theory, design and implementation of modern embedded systems. Scheduling algorithms and operating system resources. System on Chip (SoC) design issues such as interfacing with custom hardware description language (HDL) peripherals, high-performance chip interconnect standards, energy use, area, and hardware versus software performance trade-offs. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 442.

CPE 446. Design of Fault-Tolerant Digital Systems. 4 units

Term Typically Offered: F

Prerequisite: CPE/EE 329 or CPE/EE 336 or CPE 316. Recommended: STAT 350.

Hardware and software fault tolerance concepts: fault models, coding in computer systems, module and system level fault detection mechanisms, reconfiguration techniques for general purpose processors and ASICs, and software fault tolerance techniques such as recovery blocks, N-version programming, checkpointing, and recovery. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 446.

CPE 447. Stringed Musical Instrument Acoustics, Mechanics, and Transducer Design. 4 units

Term Typically Offered: TBD

Prerequisite: EE/CPE 329 or EE/CPE 336 or CPE 316 or ME 305.

Acoustics, sound production, and transducer design in the context of stringed musical instruments. Introduces music theory, scales and temperament, sound radiation, structural dynamics of stringed instruments. Integrates engineering topics including frequency spectrum analysis, electromagnetics, properties of materials, digital and analog circuit design. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 447.

CPE 450. Capstone II. 3 units

Term Typically Offered: W

Prerequisite: CPE 350.

Team-based design, construction and deployment of an embedded system that includes a custom-built computer. Technical management of product development teams. Technical documentation, configuration management, quality assurance, integration and systems testing. Professionalism. 1 lecture, 2 laboratories.

CPE 453. Introduction to Operating Systems. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC/CPE 357; and CSC 225, CPE/EE 229, or CPE/EE 233.

Introduction to sequential and multiprogramming operating systems; kernel calls, interrupt service mechanisms, scheduling, files and protection mechanisms, conventional machine attributes that apply to operating system implementation, virtual memory management, and I/O control systems. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 453.

CPE 454. Implementation of Operating Systems. 4 units

Term Typically Offered: TBD

Prerequisite: CSC/CPE 453.

Design and implementation of multiprogramming kernels, systems programming methodology, interprocess communications, synchronization, device drivers and network access methods. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 454.

CPE 458. Current Topics in Computer Systems. 4 units

Term Typically Offered: TBD

Prerequisite: CSC/CPE 357.

Selected aspects of design, implementation and analysis of networks, advanced operating and distributed systems. Topics may include process management, virtual memory, process communication, context switching, file system designs, persistent objects, process and data migration, load balancing, security and networks. The Class Schedule will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 458.

CPE 461. Senior Project I. 3 units

Term Typically Offered: F,W,SP, SU

Prerequisite: CPE 350.

Selection and completion of an individual or team project. Project results are presented in a formal report.

CPE 462. Senior Project II. 2 units

Term Typically Offered: F,W,SP,SU
Prerequisite: CPE 450.

Selection and completion of an individual or team project. Project results are presented in a formal report.

CPE 464. Introduction to Computer Networks. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC/CPE 357. Recommended: STAT 312 or STAT 321 or STAT 350.

Computer network architectures; communications protocol standards; services provided by the network; historical and current examples presented. 3 lectures, 1 laboratory.

CPE 465. Advanced Computer Networks. 4 units

Term Typically Offered: TBD
Prerequisite: CSC/CPE 453; and CSC 364 or CPE 464.

Advanced topics in computer networks; greater detail of protocol standards and services provided by the network; focus on current industry and research topics. 3 lectures, 1 laboratory.

CPE 469. Distributed Systems. 4 units

Term Typically Offered: SP
Prerequisite: CSC/CPE 357.

Foundations of distributed systems, distributed hash tables (peer-to-peer systems), failure detectors, synchronization, election, inter-process communication, consensus, replication, key-value stores, and measurements. 3 lectures, 1 laboratory. Crosslisted as CSC/CPE 469.

CPE 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CPE 471. Introduction to Computer Graphics. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CPE/CSC 357.

Graphics software development and use of application programming interfaces for 3D graphics. The graphics pipeline, modeling, geometric and viewing transforms, lighting and shading, rendering, interaction techniques and graphics hardware. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 471.

CPE 472. Digital Control Systems Laboratory. 1 unit

Term Typically Offered: F
Concurrent: CPE/EE 432.

Design and programming of microprocessor-based digital controls for electro-mechanical plants. Topics include digital control laws, translation of transfer functions into algorithms, assembly language programming, real-time software design, sample rate selection, finite word-length considerations. 1 laboratory. Crosslisted as CPE/EE 472.

CPE 476. Real-Time 3D Computer Graphics Software. 4 units

Term Typically Offered: TBD
Prerequisite: CSC/CPE 471.

Basic and advanced algorithms for real-time, interactive, 3D graphics software. Modeling (polygon mesh, height field, scene graph), real-time rendering and shading (visibility processing, LOD, texture and light maps), collision detection (bounding volumes, complexity management), interactive controls, multi-player game technology, game engine architecture. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 476.

CPE 479. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

CPE 488. Microelectronics and Electronics Packaging. 4 units

Term Typically Offered: F, W, SP
Prerequisite: EE 112 or EE 113 or EE 201. Recommended: MATE 210.

Materials, processes, and reliability of microelectronics and electronics packaging, surface mount assembly and printed circuit board fabrication. Organic substrates and ceramic substrates. Mechanical design, thermal, and electrical considerations in electronic packaging. Design for manufacturability. Overview of optoelectronics packaging and other emerging technologies in microelectronics and electronic packaging. Project on design and manufacture of an electronic device. 3 lectures, 1 laboratory. Crosslisted as CPE 488/IME 458/MATE 458.

CPE 493. Cooperative Education Experience. 2 units

Term Typically Offered: F,W,SP,SU
CR/NC
Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units.

CPE 494. Cooperative Education Experience. 6 units

Term Typically Offered: F,W,SP,SU
CR/NC
Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units.

CPE 495. Cooperative Education Experience. 12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

CPE 515. Computer Architecture. 4 units

Term Typically Offered: W

Prerequisite: CPE 315 or CPE 333, and graduate standing; or consent of instructor.

Comparative study and design of multiprocessor, dataflow, RISC, high level language and other new computer architectures. VLSI processor design techniques. 3 seminars, 1 laboratory. Crosslisted as CPE/CSC 515.

CPE 521. Computer Systems. 4 units

Term Typically Offered: TBD

Prerequisite: CPE 316 or CPE/EE 329; and CPE 315 or CPE 333; graduate standing or consent of instructor.

Organization of modern general purpose, high speed digital computer systems. Design of arithmetic units, control units, memories and memory subsystems. Cost, power and speed trade-offs in the design of such systems. 3 seminars, 1 laboratory. Crosslisted as CPE/EE 521.

CPE 522. Advanced Real-Time Operating Systems Design. 4 units

Term Typically Offered: TBD

Prerequisite: CPE/EE 439.

Define and implement a microcontroller-based Real-Time Operating System (RTOS). Advanced real-time concepts, kernel structure, task and time management, various intertask communication constructs including semaphores, queues and mailboxes. Scheduler design, memory management and shared resource management in a resource-constrained microcontroller environment. 3 seminars, 1 laboratory. Crosslisted as CPE/EE 522.

CPE 523. Digital Systems Design. 4 units

Term Typically Offered: TBD

Prerequisite: CPE 316 or CPE/EE 329; and graduate standing.

Full-custom design and analysis of digital circuits using full CMOS, pass-transistor and dynamic circuit topologies. Transistor sizing for minimizing power consumption, delay and other design criteria. 3 seminars, 1 laboratory. Crosslisted as CPE/EE 523.

CPE 532. VLSI Circuit Testing. 1 unit

Term Typically Offered: F

Prerequisite: EE 531/CPE 541.

Characterization, testing and documentation of custom-fabricated Very Large Scale Integrated (VLSI) circuits. Use of specialized test equipment. 1 laboratory. Crosslisted as CPE/EE 532.

CPE 541. Advanced VLSI Design. 4 units

Term Typically Offered: W

Prerequisite: CPE 441/EE 431.

Advanced Very Large Scale Integrated (VLSI) design using state-of-the-art software. Advanced topics in digital, analog and mixed signal circuit design to enable a quarter-long design project culminating in a tapeout-ready integrated circuit design. 3 lectures, 1 laboratory. Crosslisted as CPE 541/EE 531.

CPE 542. Advanced Real Time Embedded Systems. 4 units

Term Typically Offered: W

Prerequisite: CPE/EE 442.

Advanced study and application of modern embedded systems. Memory bandwidth matching, clock-domain crossing, IP creation and verification, and student-led lectures on modern System on Chip (SoC) design topics. Building a prototype embedded system. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 542.

CPE 564. Computer Networks: Research Topics. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 364 or CPE 464, and graduate standing; or consent of instructor.

Exploration of advanced topics in emerging computer networking technologies; focus on leading edge computer network research topics. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 564.

CPE 569. Distributed Computing. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 248 or CSC 348; and CPE/CSC 357; or graduate standing and consent of instructor.

Principles and practices in distributed computing: interprocess communications, group communications, client-server model, distributed objects, message queue system, distributed services, mobile agents, object space, Internet protocols. Distributed algorithms: consensus protocols, global state protocols. Fault tolerance: classification of faults, replication. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 569.

Computer Science (CSC)

undefined

CSC Courses

CSC 101. Fundamentals of Computer Science. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Appropriate Math Placement Level; or MATH 117 with a grade of C- or better; or MATH 118 with a grade of C- or better; or consent of instructor.

Basic principles of algorithmic problem solving and programming using methods of top-down design, stepwise refinement and procedural abstraction. Basic control structures, data types, and input/output. Introduction to the software development process: design, implementation, testing and documentation. The syntax and semantics of a modern programming language. Credit not available for students who have taken CSC/CPE 108. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 101.

CSC 121. Computing for All I. 4 units

Term Typically Offered: F
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: MATH 115; or appropriate Math Placement Level.

Fundamentals of computational thinking in the study of non-computing disciplines. Ethical and social considerations of computing. Data gathering and representation. Logic and computational reasoning. Data and procedural abstraction. Problem decomposition. Code patterns for algorithmic problem-solving. 3 lectures, 1 activity. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE Area.

CSC 122. Computing for All II. 4 units

Term Typically Offered: W
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: CSC 121.

Fundamentals of computational thinking in the study of non-computing disciplines. Ethical and social considerations of computing. Reading code and identifying patterns. Problem Decomposition. Algorithms and automation. Software Engineering. Creative Computing. 3 lectures, 1 laboratory. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE Area.

CSC 123. Introduction to Computing. 4 units

Term Typically Offered: F, W
 Prerequisite: Basic computer literacy.

Use of a supportive software development environment to design, develop, and test applications in a selected topic domain that demonstrates the potential of careers in computing. An introduction to computing and to the selected topic domain. The Class Schedule will list topic selected. No programming experience required. Not for students with credit in CPE/CSC 103 or CPE/CSC 203. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 123.

CSC 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F, W, SP
 Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CSC 202. Data Structures. 4 units

Term Typically Offered: F, W, SP
 Prerequisite: CPE/CSC 101 with a grade of C- or better; or consent of instructor.

Introduction to data structures and analysis of algorithms. Abstract datatypes. Specification and implementation of advanced data structures. Theoretical and empirical analysis of recursive and iterative algorithms. Software performance evaluation and testing techniques. Not open to students with credit in CSC/CPE 108. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 202.

CSC 203. Project-Based Object-Oriented Programming and Design. 4 units

Term Typically Offered: F, W, SP
 Prerequisite: CPE/CSC 202 with a grade of C- or better or consent of instructor.

Object-oriented programming and design with applications to project construction. Introduction to class design, interfaces, inheritance, generics, exceptions, streams, and testing. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 203.

CSC 225. Introduction to Computer Organization. 4 units

Term Typically Offered: F, W, SP
 Prerequisite: CPE/CSC 202.

Introduction to computer systems. Simple instruction set architecture and the computer hardware needed to implement that architecture. Machine and assembly language programming. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 225.

CSC 231. Programming for Engineering Students. 2 units

Term Typically Offered: F, W, SP
 Prerequisite: MATH 142; PHYS 121 or PHYS 131 or PHYS 141.

Programming techniques and procedures with applications to engineering problems. Introduction to numerical methods and simulation. Credit not allowed for CSC, Software Engineering or CPE majors. Course may be offered in classroom-based or online format. 2 activities.

CSC 232. Computer Programming for Scientists and Engineers. 3 units

Term Typically Offered: F, W, SP
 Prerequisite: MATH 118 or equivalent.

Computer programming, with an emphasis on procedural programming, taught using a language hosted by applications commonly used in science and engineering. Credit not allowed for CSC, CPE or Software Engineering majors. 2 lectures, 1 activity.

CSC 234. C and Unix. 3 units

Term Typically Offered: F, W, SP
 Prerequisite: MATH 142.

The C programming language and the UNIX programming environment. Operators, standard I/O functions, strings, pointers and arrays, data types and storage classes. Unix shell programming and basic I/O system calls. Credit not allowed for CSC, Software Engineering or CPE majors. 3 lectures.

CSC 248. Discrete Structures. 4 units

Term Typically Offered: F, W, SP
 Prerequisite: CSC/CPE 202 and CSC/CPE 203 with grades of C- or better; or consent of instructor.

Structures of computer science: logic, sets, relations, functions, graphs and trees. Propositional and predicate logic. Applications of predicate logic to preconditions, postconditions, and proof techniques. Complexity of algorithms. Not open to students with credit in CSC 141 or CSC 348. 4 lectures. Replaces CSC 348.

CSC 290. Selected Topics. 1-4 units

Term Typically Offered: F, W, SP
 Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CSC 300. Professional Responsibilities. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A3 with a grade of C- or better; CSC/CPE 357; and junior standing.

The responsibilities of the computer science professional. The ethics of science and the IEEE/ACM Software Engineering Code of Ethics. Quality tradeoffs, software system safety, intellectual property, history of computing and the social implications of computers in the modern world. Applications to ethical dilemmas in computing. Technical presentation methods and practice. 3 lectures, 1 laboratory.

CSC 304. Software Engineering without Programming. 4 units

Term Typically Offered: F

Prerequisite: Junior standing; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Introduction to software engineering for students pursuing non-computing degree objectives. Software development lifecycles. Stakeholders and roles in the software lifecycle. Product vision, user personas, and user stories. Software requirements. User interface prototyping. Data description for applications. Software architectures. Software testing. Not open to students in CPE, CSC, or SE. 4 lectures.

CSC 305. Individual Software Design and Development. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC/CPE 203.

Practical software development skills needed for construction of mid-sized production-quality software modules, using the CSC upper division programming language. Topics include inheritance, exceptions, and memory and disk-based dynamic data structures. Students must complete an individual programming project of mid-level complexity. 3 lectures, 1 laboratory.

CSC 307. Introduction to Software Engineering. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 248 or CSC 348; and CPE/CSC 357.

Requirements, specification, design, implementation, testing and verification of large software systems. Study and use of the software process and software engineering methodologies; working in project teams. Not open to students with credit in CSC 308. 3 lectures, 1 laboratory.

CSC 308. Software Engineering I. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 248 or CSC 348.

Principles for engineering requirements analysis and design of large complex software systems. Software process models. Methods of project planning, tracking, documentation, communication, and quality assurance. Analysis of engineering tradeoffs. Group laboratory project. Technical oral and written presentations. 3 lectures, 1 laboratory.

CSC 309. Software Engineering II. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 308 and CSC/CPE 357.

Continuation of the software lifecycle. Methods and tools for the implementation, integration, testing and maintenance of large software systems. Software development and test environments. Software quality assurance. Group laboratory project. Technical presentation methods and practice. 3 lectures, 1 laboratory.

CSC 312. Computational Thinking for Educators. 4 units

Term Typically Offered: SU

Prerequisite: Completion of GE Area C2; and completion of GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalog.)

Fundamentals of computational thinking in the context of K-12 Education. Ethical and social considerations of computing. Data gathering and representation. Logic and computational reasoning. Data and procedural abstraction. Problem decomposition. Code patterns for algorithmic problem-solving. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

CSC 313. Teaching Computing. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 202 or CSC 314.

An introduction to pedagogical methods and practical techniques for computer science education: selecting appropriate content, designing assignments and activities, evaluating student learning, and evaluating teaching efficacy. Hands-on guided curricular design activities and real-world practice. 3 lectures, 1 laboratory.

CSC 314. Software Design and Data Structures for Educators. 4 units

Term Typically Offered: SU

Prerequisite: CSC 312.

A programming-based introduction to software design techniques, data structures, and algorithms, appropriate for K-12 computer science teachers. Satisfies a requirement for the computer science specific supplementary authorization for teaching K-12 computer science in California. Course offered online only. 3 lectures, 1 laboratory.

CSC 320. Practical Computer Security for Everyone. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Exploration of practical computer security in everyday life for non-majors. Covering the principles, technologies and tools used to secure the Internet and keep ourselves digitally secure, including: privacy and anonymity, web and data security, cryptography, malware, authentication and access control. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

CSC 321. Introduction to Computer Security. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 357.

Survey of topics in computer system and network security, including protection, access control, distributed access control, operating system security, applied cryptography, network security, firewalls, secure coding practices, and case studies from real-world systems. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 321.

CSC 323. Cryptography Engineering. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 357.

An introduction to the theory and practice of building secure, cryptographic systems. Core cryptographic primitives. Implementation, evaluation and subversion of widely deployed cryptographic products and protocols. 3 lectures, 1 laboratory.

CSC 325. Introduction to Privacy: Policy and Technology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A3 with a grade of C- or better; CPE/CSC 203; CSC 300 or PHIL 323.

Introduction to policies and technologies related to digital privacy. Legal decisions and policies, domestic and global cultural expectations, and privacy related technologies including applications to surveillance, big data, websites, mobile, and privacy by design. 3 lectures, 1 laboratory.

CSC 344. Music Programming. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 248 or CSC 348; and CPE/CSC 357.

Music-producing programs. Software synthesizers: oscillators, coupled oscillators, wavetable synthesis. Sound processing units/filters: LTI, FIR, IIR, nonlinear. Physics of sound, mathematical foundations of sound synthesis and filtering, existing sound formats (both sampled and MIDI). 3 lectures, 1 laboratory.

CSC 349. Design and Analysis of Algorithms. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 102 and CPE/CSC 103 or CPE/CSC 202 and CPE/CSC 203; MATH 142; and CSC 248, CSC 348, or MATH 248.

Intermediate and advanced algorithms and their analysis. Mathematical, geometrical, and graph algorithms. NP-complete problems. Additional topics will be chosen from pattern matching, file compression, cryptology, dynamic and linear programming, and exhaustive search. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

CSC 350. Computing for Interactive Arts Capstone I. 2 units

Term Typically Offered: F, W, SP

Prerequisite: ART 384; CSC/CPE 103 or CSC/CPE 202; and junior standing.

Definition and specification of a team-based creative collaboration on a digital interactive art project (e.g. animation, video game, interactive media display, etc). Research and techniques, project planning and project team organization, prototype creation. 1 lecture, 1 laboratory. Crosslisted as ART/CSC 350.

CSC 357. Systems Programming. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC/CPE 102 and CSC/CPE 103 with a grade of C- or better or consent of instructor, or CSC/CPE 202 and CSC/CPE 203 with a grade of C- or better or consent of instructor; and CSC 225 or CPE/EE 229 or CPE/EE 233.

C programming language from a system programming perspective. Standard C language including operators, I/O functions, and data types in the context of system functions. Unix commands, shell scripting, file system, editors. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 357.

CSC 364. Introduction to Networked, Distributed, and Parallel Computing. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 203.

Multisystem/multiprocessor coordination and computing. Networking: OSI stack, routing, link layer, mobile, wireless, and applications. Distributed and Parallel Computing: parallelism, concurrency, coordination, shared memory, messaging, task and data decomposition, and design and implementation challenges. 3 lectures, 1 laboratory.

CSC 365. Introduction to Database Systems. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 248 or CSC 348; or CPE/CSC 102 and CPE/CSC 103 and MATH 248; or CPE/CSC 202 and CPE/CSC 203 and MATH 248.

Basic principles of database management systems (DBMS) and of DBMS application development. DBMS objectives, systems architecture, database models with emphasis on Entity-Relationship and Relational models, data definition and manipulation languages, the Structured Query Language (SQL), database design, application development tools. 3 lectures, 1 laboratory.

CSC 366. Database Modeling, Design and Implementation. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 365.

The database modeling problem. Database modeling levels: external, conceptual, logical and physical. Database models: entity-relationship, relational, object-oriented, semantic, and object-relational. Normal forms. Distributed database design. Functional analysis of database applications and transaction specification, design, and implementation. 3 lectures, 1 laboratory.

CSC 369. Introduction to Distributed Computing. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC/CPE 102 and CSC/CPE 103, or CSC/CPE 202 and CSC/CPE 203; and one of the following: STAT 301, STAT 312, STAT 321 or STAT 350.

Introduction to distributed computing paradigms and cloud computing. Modern distributed computing infrastructures. Problem-solving in a distributed computing environment. 3 lectures, 1 laboratory.

CSC 371. Game Design. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC/CPE 102 and CSC/CPE 103; or CSC/CPE 202 and junior standing.

In-depth study of game design including rules, player interaction, and storytelling. Exploration of effective use of sound, art, and game controls in creating meaningful play. Development of fully functioning and engaging games, following standard domain-specific software development processes and using physical prototyping and playtesting. Current, industry-tested game engines. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

CSC 377. Introduction to Mixed Reality. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 202. Recommended: ART 376.

Project-based study and application of Mixed Reality (MR) topics including integrated mixed reality development environments, Human Computer Interaction (HCI) peripherals, 3D environment scanning, physics interaction, diminished reality, motion capture, facial recognition, and visualization hardware. 3 lectures, 1 laboratory.

CSC 378. Interactive Entertainment Engineering. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 102 and CPE/CSC 103, or CPE/CSC 202 and junior standing.

Project-based, software oriented, introductory study of interactive entertainment. Discussion and evaluation of classic and historically influential games. Exploration of concepts in game design and development. Topics may include interactive storytelling, game physics, game AI, character development, animation, and development of virtual worlds. Projects require significant programming. 3 lectures, 1 laboratory.

CSC 400. Special Problems. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units.

CSC 402. Software Requirements Engineering. 4 units

Term Typically Offered: F

Prerequisite: CSC 307 or CSC 309.

Software requirements elicitation, analysis and documentation. Team process infrastructure and resource estimation to support appropriate levels of quality. Software architectural design. 3 lectures, 1 laboratory.

CSC 405. Software Construction. 4 units

Term Typically Offered: W

Prerequisite: CSC 305 and CSC 402.

Design and construction of sizeable software products. Technical management of software development teams. Software development process models, software design, documentation, quality assurance during development, software unit and integration testing; CASE tools, development environments, test tools, configuration management. 3 lectures, 1 laboratory.

CSC 406. Senior Project - Software Deployment. 4 units

Term Typically Offered: SP

Prerequisite: CSC 405.

Deployment of a sizeable software product by a student team. Software maintenance and deployment economic issues. Management of deployed software: version control, defect tracking and technical support. 3 lectures, 1 laboratory.

CSC 409. Current Topics in Software Engineering. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 307 or CSC 309.

Selected topics in software engineering. Topics may include program generation, quality assurance, formal methods, software metrics, design methods, testing, or software development processes. The Class Schedule will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory.

CSC 410. Software Evaluation. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 349; and one of the following: STAT 301, STAT 312, STAT 321 or STAT 350.

Theory and practice of evaluation of software and software systems. Design of experiments for measuring software performance, measuring software output quality, analytical modeling for capacity planning, workload characterization and benchmarking, selection of appropriate software evaluation metrics and criteria. 3 lectures, 1 laboratory.

CSC 421. Binary Exploitation: Tools and Techniques. 4 units

Term Typically Offered: W

Prerequisite: CSC 321; CSC 300 or PHIL 323.

Introduction to the theory and practice of finding vulnerabilities in production systems with a focus on the evolution of vulnerabilities over time. Topics include buffer overflows, return-oriented-programming attacks, return to libc attacks, heap attacks, and common tools. 3 lectures, 1 laboratory.

CSC 422. Network Security. 4 units

Term Typically Offered: SP

Prerequisite: CSC 364 or CPE 464.

Introduction to network security, including denial of service, botnets, access control, routing attacks, transport layer attacks, tunneling mechanisms, VPNs, IDS, firewalls, penetration testing, key distribution, email security, jamming, and wireless security. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 422.

CSC 424. Software Security. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 307 or CSC 309; CPE/CSC 321.

Principles behind secure software design including threat models, trust management, common vulnerabilities and mitigation techniques, robust software development, isolation of untrusted code, auditability, and testing. 3 lectures, 1 laboratory.

CSC 425. Wireless Security. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 321. Recommended: CSC 300 or PHIL 323; CSC 364 or CPE 464.

Comprehensive overview of wireless networks and system security. Security issues and solutions in emerging wireless access networks and systems as well as multi-hop wireless networks. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 425.

CSC 429. Current Topics in Computer Security. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 321 and CPE/CSC 357.

Selected topics in emerging areas of computer security. Potential topics include: network and web security, critical infrastructure protection, embedded systems security, malware analysis, mobile security, and digital forensics, among others. The Class Schedule will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory.

CSC 430. Programming Languages. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 349.

Programming language design through evaluator implementation. Expressions, functions, environments, closures, mutation, objects, type systems, and syntactic abstraction. Syntactic, semantic, and static analysis properties. 3 lectures, 1 laboratory.

CSC 431. Compiler Construction. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 430.

Intermediate code representations, memory management, functions and parameter passing, code transformations and optimizations, code generation, register allocation. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 431.

CSC 436. Mobile Application Development. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC/CPE 357.

Inception, development, testing, and deployment of mobile applications. Introduction to tools, libraries, and frameworks for one or more mobile platforms and devices. Emphasis on software engineering best practices for developing entrepreneurial or humanitarian mobile-centric applications. 3 lectures, 1 laboratory.

CSC 437. Dynamic Web Development. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 357 with a grade of C- or better and CSC 365 with a grade of C- or better; or consent of instructor.

Project-based study of web-based three-tiered applications, including current best practices and tools for design, implementation and testing of browser interface, serverside business logic, object-relational mapping, databases, and web services. 3 lectures, 1 laboratory.

CSC 445. Theory of Computation I. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 248 or CSC 348.

Theory of formal languages and automata. Turing machines. Chomsky hierarchy. Theory of decidability and computability. 4 lectures.

CSC 448. Bioinformatics Algorithms. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 349.

Introduction to the use of computers to solve problems in molecular biology. The algorithms, languages, and databases important in determining and analyzing nucleic and protein sequences and their structure. 3 lectures, 1 laboratory.

CSC 450. Computing for Interactive Arts Capstone II. 2 units

Term Typically Offered: F, W, SP

Prerequisite: ART/CSC 350.

Team-based design, construction and deployment of a collaborative interactive computational art project typically found in the fields of animation, game design, and interactive media. Management of interdisciplinary teams, documentation, creative development, testing, and assessment. 2 activities. Crosslisted as ART/CSC 450.

CSC 453. Introduction to Operating Systems. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC/CPE 357; and CSC 225, CPE/EE 229, or CPE/EE 233.

Introduction to sequential and multiprogramming operating systems; kernel calls, interrupt service mechanisms, scheduling, files and protection mechanisms, conventional machine attributes that apply to operating system implementation, virtual memory management, and I/O control systems. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 453.

CSC 454. Implementation of Operating Systems. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC/CPE 453.

Design and implementation of multiprogramming kernels, systems programming methodology, interprocess communications, synchronization, device drivers and network access methods. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 454.

CSC 458. Current Topics in Computer Systems. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC/CPE 357.

Selected aspects of design, implementation and analysis of networks, advanced operating and distributed systems. Topics may include process management, virtual memory, process communication, context switching, file system designs, persistent objects, process and data migration, load balancing, security and networks. The Class Schedule will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 458.

CSC 466. Knowledge Discovery from Data. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 349 and one of the following: STAT 252, STAT 302, STAT 312, STAT 321 or STAT 350.

Overview of modern knowledge discovery from data (KDD) methods and technologies. Topics in data mining (association rules mining, classification, clustering), information retrieval, web mining. Emphasis on use of KDD techniques in modern software applications. 3 lectures, 1 laboratory.

CSC 468. Database Management Systems Implementation. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 365.

Data structures and algorithms used in the implementation of database systems. Implementation of data and transaction managers: access methods interfaces, concurrency control and recovery, query processors and optimizers. Introduction to implementation of distributed database systems. 3 lectures, 1 laboratory.

CSC 469. Distributed Systems. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC/CPE 357.

Foundations of distributed systems, distributed hash tables (peer-to-peer systems), failure detectors, synchronization, election, inter-process communication, consensus, replication, key-value stores, and measurements. 3 lectures, 1 laboratory. Crosslisted as CSC/CPE 469.

CSC 471. Introduction to Computer Graphics. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CPE/CSC 357.

Graphics software development and use of application programming interfaces for 3D graphics. The graphics pipeline, modeling, geometric and viewing transforms, lighting and shading, rendering, interaction techniques and graphics hardware. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 471.

CSC 473. Advanced Rendering Techniques. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC/CPE 471.

Illumination models, reflectance, absorption, emittance, Gouraud shading, Phong shading, raytracing polyhedra and other modeling primitives, coherence, acceleration methods, radiosity, form factors, advanced algorithms. 3 lectures, 1 laboratory.

CSC 474. Computer Animation. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC/CPE 471.

Basic and advanced algorithms for generating sequences of synthetic images. Interpolation in time and space, procedural and keyframe animation, particle systems, dynamics and inverse kinematics, morphing and video. 3 lectures, 1 laboratory.

CSC 476. Real-Time 3D Computer Graphics Software. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC/CPE 471.

Basic and advanced algorithms for real-time, interactive, 3D graphics software. Modeling (polygon mesh, height field, scene graph), real-time rendering and shading (visibility processing, LOD, texture and light maps), collision detection (bounding volumes, complexity management), interactive controls, multi-player game technology, game engine architecture. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 476.

CSC 477. Scientific and Information Visualization. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC 349.

Basic data processing (magnitude, grouping and segmentation), visualization design, cognition and perception, spatial data visualizations (2D and 3D, e.g. GIS data, medical data) information data visualization, spatial encoding, color encoding, and interaction. 3 lectures, 1 laboratory.

CSC 478. Current Topics in Computer Graphics. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC/CPE 471.

Selected aspects of the design, implementation and analysis of computer graphics. Topics may include rendering, modeling, visualization, animation, virtual reality, computer vision, multimedia, and perception issues. The Class Schedule will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory.

CSC 480. Artificial Intelligence. 4 units

Term Typically Offered: F, W, SP

Prerequisite: either CSC/CPE 102 and CSC/CPE 103 with a grade of C- or better or consent of instructor; or CSC/CPE 202 with a grade of C- or better and junior standing.

Programs and techniques that characterize artificial intelligence. Programming in a high level language. 3 lectures, 1 laboratory.

CSC 481. Knowledge Based Systems. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC 480.

In-depth treatment of knowledge representation, utilization and acquisition in a programming environment. Emphasis on the use of domain-specific knowledge to obtain expert performance in programs. 3 lectures, 1 laboratory.

CSC 482. Speech and Language Processing. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 466 or CSC 480 or graduate standing. Recommended: CSC 349.

Introduction to natural language processing theory; speech processing; review of recent advancements. Topics include: tokenization, part-of-speech tagging, word-sense disambiguation, natural language understanding, natural language generation, data mining, voice processing, vocalization, semantic networks, intelligent assistants, computational linguistics, stylistics and machine learning. 3 lectures, 1 laboratory.

CSC 484. User-Centered Interface Design and Development. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 307 or CSC 308; junior standing.

Introduction to the importance of user-centered principles in the design of good interfaces and effective human-computer interaction. Topics include: study of human characteristics affected by interface design, effective requirements data collection and analysis, user-centered approaches to software engineering, and evaluation of interface and interaction quality. 3 lectures, 1 laboratory.

CSC 486. Human-Computer Interaction Theory and Design. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 307 or CSC 308.

Application of the theories of human-computer interaction to the task of user-centered design. Survey of techniques for studying and involving users in different aspects of the design process, and demonstration of where and when applicable. Combining of theoretical understanding with practical experience to design solutions to problems facing interactive systems designers. 3 lectures, 1 laboratory.

CSC 487. Deep Learning. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 349, and MATH 206 or MATH 244. Recommended: CSC 466 or CSC 480.

Overview of current topics in Deep Learning. Theory and practice of Deep Learning (DL) paradigms. Convolutional Neural Networks (NN), Recurrent NN, Dropout, Momentum Gradient Descent, Batch Normalization, Adversarial and Siamese NN, and new developments. Emphasis on using DL to solve a real-world application of significant scope. 3 lectures, 1 laboratory.

CSC 490. Selected Advanced Topics. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CSC 491. Senior Project I. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 307 or CSC 309; and consent of instructor.

Selection and completion of a project by individuals or team which is typical of problems which graduates must solve in their fields of employment. Project may include students from other disciplines. Formulation of outline, literature review, and project schedule.

CSC 492. Senior Project II. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 491 and consent of instructor.

Selection and completion of a project by individuals or team which is typical of problems which graduates must solve in their fields of employment. Project may include students from other disciplines. Project results are presented in a formal report.

CSC 493. Cooperative Education Experience. 1-2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of instructor.

Work experience in an area related to computing. Positions are typically paid and usually require relocation and registration in course for one quarter. Registration in course is required at start of work experience. Formal evaluation by work supervisor required. Major and total credit limited to 4 units. Credit/No Credit grading only. Course offered online only.

CSC 496. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

CSC 497. Research Senior Project I. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 307 or CSC 309; and consent of instructor.

Individual research activity under faculty supervision. Problem statement and literature review. Intended for those planning to pursue graduate studies or research-oriented employment.

CSC 498. Research Senior Project II. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 497 and consent of instructor.

Continued individual research activity under faculty supervision. Prototype development, analysis, documentation. Intended for those planning to pursue graduate studies or research-oriented employment.

CSC 500. Directed Study. 1-4 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Fully classified graduate standing and consent of instructor.

Individual directed study of advanced topics. Total credit limited to 4 units. Credit/No Credit grading only.

CSC 508. Software Engineering I. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 307 or CSC 308 and graduate standing, or consent of instructor.

In-depth study of requirements engineering, software project management, formal specifications and object-oriented analysis. 4 seminars.

CSC 509. Software Engineering II. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 508 and graduate standing, or consent of instructor.

In-depth study of software modeling and design. Formal design methodologies. Design patterns. Detailed case studies of existing projects. Tools and methods for designing large software systems. 4 seminars.

CSC 513. Computing Education Research and Practice. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or senior standing.

An overview of the current landscape of computing education research and practice, covering key research findings about how people learn computing, issues of diversity and inclusion in computer science, and a discussion of how and why we should teach everyone computing. 4 seminars.

CSC 515. Computer Architecture. 4 units

Term Typically Offered: TBD

Prerequisite: CPE 315 or CPE 333, and graduate standing; or consent of instructor.

Comparative study and design of multiprocessor, dataflow, RISC, high level language and other new computer architectures. VLSI processor design techniques. 3 seminars, 1 laboratory. Crosslisted as CPE/CSC 515.

CSC 521. Computer Security. 4 units

Term Typically Offered: TBD

Prerequisite: CPE/CSC 321 and graduate standing.

Exploration of advanced topics in computer security with an emphasis on research topics. 3 lectures, 1 laboratory.

CSC 522. Advanced Network Security. 4 units

Term Typically Offered: W

Prerequisite: CPE/CSC 321 and CPE 464; or graduate standing.

Exploration of network security and design. Particular emphasis will be placed on the threat modeling and security mechanisms design. Laboratory exploration of network security through possible theoretical and experimental experience in system design. 3 lectures, 1 laboratory.

CSC 524. System Security. 4 units

Term Typically Offered: TBD

Prerequisite: CPE/CSC 357 or graduate standing.

Exploration of system security and design. Particular emphasis will be placed on vulnerabilities and defenses in components, component selection, component interaction, sourcing, and system design. Laboratory exploration of system security through a hands-on experience in system design. 3 lectures, 1 laboratory.

CSC 530. Languages and Translators. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 430 and graduate standing, or consent of instructor.

Advanced programming language and translator concepts. Language concepts to be covered will be selected from current state-of-the-art languages and current issues in language design. Compiler concepts will include retargetable code generation, use of translator-writing systems, and error recovery. 4 seminars.

CSC 540. Theory of Computation II. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 445 and graduate standing, or consent of instructor.

Advanced topics in theoretical computer science from such areas as automata theory, cellular automata theory, computational complexity, and program verification. 4 seminars.

CSC 549. Advanced Algorithm Design and Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 349.

Advanced study of algorithmic topics including dynamic programming, network flows, and linear programming. Complexity classes and reductions. NP-complete problems, with the introduction of approximation algorithms. 4 lectures.

CSC 550. Operating Systems. 4 units

Term Typically Offered: TBD

Prerequisite: CSC/CPE 453 and graduate standing, or consent of instructor.

General concepts of computer architecture and operating systems. Design features of advanced computers, general time-sharing systems and schemes for dynamic memory allocation, scheduling and protection. Dynamic linkage between subroutines. Intercommunication between input/output and processors. 4 seminars.

CSC 560. Database Systems. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 365 and graduate standing, or consent of instructor.

Current topics in database systems: distributed databases and transactions, nested and long-running transactions, distributed concurrency control, semantic and object-oriented data models, database systems for non-traditional applications: engineering design databases, active, logic, temporal, multimedia, and real-time databases. 4 seminars.

CSC 564. Computer Networks: Research Topics. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 364 or CPE 464, and graduate standing; or consent of instructor.

Exploration of advanced topics in emerging computer networking technologies; focus on leading edge computer network research topics. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 564.

CSC 566. Topics in Advanced Data Mining. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 466 or CSC 480 or CSC 582.

Advanced topics in the areas of data mining, knowledge discovery in data, machine learning, information retrieval and intelligent analysis of information. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

CSC 569. Distributed Computing. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 248 or CSC 348; and CPE/CSC 357; or graduate standing and consent of instructor.

Principles and practices in distributed computing: interprocess communications, group communications, client-server model, distributed objects, message queue system, distributed services, mobile agents, object space, Internet protocols. Distributed algorithms: consensus protocols, global state protocols. Fault tolerance: classification of faults, replication. 3 lectures, 1 laboratory. Crosslisted as CPE/CSC 569.

CSC 570. Current Topics in Computer Science. 2-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing and evidence of satisfactory preparation in computer science.

Directed group study of selected topics for graduate students. Topics will normally consist of continuations of those in CSC 520, CSC 530, CSC 540, CSC 550, CSC 560 and CSC 580, and other topics as needed. The Class Schedule will list topic selected. Topic credit limited to 12 units. 2 to 4 seminars.

CSC 572. Computer Graphics. 4 units

Term Typically Offered: TBD

Prerequisite: Successful completion of CSC/CPE 471 and graduate standing, or consent of instructor.

Advanced topics in computer graphics with emphasis on leading edge computer graphics technologies and advanced topics in graphics fundamentals. 3 lectures, 1 laboratory.

CSC 574. Advanced Compute Shaders in Computer Graphics. 4 units

Term Typically Offered: F

Prerequisite: CPE/CSC 471 or graduate standing.

Advanced methods and techniques that utilize general-purpose computing on modern graphics processing units (GPUs) to achieve state-of-the-art effects with physics, animation and lighting. Parallel processing paradigms on the GPU with compute shaders. 3 lectures, 1 laboratory.

CSC 580. Artificial Intelligence. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 480 and graduate standing, or consent of instructor.

Current research in the field of artificial intelligence with emphasis on cooperative agents, distributed agents, and decision making in complex, concurrent environments. AI programming in a distributed environment. 3 lectures, 1 laboratory.

CSC 581. Computer Support for Knowledge Management. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 480 or consent of instructor.

Methods and techniques that computer-based systems can provide to make the management of knowledge and information in digital form easier for the user. Emphasis on support for knowledge-intensive activities performed by users. 3 lectures, 1 laboratory.

CSC 582. Computational Linguistics. 4 units

Term Typically Offered: TBD

Prerequisite: CSC 482 or consent of instructor.

Research-based review of recent advancements in computational linguistics and natural language processing. Topics selected from: language morphology, natural language generation, feature extraction and unification, meaning representations, stylistics, discourse analysis and machine learning methods. 3 lectures, 1 laboratory.

CSC 587. Advanced Deep Learning. 4 units

Term Typically Offered: SP

Prerequisite: CSC 487; or Data Science Minor and DATA 402; or graduate standing.

Current research in the field of deep learning. Topics such as supervised, unsupervised, and semi-supervised learning; representation learning; probabilistic and generative models; reinforcement learning; application domains, including image, audio, and natural language processing; ethical concerns and fairness. 4 lectures.

CSC 590. Thesis Seminar. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing or consent of instructor.

Preparation for conducting research in the field of computer science, through discussions, selected readings, and student presentations. 1 seminar.

CSC 593. Cooperative Education Experience. 2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

CSC 594. Cooperative Education Experience. 6 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

CSC 595. Cooperative Education Experience. 12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only.

CSC 596. Research in Computer Science I. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual research or activity under faculty supervision, beginning work in preparation for the master's thesis.

CSC 597. Research in Computer Science II. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 596 and consent of instructor.

Individual research activity under faculty supervision, continuing work in preparation for the master's thesis.

CSC 599. Thesis. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CSC 590; CSC 498 or CSC 597; graduate standing; and consent of instructor.

Individual research or activity under faculty supervision leading to an acceptable Master's thesis.

Construction Management (CM)

undefined

CM Courses

CM 102. Introduction to Construction Management. 2 units

Term Typically Offered: F, W, SP

Introduction to the fundamental concepts and overview of the essential elements associated with the construction profession, to include: construction trends, ethics, safety and health issues, and professional practice methods. 2 lectures.

CM 113. Construction Materials and Assemblies. 2 units

Term Typically Offered: F, W, SP

Recommended: CM 102.

Exploration of the various materials, assemblies, and processes used and applied in the building construction process. Includes presentation, discussion, analysis, study and research of construction materials and assemblies. 2 lectures.

CM 114. Construction Materials and Assemblies Lab. 2 units

Term Typically Offered: F, W, SP

Corequisite: CM 113. Recommended: CM 102.

Exploration of the various materials, assemblies, and processes used and applied in the building construction process. Includes presentation, discussion, analysis, study and research of construction materials and assemblies. 2 laboratories.

CM 115. Fundamentals of Construction Management. 6 units

Term Typically Offered: F, W, SP

Prerequisite: ARCE 106 or CM 113; MATH 141; and PHYS 141.

Production of drawings and specifications for residential and light commercial construction. Integration of scheduling, estimating, codes, and contracts with a project based approach. Manual drawing techniques and computer aided drafting with building information modeling develop visualization skills for architectural systems. 4 laboratories, 2 activities.

CM 214. Residential Construction Management. 5 units

Term Typically Offered: F, W, SP

Prerequisite: CM 115, PHYS 132 or CHEM 124. Corequisite: CM 232.

Materials, methods, and techniques associated with residential and light commercial construction operations. Topics include shallow foundations, timber and masonry framing, roofing, and exterior and interior finishes. Scheduling, estimating, and construction contracts are integrated into a project based approach. 3 laboratories, 2 activities.

CM 232. Evaluation of Cost Alternatives. 3 units

Term Typically Offered: F, W, SP

Prerequisite: MATH 142 or MATH 182.

Basic principles of economic evaluations using fundamental concepts of time value of money to compare cost alternatives related to construction, design, and real property development. 3 lectures.

CM 239. Construction Surveying. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATH 119 or equivalent.

Theory and practice of plane surveying with an emphasis on construction applications. Topics include property use and care of survey equipment and instruments, distance measurement, leveling, angular measurement, construction layout, basic roadwork, and as-built surveys. 3 lectures, 1 laboratory.

CM 280. Building Information Modeling. 2 units

Term Typically Offered: F, W, SP

Prerequisite: CE 113 or CM 115.

Use of building information modeling software to emphasize residential, commercial, and heavy civil assembly methods and techniques. BIM drafting applications integrated with construction materials, details, and assemblies supporting the understanding of the construction building process. Course may be offered in classroom-based, online, or hybrid format. 2 activities.

CM 310. Construction Means and Methods. 4 units

Term Typically Offered: F, SP

Prerequisite: CM 113 or CE 259 or ARCE 106.

Construction means, methods, and techniques related to the built environment including residential, commercial, heavy civil and HVACR construction. Focus on the major construction material assemblies and systems with an emphasis on constructability, best practices, and application. Field trips required. 4 lectures.

CM 313. Commercial Construction Management. 5 units

Term Typically Offered: F, W, SP

Prerequisite: ARCE 212 and CM 214. Corequisite: CM 280 and CM 334.

Materials, methods, and techniques associated with large commercial and institutional construction operations. Topics include building systems analysis of foundations, waterproofing, structural framing, exterior cladding, and finishes. Scheduling, estimating, and construction contracts are integrated into a project based approach. 3 laboratories, 2 activities.

CM 314. Heavy Civil Construction Management. 5 units

Term Typically Offered: F, W, SP

Prerequisite: CM 239 or BRAE 239; CM 313 or CM/CE 371.

Materials, methods, and techniques associated with civil engineering projects and heavy construction operations. Topics include tunnel, bridge, dam, and road construction; equipment selection; and temporary structures. Scheduling, estimating, and construction contracts are integrated into a project based approach. 3 laboratories, 2 activities.

CM 317. Sustainability and the Built Environment. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Interdisciplinary analysis of sustainable strategies and technologies to enhance the built environment. A systems approach to green building science that includes sustainable site development, water use efficiency, renewable energy, improving material use, indoor environmental quality, and design innovation. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

CM 318. Housing and Communities. 4 units

Term Typically Offered: F,W,SP,SU
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5
 Sustainability Related

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

An overview of the social, economic, environmental and cultural impacts of housing on communities and nations. Students are presented with varied perspectives to understand the different facets of housing and their impacts on the human experience. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

CM 334. Construction Law. 2 units

Term Typically Offered: F, W, SP
 Prerequisite: CM 115 and BUS 207.

The intersection of law and the construction industry. Topics of study include a survey of most major legal issues potentially encountered during construction activity. Course may be offered in classroom-based, online, or hybrid format. 2 activities.

CM 335. Construction Accounting. 2 units

Term Typically Offered: F,W,SP,SU
 Prerequisite: BUS 215 and CM 232.

Fundamentals of construction accounting principles to include income recognition, job cost control, cash flow analysis and associated cost reports. Course may be offered in classroom-based or online format. 2 activities.

CM 371. Construction Management and Project Planning. 4 units

Term Typically Offered: F, W, SP
 Prerequisite: ARCE 106, CE 259 or CM 113.

Theory and practice of planning, scheduling, estimating, and reporting for construction projects. Fundamentals of scheduling logic including critical path, deterministic, and probabilistic scheduling; including the impact of constraints. Identifying resources and estimating time requirements for design activities and project operations. Not open to Architectural Engineering or Construction Management majors. 3 lectures, 1 activity. Crosslisted as CE/CM 371.

CM 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: TBD
 Prerequisite: Consent of instructor.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 6 units, with a maximum of 4 units per quarter.

CM 411. Specialty Contracting Construction Management. 5 units

Term Typically Offered: F, W, SP
 Prerequisite: CM 313.

Materials, methods, and techniques associated with mechanical, electrical, and plumbing systems. Topics include heating, ventilating, air conditioning, power distribution, grounding, lighting, communication, fire detection/protection, and plumbing. Integration of scheduling, estimating, and construction subcontracts with a project based approach. 3 laboratories, 2 activities.

CM 413. Jobsite Construction Management. 5 units

Term Typically Offered: F,W,SP,SU
 Prerequisite: CM 214 or CM 313.

Management activities applicable to the construction process involving techniques, applications, and theory needed in a jobsite environment. Addresses the relationships, roles, and perspectives of all stakeholders. Integrated utilization of temporary structures associated with field construction. Course may be offered in classroom-based, online, or hybrid format. 3 laboratories, 2 activities.

CM 415. Integrated Project Delivery. 4 units

Term Typically Offered: TBD
 Prerequisite: CM 413 and CM 480.

Team based collaborative effort to analyze and evaluate the unique interdisciplinary challenges associated with coordinating and integrating the design and construction processes to deliver a project with respect to the design, budget, schedule, quality, and performance expectations of a client. Not open to students with credit in CM 450. 4 laboratories.

CM 420. Service / Experiential Learning. 1-6 units

Term Typically Offered: SP
 Prerequisite: Third-year standing.

Service and project-based learning and teaching techniques as applied to a variety of construction management concepts. Goals and objectives achieved through service-learning, project-based, and/or experiential pedagogical approaches. The Class Schedule will list topic selected. Total credit limited to 8 units. 1-6 activities.

CM 421. Emerging Trends. 1-6 units

Term Typically Offered: TBD
 Prerequisite: Third-year standing.

Emerging trends related to construction management concepts and practices. Goals and objectives achieved through analysis, study, and research of a particular construction emerging trend. The Class Schedule will list topic selected. Total credit limited to 8 units. Course may be offered in classroom-based, online, or hybrid format. 1 to 6 activities.

CM 422. Professional Preparation. 1-6 units

Term Typically Offered: F, W, SP
 Prerequisite: Third-year standing.

Professional practice related to the construction management industry. Goals and objectives achieved through analysis, study, and preparation for a particular professional practice. The Class Schedule will list topic selected. Total credit limited to 8 units. Course may be offered in classroom-based, online, or hybrid format. 1 to 6 activities.

CM 423. Construction Materials / Assemblies. 1-6 units

Term Typically Offered: TBD
Prerequisite: Third-year standing.

Various materials and assemblies related to construction process. Goals and objectives achieved through analysis, study, and research of a particular construction material and/or assembly. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 6 activities.

CM 424. Construction Technology. 1-6 units

Term Typically Offered: SU
Prerequisite: Third-year standing.

Technology related to construction management education and the construction industry. Goals and objectives achieved through analysis, study, and research of a particular construction technology. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 6 activities.

CM 425. Sustainability and Environment. 1-6 units

Term Typically Offered: TBD
Sustainability Focused
Prerequisite: Third-year standing.

Sustainable and environmental issues related to the construction industry. Goals and objectives achieved through analysis of a particular construction related sustainable and/or environmental issue. The Class Schedule will list topic selected. Total credit limited to 8 units. Course may be offered in classroom-based, online, or hybrid format. 1 to 6 activities.

CM 426. International Construction Studies. 1-6 units

Term Typically Offered: TBD
Prerequisite: Third-year standing.

Exploration of international construction studies through several potential teaching techniques, including field trips to countries overseas, research and case studies of companies and projects, and management skills and leadership as they relate to international construction. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 6 activities.

CM 436. Heavy Civil Temporary Structures and Shoring. 4 units

Term Typically Offered: W
Prerequisite: ARCE 315 or CE 352; and CM 314.

Design and construction of retaining walls, concrete formwork, falsework, scaffolding, ramps, platform, bracing, and guying as applied to heavy civil projects. Field trip may be required. 2 lectures, 2 laboratories. Crosslisted as CE/CM 436.

CM 437. Heavy Civil Projects and Equipment. 4 units

Term Typically Offered: SP
Prerequisite: CM 314.

Heavy civil projects logistics, construction, operations, planning, management, workflow and sequencing, equipment management, fleet configuration and maintenance, equipment productivity and cost optimization. 2 lectures, 2 laboratories. Crosslisted as CE/CM 437.

CM 443. Management of the Construction Firm. 3 units

Term Typically Offered: F, W, SP
Prerequisite: CM 334; CM 335; and CM 413.

Applications of strategic management techniques and business strategy for managing and long-range planning of the construction firm. 3 activities.

CM 450. Integrated Project, Design and Program Management. 5 units

Term Typically Offered: F, W, SP
Prerequisite: STAT 251 or STAT 312, CM 313 and CM 334.

Evaluation of roles and relationships of owner, designer, and construction professionals over project life cycles. Modeling, conceptual estimating, lean scheduling, contract selection, integrated delivery, design management, program management, and influential leadership strategies and techniques. Not open to students with credit in CM 415. Course may be offered in classroom-based, online, or hybrid format. 3 laboratories, 2 activities.

CM 460. Senior Project Methodology. 2 units

Term Typically Offered: F, W, SP
Prerequisite: CM 313; junior standing; Construction Management majors only.

Introduction to senior project processes, timelines, requirements, and best practices including topic selection, literature review, methodology, and paper formatting. 2 lectures.

CM 461. Senior Project I. 1 unit

Term Typically Offered: F, SP
Prerequisite: CM 460 and consent of project advisor. See department for additional guidelines and requirements.

Selection and completion of a comprehensive project under faculty supervision. Problems to involve the student's technical and creative skills. Student proposal must be submitted and approved by project advisor prior to registration for course. Construction and team projects encouraged.

CM 462. Senior Project II. 1 unit

Term Typically Offered: F, W, SP
Prerequisite: CM 460 and consent of project advisor. See department for additional guidelines and requirements.

Selection and completion of a comprehensive project under faculty supervision. Problems to involve the student's technical and creative skills. Student proposal must be submitted and approved by project advisor prior to registration for course. Construction and team projects encouraged.

CM 463. Senior Project: Professional Practice for Constructors. 3 units

Term Typically Offered: TBD
Prerequisite: CM 413. Corequisite: CM 443.

Practical application of construction management theory and practice solving problems related to the built environment. 3 laboratories.

CM 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

CM 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

CM 475. Real Property Development Principles. 4 units

Term Typically Offered: F, SP

Prerequisite: Minimum junior standing.

Development process and its major actors: investors, developers, government agencies, environmental and local stakeholders; their development roles, objectives, approaches. Basics of urban markets and economics, financing, regulation, public planning; value added, contractual, environmental and community context factors. 4 lectures.

CM 480. Preconstruction Integration and Planning. 2 units

Term Typically Offered: TBD

Prerequisite: CM 313.

Examination of the role of preconstruction services, team integration, and joint design planning in several Integrated Project Delivery (IPD) approaches. Various tools and techniques associated with preconstruction services and design planning from the proposal stage through the design stages of a project. 2 activities.

CM 485. Cooperative Education Experience. 1-6 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of instructor.

Full-time work experience in an area directly related to the construction industry for 3 months. Positions are paid and usually require relocation and registration in course for one quarter. Registration in course is required at start of work experience. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. May be repeated for credit. Major credit limited to 6 units; total credit limited to 12 units. See department for additional requirements.

CM 495. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Consent of instructor.

Full-time work experience in an area directly related to the construction industry for 6 months. Positions are paid and usually require relocation for two consecutive quarters. Registration in course is required at start of work experience. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. May be repeated for credit. Major credit limited to 6 units; total credit limited to 24 units. See department for additional requirements.

CM 510. Principles of Integrated Facility Management. 4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Examination of the facility management profession and all functions associated with it, including strategic planning, financial planning, budgeting, project management, operations and maintenance, sustainability, and emergency preparedness, and how those functions interface with the overall goals of the business enterprise. Course offered online only. 4 lectures.

CM 521. Construction Cost Estimating and Work Procurement. 4 units

Term Typically Offered: TBD

Prerequisite: Consent of program coordinator.

Examination of the construction discipline of cost estimating and pre-construction activities, emphasizing both the core and higher functions associated with types of estimates, measuring and pricing, bidding procedures and strategies, procurement, pre-construction services, budget, and cost control analysis. 4 lectures.

CM 522. Construction Planning, Scheduling, and Impact Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: Consent of program coordinator.

Examination of the construction discipline of planning, scheduling, management, and control relating to both core and higher functions associated with network diagram analysis, CPM scheduling, project diagnostics, short interval, resource loaded, pull scheduling, forecasting, and earned value management techniques. 4 lectures.

CM 523. Construction Contracts and Law. 4 units

Term Typically Offered: TBD

Prerequisite: Consent of program coordinator.

Examination of the discipline of law and contracts as they relate to the construction industry, including both the core and higher functions associated with the construction process, business organization, employment responsibilities, liability, damages, claims, dispute resolution, and risk management. 4 lectures.

CM 524. Construction Project Management and Control. 4 units

Term Typically Offered: TBD

Prerequisite: Consent of program coordinator.

Examination of the discipline of construction project management and control relating to both the core and higher functions associated with the construction process, pre-construction services, and management in the areas of safety, quality, resource, risk, schedule, budget, changes, and value. 4 lectures.

CM 525. Construction Workforce, Productivity, and Safety. 4 units

Term Typically Offered: TBD

Prerequisite: Consent of program coordinator.

Examination of the disciplines of workforce productivity and safety as they relate to the construction industry, including both the core and higher functions associated with field personnel management, construction operations, lean construction techniques, equipment utilization, productivity, and OSHA regulations. 4 lectures.

CM 570. Selected Advanced Topics in Construction Management. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed study of selected topics in Construction Management. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

CM 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

Dairy Science (DSCI)

undefined

DSCI Courses

DSCI 102. Dairy Operations and Safety. 2 units

Term Typically Offered: F, SP

Dairy farm biosecurity, animal handling and welfare, equipment operation, employee safety and hazard analysis. Instruction in standard operating procedures (SOP) relevant to milking, transition cow and calf management and cattle identification. 2 activities.

DSCI 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DSCI 202. Dairy Promotion and Marketing. 4 units

Term Typically Offered: F

Prerequisite: DSCI 230 and DSCI 231.

National and state dairy promotional programs, advertising and merchandising. Marketing and pricing of milk and dairy products at the state and national level. 4 lectures.

DSCI 229. General Dairy Manufacturing. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

Composition and properties of fluid milk and manufactured milk products. Chemistry and microbiology of dairy products. Processes and equipment involved in the manufacture of butter, cheeses, and other fermented dairy products, frozen, condensed, and dried dairy foods. 3 lectures, 1 laboratory. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs).

DSCI 230. General Dairy Husbandry. 4 units

Term Typically Offered: F, W, SP

Selection, breeding, feeding, and management of dairy cattle.

Composition and food value of dairy products. Milk pricing, political influences, dairy industry statistics and opportunities. Producing and handling products. Intended as introductory course for non-dairy science majors. 3 lectures, 1 laboratory.

DSCI 233. Milk Processing and Inspection. 4 units

Term Typically Offered: W

Prerequisite: DSCI 231, or FSN 125, or FSN 230.

Composition and properties of fluid milk and its constituents. Equipment used to handle, process, and distribute fluid milk and related products. California dairy codes used for dairy farms and plants, with practice inspections of dairy farms and factories. 3 lectures, 1 laboratory.

DSCI 241. Dairy Cattle Selection, Breeds, Fitting and Showing. 4 units

Term Typically Offered: SP

Prerequisite: DSCI 230.

Selection of dairy cattle on type conformation and the correlation between type and production. Dairy cattle breeds and breed comparisons. Techniques to properly condition, groom and present dairy cattle for evaluation and merchandising. 2 lectures, 2 activities.

DSCI 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

DSCI 301. Dairy Cattle Nutrition. 4 units

Term Typically Offered: F, SP

Prerequisite: ASCI 220 with a grade of C- or better or consent of instructor.

Nutrition principles to maximize milk production. Ruminant/post ruminant digestion, post absorptive metabolism, nutrient interactions and microbiology. Use of computer models to evaluate and formulate diets. 3 lectures, 1 activity.

DSCI 321. Lactation Physiology. 4 units

Term Typically Offered: F

Prerequisite: ASCI 220; DSCI 230; and BIO 111 or BIO 161.

Mechanisms of milk component secretion, including protein, lactose and fat metabolism. Disorders of the mammary gland (mastitis) and control strategies. Endocrine aspects of mammary gland development and lactogenesis. 4 lectures.

DSCI 330. Artificial Insemination and Embryo Biotechnology. 4 units

Term Typically Offered: F

Prerequisite: ASCI 229 or DSCI 230.

Techniques in the collection, evaluation and processing of semen, along with embryo culturing and manipulation. Insemination procedures, fertility problems, record keeping, estrous synchronization, endocrine control of reproduction, treating reproductive disorders and embryo transfer. 3 lectures, 1 laboratory.

DSCI 333. Dairy Animal Health, Safety and Applied Technology. 4 units

Term Typically Offered: W

Prerequisite: ASCI 220 and DSCI 230.

Application of principles of herd health, biosecurity, lactation physiology, cattle management and reproductive physiology to successful dairy operations. Assessment of animal comfort and general health and well-being. Practical techniques in safe animal handling. 3 lectures, 1 activity.

DSCI 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DSCI 401. Physical and Chemical Properties of Dairy Products. 4 units

Term Typically Offered: F

Prerequisite: Junior standing. Recommended: CHEM 312.

Composition, structure and properties of milk and milk products. Physical and chemical changes that occur during processing and storage of dairy products. Objective measurement of chemical and physical properties. 3 lectures, 1 laboratory.

DSCI 402. Quality Assurance and Control of Dairy Products. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing. Recommended: DSCI 444 or MCRO 421.

Current methods used to evaluate dairy products with respect to production plant economics and consumer safety. Accurate procedures for chemical and biological testing, appropriate product sampling protocols. Design and interpretation of HACCP programs for assuring product quality and safety. 3 lectures, 1 laboratory.

DSCI 410. Advanced Dairy Nutrition. 4 units

Term Typically Offered: SP

Prerequisite: ASCI 229; and ASCI 355 or DSCI 301.

Nutrient metabolism and diet formulation technologies for all classes of dairy cattle; whole-farm feed management; physiological and nutritional aspects of predominant metabolic disorders; on-farm auditing and troubleshooting of nutritional management. Field trip required. 3 lectures, 1 laboratory.

DSCI 412. Dairy Farm Consultation. 4 units

Term Typically Offered: W

Prerequisite: DSCI 333.

Student consultation teams of three or four students visit dairies and/or attend management training seminars followed by presenting management recommendations to the dairy owners, consultants, and other industry leaders. 1 seminar and supervised work.

DSCI 422. Breeding and Genetics of Dairy Cattle. 4 units

Term Typically Offered: SP

Prerequisite: DSCI 241, BIO 111 or higher, STAT 130 or higher.

Evaluation of inherited characteristics in dairy cattle, including principles of inheritance and genomic evaluations. Proving and selecting sires and dams, dairy genetic evaluations. 4 lectures.

DSCI 432. Advanced Dairy Herd Management. 4 units

Term Typically Offered: W

Prerequisite: DSCI 333.

Dairy herd management skills needed in dairy operations. Instruction and lab experience in management, records, labor, waste management, and milking management. 4 lectures.

DSCI 444. Dairy Microbiology. 4 units

Term Typically Offered: F

Prerequisite: DSCI 233; and MCRO 221 or MCRO 224; and STAT 130 or STAT 218; or graduate standing.

Microorganisms involved in the fermentation and ripening processes in the dairy industry, as well as those involved in spoilage of milk and dairy products, in the transmission of disease through these products, and indicator systems used to determine sanitary quality of these products. 3 lectures, 1 laboratory.

DSCI 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

DSCI 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

DSCI 500. Individual Study in Dairy Science. 1-6 units

Term Typically Offered: TBD

Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

Advanced independent study planned and completed under the direction of a member of the Dairy Science faculty. Total credit limited to 6 units.

DSCI 501. Dairy Chemistry. 3 units

Term Typically Offered: TBD

Prerequisite: CHEM 212 or CHEM 312; admission to Master of Professional Studies program in Dairy Products Technology.

Recommended: Differential and Integral Calculus.

Composition, structure/functional relationships and properties of milk, milk components and products. Physical, chemical and biochemical changes that occur during processing, storage and use of milk and milk components. Chemical, physical, functional and nutritional properties of milk components. 3 lectures.

DSCI 502. Dairy Chemistry Laboratory. 2 units

Term Typically Offered: TBD

Prerequisite: DSCI 501; admission to Master of Professional Studies program in Dairy Products Technology.

Objective measurements, analysis and isolation of milk components. Experimental demonstration of chemical and physical reactions of milk components during typical processing conditions. 2 laboratories.

DSCI 510. Dairy Foods: Issues and Practices. 2 units

Term Typically Offered: TBD

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology.

Contemporary issues in the dairy foods and allied industries. Consumer, political, environmental, regulatory, producer, technological, scientific, and economic considerations critical to future industry leaders. Required field trips to the dairy foods processing industry in California. 1 lecture, 1 activity.

DSCI 520. Dairy Processing and Manufacturing I. 3 units

Term Typically Offered: TBD

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology. Concurrent: DSCI 540.

Principles of unit operations involving heat and mass transfer including pasteurization and related thermal processes, centrifugal separation, concentration processes, churning and related high shear extrusion, fractionation processes, freezing, and drying technologies. Pneumatic and mechanical devices and systems. 2 lectures, 1 laboratory.

DSCI 521. Dairy Processing and Manufacturing II. 4 units

Term Typically Offered: TBD

Prerequisite: DSCI 520; admission to Master of Professional Studies program in Dairy Products Technology.

Unit operations in process systems for the efficient manufacture of fluid milk products, cream, butter, and concentrated milk. Process variables and their control, system integration. Use of processes to manipulate physical and chemical properties to influence product quality. 3 lectures, 1 laboratory.

DSCI 524. Dairy Processing and Manufacturing III. 4 units

Term Typically Offered: TBD

Prerequisite: DSCI 520 and admission to Master of Professional Studies program in Dairy Products Technology.

Unit operations in process systems for the manufacture of fermented milk, cheese, frozen desserts, and dried milk and whey products. 3 lectures, 1 laboratory.

DSCI 535. Dairy Foods Ingredient Functionality. 4 units

Term Typically Offered: TBD

Prerequisite: DSCI 501 and admission to Master of Professional Studies program in Dairy Products Technology.

Physical, chemical, and sensory properties of functional milk components when used in food products. 3 lectures, 1 laboratory.

DSCI 539. Graduate Internship in Dairy Science. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology and consent of instructor.

Practical work experience and management assignments in a dairy food processing company. Credit/No Credit grading only.

DSCI 540. Graduate Dairy Microbiology. 4 units

Term Typically Offered: TBD

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology. Concurrent: DSCI 520. Recommended: MCRO 221 or equivalent.

Raw milk microbiological principles, pasteurization and microorganisms in dairy foods safety, microbiological analysis of dairy products, fermented milks and cheese, starters and probiotics, commercial practices and sources of information for regulation on microbial aspects of dairy foods. 2 lectures, 2 laboratories.

DSCI 541. Quality Assurance, Quality Control and Food Safety. 4 units

Term Typically Offered: TBD

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology.

Concepts and methodologies used in dairy industry and dairy food plants for assurance and control of the quality of finished product. Basis for understanding physical, chemical and microbiological methods as they apply to quality evaluation of dairy foods. 3 lectures, 1 laboratory.

DSCI 560. Recent Developments in Dairy Science and Technology. 1-3 units

Term Typically Offered: TBD

Prerequisite: Senior or graduate standing and approval of instructor.

Presentation and critical review of current research publications. Methodological advances and applications in dairy food systems. The Class Schedule will list topic selected. Total credit limited to 6 units. 1 to 3 seminars.

DSCI 565. Industrial Plant Considerations for Sustainable Operation. 4 units

Term Typically Offered: TBD

Prerequisite: DSCI 520; admission to Master of Professional Studies program in Dairy Science Technology.

Plant site selection considerations, project management, plant design and layout, management of productivity maintenance, plant improvement project selection criteria, working with regulatory environment, community relations, and personal safety for overall industrial plant sustainability. 3 lectures, 1 activity.

DSCI 570. Selected Topics in Dairy Science. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

DSCI 571. Selected Advanced Laboratory in Dairy Science. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

DSCI 581. Graduate Seminar in Dairy Science. 1-3 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology.

Current challenges in the field and their application to industry. Group study of industry issues. Current research findings as applied to production, leadership and marketing. Total credit limited to 3 units. Credit/No Credit grading only. 1 to 3 seminars.

DSCI 582. Dairy Processing and Plant Management. 2 units

Term Typically Offered: TBD

Prerequisite: Admission to Master of Professional Studies program in Dairy Products Technology.

Dairy plant operation, processing experience and production team dynamics. Practical training and experience in dairy plant operations to allow efficient, safe and sanitary processing of dairy products manufacture in a team environment. Total credit limited to 4 units. 2 laboratories.

DSCI 585. Cooperative Education Experience in Dairy Science. 1-6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study, analysis and part-time work experience in the field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only.

DSCI 599. Thesis in Dairy Science. 1-9 units

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Systematic research of a significant problem in Dairy Science. Problem identification, significance, methods, data analysis, and conclusion. Enrollment required every quarter in which facilities are used or advising is received. Total credit limited to 9 units.

Dance (DANC)

undefined

DANC Courses

DANC 130. Pilates and Conditioning Fundamentals. 2 units

Term Typically Offered: F

Introduction to the Pilates method and conditioning fundamentals. Exploration and practice of physical fitness, and the maintenance of a uniformly developed body. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 131. Beginning Ballet. 2 units

Term Typically Offered: F, W, SP

Fundamentals of ballet technique stressing alignment, turnout, basic positions and terminology. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 132. Beginning Modern Dance. 2 units

Term Typically Offered: F, W, SP

Fundamentals of modern technique stressing alignment, use of torso, floor work, movement phrases, and improvisation exercises. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 133. Beginning Jazz Dance. 2 units

Term Typically Offered: W, SP

Introduction of jazz dance techniques stressing a variety of styles, alignment, isolation, polyrhythms, syncopation, improvisation and presentation of dance phrases. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 134. Beginning Ballroom Dance. 2 units

Term Typically Offered: TBD

Focus on one or more selected ballroom dances including Cha-Cha, Foxtrot, Merengue, Rhumba, Samba, Swing, Tango, and/or Line Dances. Emphasis on alignment, etiquette, leading and following, history, performance techniques and presentation of dance phrases. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 135. International Folk Dance. 2 units

Term Typically Offered: SP

Introduction to international folk dances including round, longway, and square sets. Study of various dance steps, formation, positions, historical and cultural background. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 210. Active Wellness. 4 units

Term Typically Offered: TBD

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

Investigation of health and wellness ideologies and techniques through active participation in personalized fitness circuits and lectures. Basic elements of fitness, injury prevention, nutrition are presented to help students activate optimum health now and in the future. 3 lectures, 1 activity. Fulfills GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

DANC 221. Dance Appreciation. 4 units

Term Typically Offered: SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Introductory survey of major experiments in dance. Examination of history, philosophy, aesthetics, cultural context and criticism of diverse dance genres. Focus on major western dance artists from the 19th century to the present. Purchase of concert ticket(s) may be required. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

DANC 231. Intermediate Ballet. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Intermediate level experience as determined by instructor prior to add/drop deadline.

Continuation of training in basic technical skills in ballet stressing phrasing, performance, and more complex step patterns. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 232. Intermediate Modern Dance. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Intermediate level experience as determined by instructor prior to add/drop deadline.

Continuing study of DANC 132 with emphasis on various movement styles, phrasing, more complex step patterns, and performance. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 233. Intermediate Jazz Dance. 2 units

Term Typically Offered: F, W

Prerequisite: Intermediate level experience as determined by instructor prior to the add/drop deadline.

Continuation of DANC 133 with emphasis on more extensive movement vocabulary. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 234. Intermediate Ballroom Dance. 2 units

Term Typically Offered: TBD

Prerequisite: DANC 134 or intermediate level experience as determined by instructor prior to the add/drop deadline.

Continuation of DANC 134. Selected ballroom dances: cha cha, foxtrot, merengue, rumba, swing, tango, hustle, paso doble, polka and samba. Emphasis on variations, styles, and performance skill. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

DANC 280. Body Awareness and Expression. 4 units

Term Typically Offered: TBD

Directed group study of movement techniques and exercises to facilitate expressive physical performance. Body effectiveness, alignment and conditioning practice integrated with creative exploration and movement analysis of effort, spatial awareness and detailed body usage. 4 lectures. Crosslisted as DANC/TH 280.

DANC 321. Cultural Influence on Dance in America. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

Multicultural approach to history of dance in America, with emphasis on American Indian, West African, Caribbean, Mexican, European, and Asian contributions and influences. Explores culture through dance. Purchase of concert ticket(s) required. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

DANC 331. Advanced Ballet and Repertory. 2 units

Term Typically Offered: F

Prerequisite: DANC 231 or intermediate level experience as determined by instructor prior to the add/drop deadline.

Advanced ballet technique and reconstruction of historical ballet repertoires from the romantic, classical, neoclassical, and modern periods. Participation in dance performance of selected repertory. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 332. Contemporary Dance Repertory. 2 units

Term Typically Offered: F

Prerequisite: Intermediate level experience as determined by instructor prior to the add/drop deadline.

Intermediate to advanced dance skills learned through the study and performance of selected contemporary dance repertory. Explores concepts in advanced performance technique through formal and informal presentation in performance situations. Purchase of concert ticket(s) may be required. Total credit limited to 6 units. 2 activities.

DANC 340. Dance Composition. 4 units

Term Typically Offered: W

Prerequisite: Intermediate level experience as determined by instructor prior to the add/drop deadline.

Principles of dance composition. Exploration of creative potential and development of movement motifs through choreographic studies. Preparation for informal public presentation of student generated choreographic works. Purchase of concert ticket(s) may be required. Total credit limited to 8 units. 1 lecture, 1 laboratory, 2 activities.

DANC 341. Dance Concert Practicum. 2 units

Term Typically Offered: SP

Prerequisite: consent of instructor.

Advanced practical application of choreography and dance concert production. Production of the student-produced Spring Dance Concert will be developed and executed. Investigation of complete choreographic work via peer and faculty review. Total credit limited to 8 units. 2 laboratories.

DANC 345. Choreography/Workshop in Dance Concert Preparation. 4 units

Term Typically Offered: F

Prerequisite: By audition only.

Workshop in concert preparation for major public dance production. Exploration and process of concert dance choreography. Purchase of concert ticket(s) may be required. Total credit limited to 16 units. 4 laboratories.

DANC 346. Dance Production. 1-4 units

Term Typically Offered: W

Prerequisite: One of the following: DANC 332, DANC 331, or DANC 345.

Directed production of annual Orchesis Dance Company Concert and other public performances. Attendance of professional dance concert(s) required. Purchase of concert ticket(s) may be required. Total credit limited to 16 units. 1-4 laboratories.

DANC 381. Dance Teaching Methods for Dance Minors. 4 units

Term Typically Offered: SP

Prerequisite: Consent of Instructor.

Dance skills and techniques. Experience in selected dance forms. Rhythmic structure and analysis of dance steps. Includes introduction to dance pedagogy, curricular materials and evaluative procedures. Purchase of concert ticket(s) may be required. 2 lectures, 2 activities.

DANC 400. Special Problems. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor and department head.

Individual investigation, research and studies or survey of selected problems in dance and related areas. Total credit limited to 8 units with a maximum of 4 units per quarter.

DANC 430. Advanced Selected Techniques. 2 units

Term Typically Offered: SP

Prerequisite: Consent of instructor.

Directed study of selected topics for advanced dance students. Focus on advanced level technique, style, concepts and choreography of classical and contemporary dance forms. The Class Schedule will list topic selected. Total credit limited to 8 units. 2 activities.

DANC 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed study of selected topics for advanced dance students. The Class Schedule will list topics selected. Total credit limited to 8 units. 1 to 4 lectures.

DANC 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for dance students. The Class Schedule will list topics selected. Total credit limited to 8 units. 1 to 4 laboratories.

Data Science (DATA)

undefined

DATA Courses

DATA 301. Introduction to Data Science. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 202; and one of the following: IME 326, STAT 302, STAT 312, or STAT 313.

Introduction to the field of data science and the workflow of a data scientist. Types of data (tabular, textual, sparse, structured, temporal, geospatial), basic data management and manipulation, simple summaries, and visualization. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

DATA 401. Data Science Process and Ethics. 3 units

Term Typically Offered: F

Prerequisites: DATA 301; CSC 365; and CSC 466. Concurrent: DATA 402 and DATA 403.

Complete life cycle of a data science project. Requirements engineering and data acquisition. Management and integration of data of high volume, velocity, and variety. Deployment of data science products. Engagement with stakeholders. Ethical considerations, including privacy and fairness. 3 lectures.

DATA 402. Mathematical Foundations of Data Science. 3 units

Term Typically Offered: F

Prerequisites: CSC 466; DATA 301; and STAT 334. Concurrent: DATA 401 and DATA 403.

Mathematical foundations of machine learning and data science. Principle of maximum likelihood. Inferential and predictive modeling and their comparison. Optimization techniques. Linear regression and linear classifiers. Mathematical foundations of neural networks and neural network analysis. Dimensionality reduction and its use in supervised and unsupervised learning. 3 lectures.

DATA 403. Data Science Projects Laboratory. 1 unit

Term Typically Offered: F

Concurrent: DATA 401 and DATA 402.

Project-based lab component of DATA 401 and DATA 402. Projects involving comparison of predictive and interpretable regression models, implementing linear classifiers with gradient descent, implementing neural networks from scratch, and deep learning. 1 laboratory.

DATA 441. Bioinformatics Capstone I. 2 units

Term Typically Offered: W

Prerequisite: BIO 351 or CHEM 373; BIO 441 or CSC 448; DATA 301.

Working with clients to design bioinformatics solutions to biological questions. Software requirements, elicitation techniques, data gathering, project planning, and project team organization. Ethics and professionalism. 2 laboratories.

DATA 442. Bioinformatics Capstone II. 2 units

Term Typically Offered: SP

Prerequisite: DATA 441.

Continue projects initiated in DATA 441. Team-based design, implementation of bioinformatics solutions and management of development teams. Technical documentation, quality assurance, and systems testing. Design and conduct empirical studies. Data visualization. Oral and written presentation. 2 laboratories.

DATA 451. Data Science Capstone I. 2 units

Term Typically Offered: W

Prerequisite: DATA 401.

Working with clients to develop data-driven solutions for systems to be constructed in DATA 452. Specification and design requirements, elicitation techniques, research and data gathering methods; project planning, time and budget estimating; project team organization. Ethics and professionalism. 2 laboratories.

DATA 452. Data Science Capstone II. 2 units

Term Typically Offered: SP

Prerequisite: DATA 451.

Team-based design, implementation, deployment and delivery of a system or analytical methodology that involves working with and analyzing large quantities of data. Technical management of research and development teams. Technical documentation, quality assurance, integration and systems testing. Design and conduct of empirical studies. Visualization and presentation of results orally and in writing. 2 laboratories.

DATA 472. Data Science Seminar. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: DATA 301.

Discussions of technical, societal and ethical aspects of modern data science theory and practice, concentrating on topics not covered in other courses. 1 seminar. Total credit limited to 4 units. Credit/No credit grading only.

Early Start English (ESE)

undefined

ESE Courses

ESE 105. Early Start English. 1 unit

Term Typically Offered: SU

CR/NC

Review of fundamental written communication skills; guided discussion of and reflection on the ways in which students interact with and produce texts; practice employing rhetorical strategies to meet the purpose, context, and audience expectations of a writing task. For students required to fulfill the CSU Early Start Program. 1 unit for baccalaureate credit. Credit/No Credit grading only. 1 activity.

Early Start Math (ESM)

undefined

ESM Courses

ESM 90. Early Start Program: Mathematics Workshop. 1.5 units

Term Typically Offered: SU

CR/NC

Prerequisite: Appropriate Math Placement Level. Concurrent: ESM 105.

Review of basic algebra skills intended for students who need to meet the CSU Early Start Program (ESP) requirement. Not for baccalaureate credit. Credit/No Credit grading only.

ESM 105. Early Start Program: Mathematics. 1 unit

Term Typically Offered: SU

CR/NC

Prerequisite: Appropriate Math Placement Level. Concurrent: ESM 90.

Review of basic algebra skills and an introduction to functions intended for students who need to meet the CSU Early Start Program (ESP) requirement. 1 unit for baccalaureate credit. Credit/No Credit grading only. Course may be offered in hybrid format. 1 lecture.

Earth Science (ERSC)

undefined

ERSC Courses

ERSC 144. Introduction to Earth Science. 4 units

Term Typically Offered: F

Survey of fundamental processes of Earth science. Application of systems thinking to understand the dynamic interactions among geologic, hydrological, biological, and atmospheric components of the Earth system. Explore how geographic, soil, and human factors shape the Earth. Field trip required. 3 lectures, 1 laboratory.

ERSC 223. Rocks and Minerals. 4 units

Term Typically Offered: W

Prerequisite: SS 120; and CHEM 124 or CHEM 127.

Origin, composition, identification and weathering of rocks, minerals, and clays important in the development of soils. Parent materials as related to the nature and properties of soils. 3 lectures, 1 laboratory.

ERSC 250. Physical Geography. 4 units

Term Typically Offered: F, W

Sustainability Related

Addresses the origins and patterns of the earth's diverse assemblage of climates, landforms, biota and soils. A major focus on relationship between human cultures and these earthly environments. 4 lectures. Crosslisted as ERSC/GEOG 250.

ERSC 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 lectures. Crosslisted as ERSC/SS 270.

ERSC 303. Soil Erosion and Water Conservation. 4 units

Term Typically Offered: F

Prerequisite: LA/NR 218 or GEOG 318; and SS 120.

Evaluation of soil and water conservation with application toward agriculture, rangeland, and urban land uses. Study of process, regulation, and best management practices for soil erosion, water quality, and stormwater. Development of stormwater pollution prevention or farm water quality plans to meet regulatory requirements. 3 lectures, 1 activity.

ERSC 325. Climate and Humanity. 4 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: Junior standing.

Geographic perspective on the interrelationships between climate and human cultures. Effects of people on climate and the influence of climate and weather upon human activities and behavior. Focus on global human conditions which are responsible for the alteration of climate and in turn are vulnerable to climate change. 4 lectures. Crosslisted as ERSC/GEOG 325.

ERSC 333. Human Impact on the Earth. 4 units

Term Typically Offered: F, W

Sustainability Focused

Prerequisite: Junior standing.

Global assessment of the impact of humans on the earth's vegetation, animals, soil, water and atmosphere. Emphasis on problems stemming from the interactions of human attitudes, technologies, and population with natural resources. 4 lectures. Crosslisted as ERSC/GEOG 333.

ERSC 335. Soil, Water, and Civilization. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Explore past civilizations and how management of soil, water, and other natural resources allowed them to flourish, decline, or fail. Sustainability of natural resource use in modern/future societies. Issues include sustainability, agricultural practices, deforestation, water quality, and land management. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ERSC 339. Internship in Environmental Earth and Soil Sciences. 1-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of internship instructor.

Selected students will spend up to 12 weeks with an approved firm or agency engaged in work and study related to their major. A detailed written proposal and written interim and final reports required. One unit of credit may be allowed for each full week of internship. Credit/No Credit grading. Crosslisted as ERSC/SS 339.

ERSC 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 12 units. Crosslisted as ERSC/SS 400.

ERSC 414. Global and Regional Climatology. 4 units

Term Typically Offered: TBD

Sustainability Related

Prerequisite: Junior standing.

The earth's pattern of climates and the physical processes that account for them. Focus on interrelationships between climate and the physical/biological and cultural environments. Special emphasis on modern climate changes and their consequences. 3 lectures, 1 laboratory. Crosslisted as ERSC/GEOG 414.

ERSC 415. Applied Meteorology and Climatology. 4 units

Term Typically Offered: W

Prerequisite: ERSC/GEOG 250.

Physical processes in the atmosphere that determine regional weather, climate and climate variability. Surface and satellite systems for weather observation, and weather/climate modeling. Dynamics of weather systems, including thunderstorms and hurricanes. Emphases on weather/climate affecting agriculture and other human activities. 3 lectures, 1 activity. Crosslisted as ERSC/GEOG 415.

ERSC 416. Field-Geology Methods. 4 units

Term Typically Offered: W

Prerequisite: GEOL 102 or GEOL 201; and GEOL 415.

Collecting and interpreting field-geologic data. Description of sedimentary rocks and construction of stratigraphic columns. Mapping geologic structures in the field. Surficial geologic stratigraphy and surficial geologic mapping. Understanding geologic processes through field study. Communicating results of field study. 1 lecture, 3 activities. Crosslisted as ERSC/GEOL 416. Formerly ERSC/GEOL 401.

ERSC 417. Geologic Mapping. 4 units

Term Typically Offered: SP

Prerequisite: ERSC/GEOL 401 or ERSC/GEOL 416.

Bedrock geologic mapping on topographic maps and aerial photos. Surficial geologic mapping on topographic maps and aerial photos. Correlating and defining surficial geologic map units on the basis of soil development. Understanding landscape evolution using soil development 4 activities. Crosslisted as ERSC/GEOL 417. Formerly ERSC/GEOL 402.

ERSC 423. Geomorphology. 4 units

Term Typically Offered: F

Prerequisite: GEOL 201.

Evaluation of processes shaping landscapes. Field-based production of surficial geologic maps. Field, aerial photograph, and topographic map analysis to assess processes shaping landscapes. Interpretation of landforms and landform relationships. Understanding how tectonics and climate influence landscapes. Fundamentals of soil geomorphology. Field trip required. 2 lectures, 1 laboratory, 1 activity.

ERSC 442. Applied Environmental Groundwater Hydrology. 4 units

Term Typically Offered: F

Prerequisite: ERSC 144 or GEOL 201; MATH 141 or MATH 161; and SS 120.

Applied field methods of vadose zone and groundwater flow modeling, resource evaluation, confined and unconfined aquifer characterization, well installation and groundwater monitoring. Introduction to groundwater modeling software including MODFLOW and AQTESOLV. 3 lectures, 1 laboratory. Formerly SS 442.

ERSC 443. Applied Environmental Contaminant Transport. 4 units

Term Typically Offered: TBD

Sustainability Related

Prerequisite: CHEM 125 or CHEM 128; ERSC 144 or GEOL 201; MATH 141 or MATH 161; and SS 120.

Applied study of mechanisms of fate and transport of contaminants in soils and groundwater. Field methods and technologies of soil and groundwater sampling and site characterization. Representative conceptual and mathematical models, case studies, laboratory study of breakthrough behavior, and remediation technologies. Field trip required. 3 lectures, 1 laboratory.

ERSC 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule list topic selected. Total credit limited to 12 units. 1 to 4 lectures. Crosslisted as ERSC/SS 470.

ERSC 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories. Crosslisted as ERSC/SS 471.

ERSC 476. Senior Project - Advanced Internship Experience in Environmental Science/Management. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Independent internship experience conducted under faculty supervision focusing on a discipline area of environmental science/management. Completion of a project as a component of their internship. Satisfies the senior project requirement. Minimum 90 hours required. Crosslisted as ERSC/NR 476.

ERSC 477. Senior Project - Research Experience in Environmental Science. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Guided research experience in a specific area of environmental science. Implementation of materials and methods. Collection, analysis and interpretation of data. Completion of formal written report. Satisfies senior project requirement. 1 lecture, 2 laboratories. Crosslisted as ERSC/NR 477.

ERSC 478. Senior Project - Current Topics in Environmental Science/Management. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Critical evaluation and formal presentation of current issues in environmental science/management. Evaluation of current topics, analysis of supporting evidence, and synthesis and presentation of resulting perspectives on different approaches to current challenges in environmental science/management. Satisfies the senior project requirement. 3 lectures. Crosslisted as ERSC/NR 478.

ERSC 479. Senior Project - Independent Study. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; ERSC 363 or NR 306 or NR 326; and consent of instructor.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time. Crosslisted as ERSC/NR 479.

ERSC 570. Selected Topics in Earth Science. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

ERSC 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

Economics (ECON)

undefined

ECON Courses

ECON 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: TBD

Prerequisite: Sophomore standing and consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ECON 201. Survey of Economics. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Basic principles of microeconomics and macroeconomics. Emphasis on applications to current local, national and global economic issues. Not open to student with credit in ECON 222. Course may be offered in classroom-based or hybrid format. 4 lectures. Crosslisted as ECON/HNRS 201. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

ECON 202. Using Big Data to Solve Economic and Social Problems. 4 units

Term Typically Offered: F, SP

Introduction to basic methods in empirical economic analysis, including regression, causal inference, and machine learning. Applications of the methods to equality of opportunity, education, racial disparities, innovation and entrepreneurship, health care, climate change, criminal justice, and tax policy. Course may be offered in classroom-based or hybrid format. 4 lectures.

ECON 221. Microeconomics. 4 units

Term Typically Offered: F, W, SP

Microeconomic principles. Marginal and equilibrium analysis of commodity and factor markets in determination of price and output. Normative issues of efficiency and equity. 4 lectures.

ECON 222. Macroeconomics. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Introduction to macroeconomics including aggregate output, employment, inflation, and economic growth. Money and the monetary system. Macroeconomic policy including fiscal and monetary policy. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

ECON 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ECON 303. Economics of Poverty, Discrimination and Immigration. 4 units

Term Typically Offered: F,W,SPSU

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and ECON 201 or ECON 222.

Economic analysis of the cause, extent and impact of poverty, discrimination and immigration and of the policies designed to address these socioeconomic issues. Emphasis on the experience of African-Americans, Latinos, and women in the United States. 4 lectures. Crosslisted as ECON/HNRS 303. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

ECON 304. Comparative Economic Systems. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and ECON 201 or ECON 222.

Analysis of economic systems as a set of mechanisms and institutions for decision making, and the implementation of decisions regarding income distribution, the levels of consumption and production, and the level of economic welfare. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

ECON 311. Intermediate Microeconomics I. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ECON 201 or ECON 221; and MATH 141 or MATH 221.

Consumer behavior and the theory of demand; production, cost, supply functions; perfect competition; monopoly and oligopoly; labor markets. 4 lectures.

ECON 312. Intermediate Microeconomics II. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ECON 311.

Game theory; risk, uncertainty and information; choice over time; asset markets; general equilibrium; welfare economics, externalities and public goods. 4 lectures.

ECON 313. Intermediate Macroeconomics. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ECON 201 or ECON 222. Corequisite: ECON 311.

Study of the macroeconomy, macroeconomic theories, and macroeconomic policies. Nature of growth. Business cycles. Money and inflation. Fiscal policy. Monetary policy. Financial crises. 4 lectures.

ECON 330. International Trade Theory. 4 units

Term Typically Offered: W

Prerequisite: Either ECON 221 and ECON 222, or ECON 201.

Theory of comparative advantage, gains from trade, and recent developments in trade theory; examination of tariffs, quotas, exchange controls, other trade barriers and underlying policy issues; review of U.S. commercial policy, GATT, the common market, regional and world economic organizations. 4 lectures. Not open to students with credit in ECON 404 or equivalent.

ECON 337. Money, Banking and Credit. 4 units

Term Typically Offered: F, W

Prerequisite: Either ECON 221 and ECON 222, or ECON 201.

Financial markets and institutions. Structure of the banking industry and impacts of technological change in banking. Structure and operations of the Federal Reserve. Impacts of monetary policy on the economy. 4 lectures.

ECON 339. Econometrics. 4 units

Term Typically Offered: F, W, SP

Prerequisite: either ECON 221 and ECON 222; or ECON 201; MATH 141 or MATH 221, and STAT 252 or STAT 302.

Application of statistical methods useful in economics. General linear regression model. Specific issues and problems related to economic models: multicollinearity, autocorrelation, heteroscedasticity, dummy variables, lagged variables, and simultaneous equation estimation. Application and evaluation of selected examples of empirical economic research. Microcomputer applications. 4 lectures.

ECON 345. Environmental and Natural Resource Economics. 4 units

Term Typically Offered: TBD

Prerequisite: ECON 201; or ECON 221 and ECON 222.

Economics of environmental resource management. Conservation, sustainability, and dynamic efficiency in natural resources. Effects of property rights and economic incentives on environmental and economic systems. Design of local and global environmental policies to align market outcomes with social welfare goals. 4 lectures. Not open to students with credit in ECON 431, ECON 432 or equivalent.

ECON 395. Programming for Economics and Analytics. 4 units

Term Typically Offered: F, W

Prerequisite: Junior standing; STAT 252 or STAT 302.

Basic principles of algorithmic problem solving and computer programming for economics and business analytics applications. Functions, iteration, recursion, and data structures. Testing and debugging. Design of algorithms and algorithmic complexity. Stochastic programs. Graph optimization. Credit will only be granted in one of the following courses: CSC 108, CSC 202, ECON 395. 4 lectures.

ECON 400. Special Problems. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

ECON 403. Industrial Organization. 4 units

Term Typically Offered: W

Prerequisite: ECON 312.

Application of basic tools of economics to American Industry. Case studies of individual firms and industries. Performance of various business structures, such as monopoly and oligopoly. Effects of government regulation and antitrust policy. 4 lectures.

ECON 404. International Trade Theory. 4 units

Term Typically Offered: TBD

Prerequisite: ECON 312.

Theory of comparative advantage, neoclassical model of trade, offer curves and terms of trade, edgeworth boxes, valuation of factor inputs, effects of migration and mobility of funds, emerging growth and trade distortions, welfare effects of trade, and recent developments in trade theory. 4 lectures.

ECON 405. International Monetary Economics. 4 units

Term Typically Offered: SP

Prerequisite: ECON 313.

Nature of international payments, U.S. balance of payments. Theory and practice of foreign exchange rate determination under the gold standard, paper standard, and IMF system; international money and capital markets; problems of international liquidity and monetary stability. 4 lectures.

ECON 406. Applied Forecasting. 4 units

Term Typically Offered: TBD

Prerequisite: ECON 339.

Use of economic, financial, and other time series data to construct and evaluate forecasts. Forecasting methods including regression-based models, exponential smoothing, ARIMA and the GARCH family of models. 4 lectures.

ECON 408. Mathematical Economics. 4 units

Term Typically Offered: SP

Prerequisite: ECON 312.

Applications of quantitative techniques to topics in microeconomic and macroeconomic theory. Use of multivariate calculus and linear algebra in formulating static economic models. Applications of statistical inference, estimation and forecasting in economic models. 4 lectures.

ECON 409. Probability Models for Economic Decisions. 4 units

Term Typically Offered: F

Prerequisite: ECON 312.

Decision making in complex, realistic situations. Simulation of random variables in Excel. Risk aversion. Subjective assessment of probabilities and correlations. Decision trees. Optimal bidding in auctions. The winner's curse. Moral hazard and risk sharing. Repeated investment decisions under risk. 4 lectures.

ECON 410. Public Finance and Cost-Benefit Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: ECON 312 or graduate standing.

Principles of rational decision making with respect to government revenues and spending. Measurement of costs and benefits, and criterion selection. Taxation, user fees, deficit financing, public goods, neighborhood effects and zoning. Microcomputer applications. 4 lectures.

ECON 413. Labor Economics. 4 units

Term Typically Offered: F

Prerequisite: ECON 312.

Wage determination theory, basic economic factors that affect the labor movement, economic impact of union activities on employment, output, income, wages, prices, and national economic policy. 4 lectures.

ECON 417. Development of Economic Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: ECON 311.

Analysis of ideas related to the development of economic theory in the Western civilization from the Greeks through the classical, neoclassical, and Keynesian to the current post-Keynesian concepts. 4 lectures.

ECON 424. Monetary Economics. 4 units

Term Typically Offered: TBD

Prerequisite: ECON 313.

The role of money in our economy. Focus on the links between monetary policy, interest rates, prices, housing markets, mortgage lending and overall economic activity. Public policy issues relating to real estate markets. 4 lectures.

ECON 431. Environmental Economics. 4 units

Term Typically Offered: F

Sustainability Focused

Prerequisite: ECON 312.

Economic dimensions of environmental abuse and protection. Use of simple economic models in developing and evaluating environmental policies. Overview of current environmental problems. Issues related to the sustainability of economic growth at the national and international levels. 4 lectures.

ECON 432. Economics of Energy and Resources. 4 units

Term Typically Offered: W

Sustainability Focused

Prerequisite: ECON 312 or graduate standing.

Economic theory and public policies as applied to problems of natural resources and energy. Dynamic resource and energy models developed with reference to public and private sector growth. Application of the principles of capital theory emphasized. Case studies. Computer software applications in the study of natural resources and energy under uncertainty. 4 lectures.

ECON 434. Urban Economics. 4 units

Term Typically Offered: W

Prerequisite: ECON 311. Recommended: ECON 312.

Application of basic tools of economic analysis to problems of urban regions. Causes and possible cures for inadequate growth rate, income levels, and the quality of life in urban regions. 4 lectures.

ECON 435. Economics of Land and Water. 4 units

Term Typically Offered: TBD

Prerequisite: ECON 312 or graduate standing.

Economic analysis of natural resource issues, policies and management with an emphasis on land and water use decisions in the western U.S. Urban demand for water; water supply and economic growth; economic impacts of surface water law and institutions; economics of land management. 4 lectures.

ECON 440. Advanced Econometrics. 4 units

Term Typically Offered: F, SP

Prerequisite: ECON 339.

Modern advanced econometric techniques with a special focus on those commonly used in academic and non-academic settings. Discrete dependent variable models, instrumental variables, causal inference, nonlinear estimation, panel data, seemingly unrelated regression, distributed lag models, cointegration, and error correction models. 4 lectures.

ECON 445. Experimental and Behavioral Economics. 4 units

Term Typically Offered: SP

Prerequisite: ECON 312 and ECON 395.

Design and implementation of economic experiments including computer programming and statistical methods for experimental analysis. Behavioral economic models as an alternative to neoclassical economics including prospect theory, time-inconsistent preferences, and social preferences. 4 lectures.

ECON 460. Research Methodology in Applied Economics. 4 units

Term Typically Offered: F, W

Prerequisite: ECON 313; ECON 339 and Senior standing.

Theory and practice of the development of economic analysis. Steps in the formulation and execution of an economics research project. 4 lectures.

ECON 461. Senior Project I. 2 units

Term Typically Offered: TBD

Prerequisite: ECON 313 and senior standing.

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time.

ECON 462. Senior Project II. 2 units

Term Typically Offered: TBD

Prerequisite: ECON 313 and senior standing.

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time.

ECON 464. Applied Senior Project. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing and two 400-level ECON courses other than ECON 460. Corequisite: ECON 460.

Analysis of selected economic topics and problems in directed individual or group-based projects, which require application of economic models, principles and theory to investigate important business, economic or social issues. Formal report required. 4 seminars.

ECON 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ECON 519. Econometrics and Data Analysis. 4 units

Term Typically Offered: F

Prerequisite: GSE 518. Corequisite: GSE 524.

Identification and estimation of linear and nonlinear regression models for analyzing business data. Topics include multiple linear regression; model selection; robust standard errors; instrumental variables; maximum likelihood estimation; logit/probit, ordered logit/probit, and other microeconomic models. 4 lectures.

Education (EDUC)

undefined

EDUC Courses

EDUC 125. First Year Seminar. 2 units

Term Typically Offered: TBD

CR/NC

Issues associated with the successful transition from high school or community college to Cal Poly. Links fostered between student needs and campus resources. Coverage of academic policies and procedures, university study skills, goal setting, career planning, wellness and other topics relevant to student success. Not open to students with credit in UNIV 100. Credit/No Credit grading only. 1 lecture, 1 activity. Crosslisted as EDUC/UNIV 125.

EDUC 207. Children's Learning and Development in Educational Settings. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Sophomore standing; PSY 201 or PSY 202 or admission to the university with the intent to enter the MSTEP Program.

Study of theories and research about the development and learning of children and young adolescents within diverse backgrounds, and application to teaching in public school settings. Observations/interactions with children in school settings. 3 lectures, 1 activity. Participation in public schools requires mandated fingerprint clearance. Crosslisted as CD/EDUC 207.

EDUC 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

EDUC 300. Historical, Philosophical, and Social Foundations of Public Education. 3 units

Term Typically Offered: F, W, SP
Prerequisite: Junior standing.

Historical, philosophical, and social foundations of public education in relation to school curriculum, instruction and dispositions of effective teachers. Structured observation and participation in K-12 public schools with attention to instructional practices for diverse learners. 2 lectures, 1 activity. Participation in public schools requires mandated fingerprint clearance.

EDUC 400. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: TBD
Prerequisite: Junior standing and consent of instructor.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

EDUC 402. Learning to Teach K-8 Health and Physical Education with Diverse Populations. 3 units

Term Typically Offered: W, SP
Prerequisite: Admission to the Multiple Subject Teacher Preparation Program.

Subject-specific instructional methodologies in Health and Physical Education (PE). Design and implementation of elementary school instruction to address state-adopted content standards for Health and Physical Education in the State of California. Course may be offered in classroom-based or online format. 2 lecture, 1 laboratory.

EDUC 403. Developing Teachers of Color. 4 units

Term Typically Offered: SP
Prerequisite: Junior standing. Recommended: Lower-division Ethnic Studies (ES) course in GE Area F.

Developing and supporting teachers of Color in elementary and secondary (K-12) education. Focus on the structural factors associated with underrepresentation of teachers of Color, culturally sustaining pedagogies, and resources to support teachers of Color. 4 seminars.

EDUC 405. Social, Historical and Cultural Influences on Latino/a Students in Education. 4 units

Term Typically Offered: SP
Prerequisite: SPAN 202 with a grade of B or better; or appropriate score on placement exam; or consent of instructor.

Social, cultural, historical, political, economic, and educational factors and systems in Latin America and the United States that have contributed to and shaped Latino/a individual and group identity. How factors affect individual acculturation in California and the United States and influence how Latino/as experience and participate with schooling in the United States. Course may be offered in classroom-based or online format. 3 seminars, 1 activity.

EDUC 410. Social, Historical and Ethical Perspectives on Teaching and Learning. 3 units

Term Typically Offered: SU
Prerequisite: Admission to the Single Subject Credential Program.

Inquiry into the social, historical, philosophical and psychological foundations of education with an emphasis on applying educational theory to practice. Prepares Single Subject Credential Program students for classroom teaching. Course may be offered in classroom-based or online format. 3 lectures.

EDUC 412. Access to Learning in a Pluralistic Society. 4 units

Term Typically Offered: F
Prerequisite: Admission to the Single Subject Credential Program.

The role of culture, status, identity, and human development in public school experiences of diverse learners. Organization and management of secondary school classrooms as related to adolescent development and issues of access to learning. 4 lectures.

EDUC 414. Curriculum and Inquiry in Public Schools. 4 units

Term Typically Offered: F
Prerequisite: Admission to the Single Subject Credential Program.

Principles, methods and practices of organizing curriculum, instruction, and assessment for secondary school subject areas, with an emphasis on backward design in curriculum development and assessment. Site visits to local schools to allow analysis of planning, instruction, and assessment in secondary school classrooms. 4 lectures.

EDUC 416. Literacy, Language, and Culture in Content Area Classrooms. 3 units

Term Typically Offered: W
Prerequisite: Admission to the Single Subject Credential Program.

Theories and application of literacy learning, assessment and second language acquisition in content classrooms. Observation of classrooms, tutoring English language learners, designing and teaching literacy lessons, planning and implementing assessments across content areas. Recognition of the role of culture in language acquisition. Course may be offered in classroom-based or online format. 3 lectures.

EDUC 417. Literacy, Language, and Culture in the Content Area Classroom Fieldwork. 1 unit

Term Typically Offered: TBD
CR/NC
Fieldwork in the secondary classroom related to literacy, language and culture for Agriculture Education candidates. Includes 1-3 hours of observation each week. Participation in public schools requires mandated fingerprint clearance. Credit/No Credit grading. 1 activity.

EDUC 418. Culturally Responsive Teaching in Diverse Classrooms. 3 units

Term Typically Offered: SU
Prerequisite: Admission to the Single Subject Credential Program.

Differentiated instruction and further theoretical knowledge and skills needed for successful teaching of linguistically and culturally diverse learners, as well as students with special learning needs. PACT assessments embedded in course prepare credential candidates for the teaching event. 3 lectures.

EDUC 419. Culturally Responsive Fieldwork in Diverse Classrooms. 1 unit

Term Typically Offered: F

CR/NC

Fieldwork in the secondary classroom related culturally responsive teaching in diverse classrooms for Agriculture Education candidates. Includes 1-3 hours of observation each week. Participation in public schools requires mandated fingerprint clearance. Credit/No Credit grading. 1 activity.

EDUC 423. Bilingual Literacy. 4 units

Term Typically Offered: W

Prerequisite: Admission to the Spanish Authorization for Bilingual Educators (SABE) Program.

Patterns of classroom organization, application of reading programs, approaches, methods in English and Spanish, and supervised field experiences in elementary classrooms with bilingual students. Course may be offered in classroom-based or online format. 3 seminars, 1 activity.

EDUC 427. Theories, Methods, and Assessment of First and Second Language Acquisition in Schools. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Senior standing. Recommended: ENGL 391.

Theories, methods, materials and assessment involved in the instruction of emergent bilingual students. Bilingual, transitional, and English only programs compared across a historical framework. Emphasis on an integrated language arts approach; theories of language acquisition. 3 seminars, 1 activity. Participation in public schools requires mandated fingerprint clearance.

EDUC 428. Foundations of K-8 Literacy Teaching and Learning in Schools with Diverse Populations. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior or Graduate standing.

Introduction of foundational topics in literacy teaching and learning in K-8 schools with diverse populations. Examination of concepts and theories underlying literacy learning and instruction, and relating research-based patterns of reading and writing development to features of the learner and learning environments. Participation in public schools requires mandated fingerprint clearance. 3 seminars, 1 activity.

EDUC 429. Learning to Teach K-8 Literacy in Schools with Diverse Populations. 4 units

Term Typically Offered: F, W

Prerequisite: Admission to the Multiple Subject Teacher Preparation Program.

Integration of theory and practice for planning, instruction and assessment in a balanced, comprehensive, research-based K-8 literacy and language arts program to enable children of all abilities and background to read, write, speak, listen and think effectively. 4 seminars.

EDUC 431. Learning to Teach K-8 Social Studies with Diverse Populations. 4 units

Term Typically Offered: W, SP

Prerequisite: Admission to the Multiple Subject Teacher Preparation Program.

Curriculum instruction and assessment concepts regarding teaching social studies to culturally diverse students in grades K-8, to promote civic competence and the development of elementary students' knowledge and reasoning in the social sciences. 4 seminars.

EDUC 433. Foundations of Bilingual Education. 4 units

Term Typically Offered: F

Prerequisite: Admission to the Spanish Authorization for Bilingual Educators (SABE) Program.

History, theories, and practices associated with contemporary bilingual education in California and the U.S. Observation and limited teaching in bilingual classrooms. Approximately one-half of the class taught in Spanish. Course may be offered in classroom-based or online format. 3 seminars, 1 activity.

EDUC 435. Learning to Teach K-8 Mathematics with Diverse Populations. 4 units

Term Typically Offered: F, W

Prerequisite: Admission to the Multiple Subject Teacher Preparation Program.

Curriculum, instruction, and assessment concepts regarding teaching mathematics for understanding to culturally diverse students in grades K-8, with emphasis on using manipulatives to promote elementary students' development of mathematical knowledge and reasoning. 4 seminars.

EDUC 436. Learning to Teach K-8 Science with Diverse Populations. 4 units

Term Typically Offered: F, W

Prerequisite: Admission to the Multiple Subject Teacher Preparation Program.

Curriculum, instruction, and assessment concepts regarding teaching science for understanding to culturally diverse students in grades K-8, with emphasis on teaching via inquiry to promote the development of scientific knowledge and reasoning. 3 seminars, 1 activity.

EDUC 438. Multiple Subject Clinical Practice I. 2-4 units

Term Typically Offered: F, W

CR/NC

Prerequisite: Admission to the Multiple Subject Teacher Preparation (MSTEP) Program.

Clinical experiences involving observation; limited lesson planning, instruction, assessment and reflection; growth as a professional educator and participation in school-related activities in K-8 public school classrooms. Participation in public schools requires mandated fingerprint clearance. Total credit limited to 4 units. Credit/No Credit grading only.

EDUC 439. Multiple Subject Clinical Practice Seminar I. 3 units

Term Typically Offered: F, W

CR/NC

Prerequisite: Admission to the Multiple Subject Teacher Preparation (MSTEP) Program.

Discussion of contemporary educational issues and classroom practice; reflection on beginning clinical experiences in elementary education and their connection with educational theory and research. Credit/No Credit grading only. 3 seminars.

EDUC 440. Educating Individuals with Exceptional Needs. 4 units

Term Typically Offered: F, W, SP

Prerequisite: EDUC 429, EDUC 431, EDUC 435, EDUC 436, EDUC 438 and EDUC 439.

Characteristics, incidence, and etiology of individuals with exceptional needs. Problems, assessment, and approaches toward accommodating students with exceptional needs in the regular classroom. 3 seminars, 1 activity.

EDUC 442. Elementary Field Experience in General and/or Special Education. 1-4 units

Term Typically Offered: F

CR/NC

Prerequisite: Acceptance into the Preliminary Special Education Credential Program or the Multiple Subject Teacher Preparation (MSTEP) Program.

Public school classroom experiences in general education and/or special education classrooms at the elementary level. Teaching individuals and small groups. Total credit limited to 4 units. Credit/No Credit grading only.

EDUC 447. Secondary Field Experience in General and/or Special Education. 1-4 units

Term Typically Offered: W

CR/NC

Prerequisite: Acceptance into the Preliminary Special Education Credential Program or the Single Subject Credential Program.

Public school classroom experiences in general education classrooms and/or special education classrooms at the secondary level. Teaching individuals and small groups. Total credit limited to 4 units. Credit/No Credit grading only.

EDUC 449. Special Education Student Teaching. 8 units

Term Typically Offered: SP

CR/NC

Prerequisite: Acceptance into Level I Special Education Credential Program, and completion of all program requirements. Concurrent: EDUC 451.

Participation in public schools as a student teacher in activities representing different roles of special education teachers. Assumption of a teacher's responsibility for individual and small groups. Minimum 4 days per week. Credit/No Credit grading only.

EDUC 450. Teaching Performance Assessment Seminar. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Tasks, timelines, evaluation rubrics, and academic writing in relation to the Teaching Performance Assessments that are required for teacher credentialing in California. Total credit limited to 2 units. Credit/No Credit grading. 1 seminar.

EDUC 451. Special Education Student Teaching Seminar. 4 units

Term Typically Offered: SU

CR/NC

Prerequisite: Acceptance into Level I Special Education Credential Program; completion of program requirements for the Level I Special Education Program. Concurrent: EDUC 449.

Educational issues and research, development and assessment of teaching portfolio, completion of materials for a job search, and beginning the first year as a special educator. 3 seminars, 1 activity.

EDUC 454. Multiple Subject Clinical Practice II. 6 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: Admission to the Multiple Subject Teacher Preparation (MSTEP) Program.

Clinical experiences involving planning, instruction, assessment and reflection; growth as a professional and related activities in K-8 public school classrooms. Participation in public schools requires mandated fingerprint clearance. Credit/No Credit grading only.

EDUC 455. Multiple Subject Clinical Practice Seminar II. 3 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: Acceptance into STEP II or STEP B of the Multiple Subject Teacher Preparation Program. Concurrent: EDUC 454.

Discussion of contemporary educational issues, state education policies and expectations for effective classroom practice; reflection on clinical experiences in elementary education and their connection with educational theory research. Participation in public schools requires mandated fingerprint clearance. Credit/No Credit grading. 3 seminars.

EDUC 456. Multiple Subject Clinical Practice III. 12 units

Term Typically Offered: F, SP

CR/NC

Prerequisite: EDUC 454 and EDUC 455. Concurrent: EDUC 457.

Advanced clinical experiences involving planning, instruction, assessment and reflection; growth as a professional and related activities in K-8 public school classrooms. Credit/No Credit grading only.

EDUC 457. Multiple Subject Clinical Practice Seminar III. 3 units

Term Typically Offered: F, SP

CR/NC

Prerequisite: EDUC 454 and EDUC 455. Concurrent: EDUC 456.

Discussion of contemporary educational issues, national education policies and expectations for effective classroom practice; reflection on advanced clinical experiences in elementary education and their connection with educational theory and research. Credit/No Credit grading. Course may be offered in classroom-based or online format. 3 seminars.

EDUC 460. Clinical Practice I. 4 units

Term Typically Offered: F

CR/NC

Prerequisite: Admission to the Single Subject Credential Program.

Clinical experiences involving observation; limited planning, instruction, assessment and reflection; growth as a professional, and participation in other school-related activities in secondary public classrooms. Credit/No Credit grading only.

EDUC 469. Clinical Practice II. 8 units

Term Typically Offered: W
CR/NC

Prerequisite: Completion of courses and requirements to begin student teaching and approval of campus screening committee for credential candidates.

Part-time assignment in a classroom (Single Subject only). Includes teaching activities under the direction of a selected cooperating teacher in consultation with a university supervisor. Assignment consists of an entire morning in the classroom (or the equivalent) for one quarter. Credit/No Credit grading only.

EDUC 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

EDUC 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

EDUC 479. Clinical Practice III. 12 units

Term Typically Offered: SP
CR/NC

Prerequisite: Completion of all courses and requirements prerequisite to full-time student teaching and approval by campus screening committee for credential candidates.

Full-time assignment in a classroom (Single Subject only). Includes teaching activities under the direction of a selected cooperating teacher in consultation with a university supervisor. Assignment consists of an entire teaching day in the school for one quarter. Credit/No Credit grading only.

EDUC 500. Individual Study. 1-4 units

Term Typically Offered: F, W, SP
Prerequisite: Consent of department head, graduate major advisor, and supervising faculty member.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 8 units.

EDUC 502. Advancing Pedagogical Practices with Technology. 4 units

Term Typically Offered: SU
Prerequisite: Graduate standing.

Examination of technology-supported instruction with special focus on the use of technology to enable constructivist learning experiences for K-12 students. A survey of advanced technologies including Web-based tools, apps, digital story telling, and media production. Course offered online only. 3 seminars, 1 activity.

EDUC 510. Education Finance and Resource Allocation. 4 units

Term Typically Offered: SP
Prerequisite: Graduate standing and consent of instructor.

Financing public schools in America: historical and current sources and types of funding. District level and site level funding and budgeting including priorities and purchasing procedures. Financial implications of personnel contracts and obligations. 3 seminars, 1 activity.

EDUC 511. Educational Law and Governance. 4 units

Term Typically Offered: SP
Prerequisite: Graduate standing and consent of instructor.

Legal aspects of school administration including unions, collective bargaining, and contract administration. Governing roles of federal, state, and local agencies including boards and district administrators. 3 seminars, 1 activity.

EDUC 512. Education Organization and Management. 4 units

Term Typically Offered: F
Sustainability Related
Prerequisite: Graduate standing and consent of instructor.

Principles of organization, management, sustainability, and regenerative practices, leadership and their relationship to educational effectiveness and productivity. Activity experience in the application of management theory in schools. This course meets the requirements of the Cal Poly Sustainability Learning Objectives (SLO). 3 seminars, 1 activity.

EDUC 513. Education Planning and Decision Making. 4 units

Term Typically Offered: F
Prerequisite: Graduate standing and consent of instructor.

Concepts of planning and decision making in educational administration that utilize a wide range of data gathering and analysis procedures. 3 seminars, 1 activity.

EDUC 515. Educational Program Management and Evaluation. 4 units

Term Typically Offered: W
Prerequisite: Graduate standing and consent of instructor.

Supervision, management, and evaluation of educational curriculum and educational programs. Current trends in program management including mapping, monitoring, alignment. 3 seminars, 1 activity.

EDUC 516. Educational Personnel Supervision and Evaluation. 4 units

Term Typically Offered: W
Prerequisite: Graduate standing and consent of instructor.

Principles and processes for the supervision and evaluation of certificated and classified staff including legal, research, and professional considerations. 3 seminars, 1 activity.

EDUC 517. Managing Action Research Communities. 2 units

Term Typically Offered: SP
Prerequisite: Admission to School of Education's Educational Leadership and Administration Master's program.

Examination of issues that affect educational leaders implementing and managing large-scale collaborative action research projects. Application of interventions based on action research findings. 2 seminars.

EDUC 518. Administrative Services Fieldwork. 3 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Admittance to the Administrative Services Credential program and consent of instructor.

Supervised fieldwork in school administration for supervision at the elementary and secondary level. Assignments must encompass three of the four academic quarters and must involve some multicultural experience. Total credit limited to 18 units, only 9 of which may be applied toward master's degree. Credit/No Credit grading only.

EDUC 519. Professional e-Portfolios for Educational Leaders. 1 unit

Term Typically Offered: SP

CR/NC

Prerequisite: Enrollment in the Educational Leadership and Administration Program (ELAP).

Demonstration of exemplars of professional practice keyed to standards for the California Preliminary Administrative Services Credential. Class meets two (2) times per quarter. Faculty meet individually with students as to address portfolio development on a case-by-case basis. Credit/No Credit grading only. 1 activity.

EDUC 521. Literacy Across the Curriculum. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing.

Supporting students' literacy development across school subjects -- English language arts, mathematics, science, social studies -- through an integrated instructional approach focusing on critical literacy as meaning-making, accommodating diverse students including English language learners and students with special needs. 4 seminars.

EDUC 522. Advanced Classroom Pedagogy. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing.

Principles of authentic pedagogy and development of a classroom learning community. Examination of the role of classroom culture and advanced instructional strategies to foster conceptual development and disciplinary ways of knowing in diverse classrooms. Course may be offered in classroom-based or online format. 4 seminars.

EDUC 523. Integrative Approaches to Curriculum. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing.

Perspectives, principles and practices for designing curriculum to foster authentic instruction using integrative approaches. Emphasis on designing for the development of multiple literacies. Course may be offered in classroom-based or online format. 4 seminars.

EDUC 528. Advanced Classroom Pedagogy in English Language Arts. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing.

The relationship between theory, research and practice in English Language Arts. Emphasis is on reading processes and principles and advanced teaching practices for the English Language Arts with attention to working with diverse students including English language learners and students with special needs. 4 seminars.

EDUC 531. Social Justice in Education: In & Out of the Classroom. 4 units

Term Typically Offered: SP

Prerequisite: Admission to a School of Education Master's program.

Examines social justice education approaches inside and outside the classroom. Prepares graduate students to develop an action-oriented project that includes strategies for advocating for marginalized students. Course may be offered in classroom-based or online format. 4 seminars.

EDUC 532. Advanced Field Experiences in Education. 2-6 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Admission to a School of Education Master's program.

Advanced field experience and practical application of master's degree emphasis for general and special education teachers, school administrators and school support personnel. Total credit limited to 12 units for specialist credentials. Total credit limited to 6 units for the master's degree. Credit/No Credit grading only.

EDUC 535. Advanced Classroom Pedagogy in Mathematics Education. 4 units

Term Typically Offered: W

Prerequisite: Admission to a School of Education Master's program.

Standards-based principles and advanced pedagogical practices for mathematics instruction in diverse classroom settings. 4 seminars.

EDUC 542. Administration of Special Programs and Services. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing and consent of instructor.

Principles and practices of organizing and administering special education, reading, counseling, and other support programs. Assessment and placement procedures, middle management's role, overview of specially funded programs, historical precedents and future trends. 3 seminars, 1 activity.

EDUC 544. Advanced Collaboration and Consultation for Teachers of Students with Special Needs. 5 units

Term Typically Offered: TBD

Prerequisite: Admission into the Level I Special Education Credential Program and master's degree program in education.

Advanced studies and skills in educational consultation. Emphasis on the collaborative and consultative role of the special educator with a wide range of individuals from diverse cultural backgrounds including school personnel, parents, outside agencies, and paraprofessionals. 3 seminars, 2 activities.

EDUC 546. Reading and Language Arts Instruction in Special Education. 5 units

Term Typically Offered: F

Prerequisite: Admission into the Level I Special Education Credential Program and master's degree program in education.

Overview of principles of reading instruction, elements of the language arts program including literature-based reading, content area reading, and the role of phonics, emergent literacy, and diagnosis of reading problems for special education teachers. 3 seminars, 2 activities.

EDUC 550. Assessment Strategies for Special Education. 5 units

Term Typically Offered: W

Prerequisite: Admission to MS in Special Education.

Using norm referenced, criterion referenced, and curriculum based testing for assessing academic, behavioral, and physical status of individuals with exceptional needs, including English language learners, for referral purposes. Instructional and evaluation decisions regarding exceptional students in school settings. 3 seminars, 2 activities.

EDUC 552. Support and Transition Strategies in Special Education. 5 units

Term Typically Offered: SP

Prerequisite: Admission to MS in Special Education.

Basic guidance techniques for teachers working with exceptional individuals and their families. Career selection, preparation, and counseling. Transition from school to work, and community resource utilization. 3 seminars, 2 activities.

EDUC 554. Behavior Disorders and Positive Behavior Support Strategies. 5 units

Term Typically Offered: SP

Prerequisite: Admission to MS in Special Education.

Assessment of students whose behavior impedes either their own learning or the learning of other students. Strategies for facilitating proactive educational, environmental and social-emotional techniques for supporting students with challenging behavior. 3 seminars, 2 activities.

EDUC 555. Introduction to the Counseling Profession. 4 units

Term Typically Offered: F

Prerequisite: Admission to MS in Higher Education, Counseling and Student Affairs.

Overview of the counseling profession, history, philosophy, theory and ethics. Required activity. 3 seminars, 1 activity.

EDUC 556. Multicultural Counseling. 4 units

Term Typically Offered: W

Prerequisite: Admission to MS in Higher Education, Counseling and Student Affairs.

Initiation of critical analysis of personal beliefs and attitudes regarding counseling in a diverse society. Focus on a variety of approaches to explore the beliefs and attitudes of the student in counseling settings, and examination of strategies considered effective in working with diverse populations. 3 seminars, 1 activity.

EDUC 557. Career Counseling. 4 units

Term Typically Offered: SP

Prerequisite: Admission to MS in Higher Education, Counseling and Student Affairs.

Focus on the study and application of career development theories in career counseling. Utilizing appraisal instruments, community referral resources, occupational information, computerized retrieval systems, and personal and social data and required activities. 3 seminars, 1 activity.

EDUC 560. Counseling Theories. 4 units

Term Typically Offered: W

Prerequisite: Admission to MS in Higher Education, Counseling and Student Affairs.

Theories and practice of counseling with special emphasis on the counseling process. Emphasis of conditions of counseling, counseling techniques, counseling diverse populations and the counselor as a professional helper. 3 seminars, 1 activity.

EDUC 561. Group Counseling. 4 units

Term Typically Offered: F

Prerequisite: EDUC 555, EDUC 560 or consent of instructor.

Theory and practice of group counseling, client selection, group structure, process and termination, and application of theories to specific developmental groups. Communication and facilitation skills emphasized with relevant ethics and law. 3 seminars, 1 activity.

EDUC 562. Student Development - Higher Education. 4 units

Term Typically Offered: F

Prerequisite: Admission to MS in Higher Education, Counseling and Student Affairs.

Exploration of the roles and competencies of the student development specialist in higher education. Review of relevant developmental theory with emphasis on practical implementation. Explore current issues and trends in higher education, and organizational framework. 4 seminars.

EDUC 564. Legal and Ethical Issues in Counseling. 4 units

Term Typically Offered: W

Prerequisite: Admission to MS in Higher Education, Counseling and Student Affairs.

Consideration of legal, ethical, cultural and related professional issues as they affect the practice of counseling. 3 seminars, 1 activity.

EDUC 565. Counseling Measurement and Assessment. 4 units

Term Typically Offered: SP

Prerequisite: Admission to MS in Higher Education, Counseling and Student Affairs.

Assessment in the form of tests, scales, measures, and other instruments with college and community college students, young adults, and postsecondary program evaluation. An understanding of culturally appropriate tests and measures, collaboration with stakeholders in the review and interpretation of assessments, test scores, and measures. 3 seminars, 1 activity.

EDUC 566. Leadership and Consultation in Counseling. 4 units

Term Typically Offered: SP

Prerequisite: Admission to MS in Higher Education, Counseling and Student Affairs.

Development of skills in planning, organizing, coordinating, and delivering programs that generate systemic change through establishing collaboration among stakeholders. Emphasis on social action and its role in the counseling profession. 3 seminars, 1 activity.

EDUC 568. Individual Counseling Techniques. 4 units

Term Typically Offered: SP

Prerequisite: Admission to MS in Higher Education, Counseling and Student Affairs.

Theory and practice of individual counseling, process and termination, and application of theories to specific developmental issues working with college and community college students and young adults. Communication and facilitation skills emphasized, working with diverse populations and following legal and ethical guidelines. 3 seminars, 1 activity.

EDUC 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

EDUC 573. Field Experience in Higher Education Counseling and Student Affairs. 1-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Admission to the MS Degree in Higher Education Counseling and Student Affairs.

Practical application of higher education counseling and student affairs coursework in colleges and community settings. Seminars with university staff included. Total credit limited to 24 units. Credit/No Credit grading only. Maximum of 12 units may be applied toward MS in Higher Education, Counseling and Student Affairs.

EDUC 586. Introduction to Inquiry in Education. 4 units

Term Typically Offered: F

Prerequisite: Admission to a School of Education Master's program.

Explanation of social construction of knowledge, and the philosophical basis of quantitative and qualitative research. Introduction to professional literature search techniques and to professional organizations as a basis for educational inquiry. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based or online format. 3 seminars, 1 activity.

EDUC 587. Educational Foundations and Current Issues. 4 units

Term Typically Offered: F, SU

Prerequisite: Admission to a School of Education Master's Program.

Historical, organizational, legal and philosophical characteristics of education in the United States. Emphasis on the analysis of contemporary issues focusing on these characteristics. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based or online format. 4 seminars.

EDUC 588. Education, Culture, and Learning. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Admission to School of Education Master's Program.

Cultural characteristics of educational institutions and practice. Review of theory and research relating to the social and organizational context in which learning and teaching takes place. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based or online format. 4 seminars.

EDUC 589. Educational Research Methods. 4 units

Term Typically Offered: W, SP

Prerequisite: Admission to a School of Education Master's Program.

Educational research methodologies, application of inferential and descriptive statistics, critical analysis of research designs and data collection techniques. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based or online format. 3 seminars, 1 activity.

EDUC 590. Research Application in Education. 4 units

Term Typically Offered: W, SU

Prerequisite: EDUC 589.

Application of social science research techniques to problems in education and human services. Capstone experience for the School of Education master's inquiry course sequence. Completion of an inquiry project required. 2 seminars, 2 activities.

EDUC 598. Action Research Project in Education. 1-3 units

Term Typically Offered: SU

CR/NC

Prerequisite: EDUC 589.

Completion and presentation of the results of an action research project that addresses a meaningful question in the practice of education. Total credit limited to 6 units. Credit/No Credit grading only.

Electrical Engineering (EE)

undefined

EE Courses

EE 111. Introduction to Electrical Engineering. 1 unit

Term Typically Offered: F

Concurrent: EE 151.

A general overview of the field of electrical engineering. Preparation for successful completion of the Electrical Engineering (EE) program at Cal Poly. 1 lecture. Not required for students with transfer credit for EE 211 or EE 241.

EE 112. Electric Circuit Analysis I. 2 units

Term Typically Offered: TBD

Prerequisite: MATH 142 or equivalent. Recommended: EE 111/151.

Introduction to basic circuit analysis. Resistive circuits, voltage and current sources, network theorems. Course may be offered in classroom-based or online format. 2 lectures.

EE 113. Electric Circuit Analysis I. 3 units

Term Typically Offered: F, SP

Prerequisite: MATH 142. Concurrent: EE 143. Recommended: EE 111, EE 151; PHYS 133.

Basic circuit analysis and basic electronics manufacturing. Resistive circuits, voltage and current sources, op-amps, network theorems. Practical electronics manufacturing expanded through concepts such as CAD/CAM design, Design for Manufacture (DFM), documentation requirements, deposition and etching processes, prototyping, and production planning. PCB design and assembly. 3 lectures.

EE 115. Electrical and Electronic Circuits I. 3 units

Term Typically Offered: F, W, SP

Prerequisite: MATH 141. Corequisite: CHEM 124 and PHYS 143.

Concurrent: EE 145.

DC analysis of two-terminal electrical devices and electrical circuits, including resistors, diodes, switches, relays, photo-cells, batteries and more. KCL, KVL. Multi-component networks and their two-terminal equivalents. Two-port devices for actuation and waveform manipulation. 3 lectures.

EE 133. Digital Design. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: An orientation course in student's major (EE 111 and EE 151; or CPE 100) and CPE/CSC 101.

Number systems, Boolean algebra, Boolean functions, and function minimization. Analysis and design of combinational and sequential digital logic circuits. Hardware Description Language (HDL) concepts and applications digital design and synthesis in FPGAs. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 133.

EE 143. Electronics Manufacturing and Circuit Analysis Laboratory. 1 unit

Term Typically Offered: F, SP

Prerequisite: MATH 142. Concurrent: EE 113. Recommended: EE 111, EE 151; PHYS 133.

Use of electrical and electronic test equipment. Introduction to engineering design flow (design, simulate, build, test). PCB design and manufacturing. 1 laboratory.

EE 145. Electrical and Electronic Circuits I Laboratory. 1 unit

Term Typically Offered: F, W, SP

Concurrent: EE 115.

Lab experiments for two-terminal electrical devices and electrical DC circuits, including resistors, diodes, switches, relays, photo-cells, batteries and more. KCL, KVL. Multi-component networks and their two-terminal equivalents. Two-port devices for actuation and waveform manipulation. 1 laboratory.

EE 151. Introduction to Electrical Engineering Laboratory. 1 unit

Term Typically Offered: F

Concurrent: EE 111.

A variety of hands-on experiments and demonstrations in electrical engineering, providing background and motivation for successful completion of the Electrical Engineering (EE) program at Cal Poly. Not open to students with credit for EE 241. 1 laboratory.

EE 200. Special Problems. 1-2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of department chair.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EE 201. Electric Circuit Theory. 3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: MATH 244, PHYS 133.

Application of fundamental circuit laws and theorems to the analysis of DC, and steady-state single-phase and three-phase circuits. Not for electrical engineering majors. Course may be offered in classroom-based or online format. 3 lectures.

EE 211. Electric Circuit Analysis II. 3 units

Term Typically Offered: F, W, SP

Prerequisite: EE 112 or EE 113. Prerequisite or Concurrent: PHYS 133, MATH 244. Concurrent: EE 241.

Continuation of basic circuit analysis. Op-amp circuits. Energy storage elements, RC and RL circuits, and AC steady state analysis. 3 lectures.

EE 212. Electric Circuit Analysis III. 3 units

Term Typically Offered: F, W, SP

Prerequisite: MATH 244, EE 211. Concurrent: EE 242.

AC power, 3-phase circuits. Mutual inductance, series and parallel resonance and two-port networks. Frequency response, including Bode plots. 3 lectures.

EE 215. Electrical and Electronic Circuits II. 3 units

Term Typically Offered: F, W, SP

Prerequisite: EE 115. Concurrent: EE 245.

Time and frequency domain analysis of linear circuits. Laplace transforms, s-Domain circuit analysis. Network functions, frequency response, Fourier series. Active filter design. 3 lectures.

EE 228. Continuous-Time Signals and Systems. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BMED 355; or EE 212 and EE 242. Recommended: MATH 241.

Continuous-time systems analysis, with emphasis on linear time-invariant (LTI) systems. Classifications of continuous-time systems. Convolution and its application to LTI systems. The Laplace transform, Fourier transform, and Fourier series, and their application to the analysis of LTI systems. 4 lectures.

EE 233. Computer Design and Assembly Language Programming. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/EE 133.

Design and implementation of digital computer circuits via CAD tools for programmable logic devices (PLDs). Basic computer design with its datapath components and control unit. Introduction to assembly language programming of an off-the-shelf RISC-based microcontroller. Not open to students with credit in CPE/EE 229. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 233.

EE 241. Electric Circuit Analysis Laboratory II. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: EE 112 or EE 113; EE 151 for EE students. Prerequisite or concurrent: MATH 244; PHYS 133. Concurrent: EE 211.

Use of electrical and electronic test equipment. Experimental verification of circuit analysis concepts including Kirchhoff's Laws, Thevenin's Theorem, maximum power transfer and superposition. 1 laboratory.

EE 242. Electric Circuit Analysis Laboratory III. 1 unit

Term Typically Offered: F, W, SP
 Prerequisite: MATH 244, EE 241 or consent of department chair.
 Concurrent: EE 212.

Observation of transient and steady-state phenomena, phase-shift circuits, resonance. Use of phasor diagrams. 1 laboratory.

EE 245. Electrical and Electronic Circuits II Laboratory. 1 unit

Term Typically Offered: F, W, SP
 Concurrent: EE 215.

Lab projects dealing with dynamic circuits in the frequency-domain and the time domain. Frequency domain analysis of two-port circuits. Laplace transforms, s-Domain circuit analysis. Network functions, frequency response, Fourier series. Passive and active filter design. 1 laboratory.

EE 251. Electric Circuits Laboratory. 1 unit

Term Typically Offered: F,W,SP, SU
 Concurrent: EE 201.

Techniques of measurement of DC and steady-state AC circuit parameters. Equivalent circuits, nonlinear elements, resonance. 1 laboratory.

EE 255. Energy Conversion Electromagnetics. 3 units

Term Typically Offered: F,W,SP, SU
 Prerequisite: EE 212 and EE 242; or EE 201 and EE 251; or EE 215 and EE 245. Concurrent: EE 295.

Fundamentals of electromechanical energy conversion. Magnetic circuits and electromagnetic devices. Theory of operation and operating characteristics of transformers, and AC induction and synchronous machines. 3 lectures.

EE 261. Intro C Programming with a Hardware Emphasis. 1 unit

Term Typically Offered: F, W, SP
 Prerequisite: CPE/CSC 101. Recommended: EE 151.

Introduction to the C Programming Language with an emphasis on microprocessor implementation and applications. Not open to students with credit in CPE/CSC 357 or CPE/EE 329. 1 laboratory.

EE 262. Intro C++ Programming with a Hardware Emphasis. 1 unit

Term Typically Offered: W, SP
 Prerequisite: CPE/CSC 101. Recommended: EE 151.

Introduction to the C++ Objected Oriented Programming Language with an emphasis on Microprocessor Implementation and applications. 1 laboratory.

EE 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
 Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

EE 271. Selected Laboratory. 1-2 units

Term Typically Offered: SP
 Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics. The Class Schedule will list topic selected. Total credit limited to 6 units. 1 to 2 laboratories.

EE 295. Energy Conversion Electromagnetics Laboratory. 1 unit

Term Typically Offered: F,W,SP, SU
 Prerequisite: EE 212 and EE 242; or EE 201 and EE 251; or EE 215 and EE 245. Concurrent: EE 255.

Single-phase and three-phase transformers. Starting of rotating machines, evaluation of characteristics of rotating machines. 1 laboratory.

EE 302. Classical Control Systems. 3 units

Term Typically Offered: W, SP
 Prerequisite: EE 215 or EE 228. Concurrent: EE 342. Recommended: EE 368; or CPE 327 and CPE 367.

Introduction to feedback control systems. System modeling. Transfer functions. Graphical system representation. System time response, stability. Root Locus. Frequency response. Compensation. 3 lectures.

EE 306. Semiconductor Device Electronics. 3 units

Term Typically Offered: F, W
 Prerequisite: CHEM 124, EE 212 & EE 242, EE 143 or IME 156 or IME 458, PHYS 211. Concurrent: EE 346.

Internal operation, semiconductor physics, terminal characteristics, models and application of diodes (LEDs, solar cells, and photo-diodes) and transistors (field-effect and bipolar). 3 lectures.

EE 307. Digital Electronics and Integrated Circuits. 3 units

Term Typically Offered: W, SP
 Prerequisite: CPE/EE 133, EE 306 and EE 346. Corequisite: CPE/EE 233. Concurrent: EE 347.

Analysis, design, application and interfacing of integrated logic circuits, including NMOS, CMOS, TTL, ECL, and other logic families. 3 lectures.

EE 308. Analog Electronics and Integrated Circuits. 3 units

Term Typically Offered: F, SP
 Prerequisite: EE 302 & EE 342, EE 307 & EE 347. Concurrent: EE 348.

Analysis and design of integrated circuits for use in analog applications. Gain, frequency response, and feedback of linear small-signal amplifiers. 3 lectures.

EE 314. Introduction to Communication Systems. 3 units

Term Typically Offered: W, SP
 Prerequisite: EE 228 or CPE/EE 327. Corequisites: STAT 350; and EE 306 or EE 315.

Analog modulation, including: double-sideband modulation, amplitude modulation, single-sideband modulation, frequency modulation, phase modulation. Performances of such systems in the presence of white Gaussian noise. Implementations of transmitters and receivers. Course may be offered in classroom-based or online format. 3 lectures.

EE 315. Electrical and Electronic Circuits III. 4 units

Term Typically Offered: F, W, SP
 Prerequisites: CPE 133 and EE 215.

Digital electronics circuit design using MOSFETs. Design of one and two transistor amplifiers. Applications of transistor for interfacing analog signals to digital circuits. Review of circuits and electronics fundamentals. Designing interface circuits for small analog signals, noise reduction and protection. 3 lectures, 1 laboratory.

EE 321. Electronics. 3 units

Term Typically Offered: F,W,SPSU

Prerequisite: EE 201 or BRAE 216 for BRAE majors.

Semiconductor devices and circuits. Instrumentation amplifiers, power control rectifiers, feedback, pulse circuits, digital logic circuits. Not for Electrical Engineering majors. 3 lectures.

EE 322. Microcontrollers for Everyone. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Microcontroller history and computer systems overview. Introduction to basic electrical circuits and computer programming concepts. 3 lectures, 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

EE 327. Digital Signals and Systems. 3 units

Term Typically Offered: F, W

Prerequisite: EE 212 or EE 215; and MATH 244. Concurrent: CPE 367.

Signal and system description and analysis, with emphasis on discrete-time signals and linear time-invariant (LTI) systems. Sampling theorem. Frequency spectrum, Convolution and its application to LTI systems. The z transform, discrete-time Fourier transform, and discrete Fourier transform. Introduction to digital filters. 3 lectures. Crosslisted as CPE/EE 327.

EE 328. Discrete Time Signals and Systems. 3 units

Term Typically Offered: F, W

Prerequisite: BMED 355 or EE 228. Concurrent: CPE/EE 368.

Discrete-time systems and analysis, with emphasis on linear time-invariant (LTI) systems. Sampling theorem. Classification of discrete-time systems. Convolution and its application to LTI systems. The z transform, discrete-time Fourier transform, and discrete Fourier transform. Introduction to digital filters. Not open to students with credit in CPE 327. 3 lectures. Crosslisted as CPE/EE 328.

EE 329. Microcontroller-Based Systems Design. 4 units

Term Typically Offered: F, SP

Prerequisite: CPE/EE 233; EE 307 and EE 347.

Design, implementation and testing of microcontroller-based systems. Hardware and C software for embedded systems to sense and actuate external devices. I/O common embedded systems to interface I/O devices and protocols. Analysis of power consumption. Ethics. Not open to students with credit in CPE/EE 336. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 329.

EE 335. Electromagnetic Fields and Transmission. 4 units

Term Typically Offered: F, SP

Prerequisite: EE 201 and EE 251; or EE 212 and EE 242; or EE 215 and EE 245; and MATH 241. Concurrent: EE 375.

Maxwell's equations. Plane wave propagation in free space. Static electric and magnetic fields. Distributed-circuit concepts and transmission line parameters. Reflections and standing waves. The Smith chart and its applications. Transmission line measurements and impedance matching techniques. 4 lectures.

EE 336. Microprocessor System Design. 4 units

Term Typically Offered: TBD

Prerequisite: CPE/EE 233.

Introduction to microcontrollers and integrated microprocessor systems. Hardware/software trade-offs, system economics, and functional configurations. Interface design, real-time clocks, interrupts, A/D conversion, serial and parallel communications, watch-dog timers, low power operation, event-based inter-peripheral communication, and assembly and higher-level language programming techniques. Architecture and design of sampled data and low-power systems. Not open to students with credit in CPE/EE 329. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 336.

EE 342. Classical Control Systems Laboratory. 1 unit

Term Typically Offered: W, SP

Prerequisite: EE 215 or EE 228. Concurrent: EE 302. Recommended: EE 368; or CPE 327 and CPE 367.

Laboratory work pertaining to classical control systems, including servo control, transient and frequency responses, stability, and computer-aided analysis of control systems. 1 laboratory.

EE 346. Semiconductor Device Electronics Laboratory. 1 unit

Term Typically Offered: F, W

Prerequisite: CHEM 124, EE 212 & EE 242, EE 143 or IME 156 or IME 458, PHYS 211. Concurrent: EE 306. Recommended: ENGL 134.

Experimental determination of device characteristics and models. 1 laboratory.

EE 347. Digital Electronics and Integrated Circuits Laboratory. 1 unit

Term Typically Offered: W, SP

Prerequisite: CPE/EE 133, EE 306 and EE 346. Corequisite: CPE/EE 233. Concurrent: EE 307.

Computer simulation and experimental investigation of the characteristics, applications and interfacing of different logic families. 1 laboratory.

EE 348. Analog Electronics and Integrated Circuits Laboratory. 1 unit

Term Typically Offered: F, SP

Prerequisite: EE 302 & EE 342, EE 307 & EE 347. Concurrent: EE 308.

Design, simulation, construction and testing of solid state amplifiers and sub-circuits to meet stated specifications. 1 laboratory.

EE 361. Electronics Laboratory. 1 unit

Term Typically Offered: F,W,SPSU

Prerequisite: EE 251 or BRAE 216 for BRAE majors. Concurrent: EE 321.

Instrumentation amplifiers, feedback, rectifiers and power control, pulse and digital logic circuits. 1 laboratory.

EE 367. Digital Signals and Systems Laboratory. 1 unit

Term Typically Offered: F, W

Prerequisite: EE 242 or EE 245. Concurrent: CPE 327.

Laboratory work pertaining to discrete-time signals and linear systems; including frequency response and Fourier spectral analysis, signal sampling and aliasing, digital signal processing techniques, and digital filter design and implementation. 1 laboratory. Crosslisted as CPE/EE 367.

EE 368. Signals and Systems Laboratory. 1 unit

Term Typically Offered: F, W

Prerequisite: BMED 355 or EE 228. Concurrent: CPE/EE 328.

Laboratory work pertaining to linear systems, including Fourier analysis, time and frequency responses, and system transfer function. Not open to students with credit in CPE 367. 1 laboratory. Crosslisted as CPE/EE 368.

EE 375. Electromagnetic Fields and Transmission Laboratory. 1 unit

Term Typically Offered: F, SP

Concurrent: EE 335.

Transmission line and passive component measurements at microwave frequencies. Response to pulse excitation using time domain techniques and sinusoidal excitation using frequency domain techniques. Application of the Smith Chart and network analyzers in transmission line characterization and impedance matching techniques. 1 laboratory.

EE 400. Special Problems. 1-5 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 5 units.

EE 402. Electromagnetic Waves. 4 units

Term Typically Offered: F, W

Prerequisite: EE 335.

Maxwell's equations and plane wave propagation in materials. Reflection and transmission of normal and oblique incidence plane waves at planar boundaries between different media. Wave guides. Antennas. 4 lectures.

EE 403. Introduction to Photonics and Fiber Optics. 3 units

Term Typically Offered: F

Prerequisite: EE 306 and EE 346; or PHY 323. Concurrent: EE 443.

Introduction to modern fiber optics and photonics. Lens systems, photodiodes, LEDs, laser diodes, transmitter and receiver design, diffraction, interference, optical signal processing, propagation of light in optical fibers. 3 lectures.

EE 405. High Frequency Amplifier Design. 3 units

Term Typically Offered: F

Prerequisite: EE 308 & EE 348, EE 335. Concurrent: EE 445.

Design of modern electronic amplifiers and amplifier systems with advanced techniques. UHF and microwave small signal amplifier design utilizing microstrip transmission lines, S parameters of GaAs FET, and bipolar transistors. Low noise, broadband, and power amplifier designs. Oscillator designs. 3 lectures.

EE 406. Power Systems Analysis I. 4 units

Term Typically Offered: F

Prerequisite: EE 335, EE 255 & EE 295.

Introduction to electric power systems. Representation of power systems and its components including transmission lines, synchronous machines, transformers and loads. One line diagrams and per unit calculations. symmetrical faults. Load flow analysis. 4 lectures.

EE 407. Power Systems Analysis II. 4 units

Term Typically Offered: W

Prerequisite: EE 406.

Symmetrical components, unbalanced faults, power system stability, system protection, relays and relay systems, power system instrumentation and measurement techniques, economic operation. 4 lectures.

EE 409. Electronic Design. 3 units

Term Typically Offered: F, W

Prerequisite: EE 308 & EE 348; CPE/EE 328 & CPE/EE 368, or CPE 327 & CPE 367; CPE/EE 329 or CPE/EE 336 or CPE 316. Concurrent: EE 449.

Design of electronic systems and subsystems using analog and digital integrated circuits. Design principles and techniques. Analysis and design of feedback amplifiers; operational amplifier applications. Design of analog/digital and digital/analog converters. Power supply design. Emphasis on IC implementation. 3 lectures.

EE 410. Power Electronics I. 4 units

Term Typically Offered: F

Prerequisite: EE 308 and EE 348, or EE 321 and consent of instructor.

Introduction to power electronic converters and power semiconductor devices. Steady state analysis, performance study, and design of uncontrolled and controlled rectifiers, non-isolated and isolated DC-DC converters, AC voltage controllers, and single-phase inverters. Use of commercially available software. 3 lectures, 1 laboratory.

EE 411. Power Electronics II. 4 units

Term Typically Offered: W

Prerequisite: EE 410.

Switching trajectory, switching losses, and Safe Operating Area of solid-state switches. Analysis and design of snubber circuits. Synchronous rectification. Steady-state analysis and operation of resonant DC-DC converters. Power quality and harmonics. Operation of HVDC transmission lines, introduction to flexible AC transmission system (FACTS) controllers, multilevel and three-phase inverters. Use of commercially available software. 3 lectures, 1 laboratory.

EE 412. Advanced Analog Circuits. 3 units

Term Typically Offered: W

Prerequisite: EE 314, EE 409 & EE 449. Concurrent: EE 452.

Application of linear integrated circuits to data acquisition problems: transducer interfacing, linear and nonlinear preprocessing, phase-locked loops, and high performance quantization and recovery (A/D, D/A conversion). 3 lectures.

EE 413. Advanced Electronic Design. 4 units

Term Typically Offered: SP

Sustainability Related

Prerequisite: CSC 101, EE 409 and EE 449.

Advanced design of electronic circuits and subsystems, including sustainability and design as a process. Automated testing with GPIB instruments. Implementation of specific design projects, including team-based projects. 3 lectures, 1 laboratory.

EE 414. Robotic Systems Integration. 4 units

Term Typically Offered: W

Prerequisite: CPE/EE 329 or CPE/CSC 357 or ME 305.

Integration of sensors, actuators, chassis, and Linux-based computational platforms into functioning autonomous robotic systems. Embedded Linux system programming, inter-process software communication, basic sensor fusion techniques, Pulse Width Modulation (PWM) motor actuation, and web-based interfacing for remote system way-pointing and monitoring. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 414.

EE 415. Communication Systems Design. 3 units

Term Typically Offered: F

Prerequisite: CPE 327 or EE 328.

Design of modern wireline and wireless electronic communication and telemetry systems. Emphasis: practical implementation and comparative evaluation of various communication systems. 3 lectures.

EE 416. Digital Communication Systems. 3 units

Term Typically Offered: TBD

Prerequisite: EE 314; EE 328 or CPE 327.

Baseband (PCM, PAM, DM) signals and transmission. Bandpass (PSK, FSK, ASK) modulation and demodulation techniques. Digital communication signals in the presence of noise and detection of signals in Gaussian noise. Other topics such as: quantization, multiplexing and multiple access, spread spectrum techniques, coding, synchronization. 3 lectures.

EE 417. Alternating Current Machines. 4 units

Term Typically Offered: F

Prerequisite: EE 255 & EE 295.

Alternating current machines. Generalized, operational and dynamic analysis. Steady-state and transient operation of synchronous machines and linear induction machines. 3 lectures, 1 laboratory.

EE 418. Photonic Engineering. 3 units

Term Typically Offered: SP

Prerequisite: EE 335 or PHYS 323. Concurrent: EE 458.

Modern optical design with emphasis on the use of computers to design simple optical systems and to evaluate existing optical designs. Paraxial and exact ray tracing through thin and thick lenses, mirrors, and prisms. Radiometry and photometry. Electro-optic, acousto-optic, and magneto-optic modulators and their applications. Thermal detectors, semiconductor detectors, and charge coupled device (CCD) arrays. 3 lectures.

EE 419. Digital Signal Processing. 3 units

Term Typically Offered: W

Prerequisite: CSC 101 or CSC 231; EE 328 and EE 368, or CPE 327 and CPE 367. Concurrent: EE 459.

Review of Z-transform, convolution and discrete Fourier Transform. Digital filter design. Fast Fourier Transform. Theory and applications of digital signal processors. 3 lectures.

EE 420. Sustainable Electric Energy Conversion. 4 units

Term Typically Offered: W

Sustainability Focused

Prerequisite: CHEM 124; EE 255 and EE 295.

Electrical engineering aspects of photovoltaic and wind power generation and usage, and electrochemical energy conversion. Power control, processing, and quality for grid-connected and stand-alone systems. Distribution and storage of electric energy. Hydrogen and synthetic fuels. Distributed generation. 3 lectures, 1 laboratory.

EE 422. Polymer Electronics Laboratory. 1 unit

Term Typically Offered: F, W

Prerequisite: EE 347 or MATE 340 or CHEM 319 or PHYS 340.

Experimental procedures in polymer electronics. Investigation of the characteristics of a polymer electronic device. 1 laboratory. Crosslisted as EE/PHYS 422.

EE 423. Micro/Nano Fabrication. 3 units

Term Typically Offered: W

Prerequisite: BMED 212 or MATE 210.

Fabrication science and technology for creating micro and nano scale devices. Explore basic processes such as oxidation, diffusion, ion implantation, etching, chemical and physical vapor deposition, photolithography. Develop an understanding of the science of each process and how to select the right steps for fabricating electronic, photon and micro-electro-mechanical systems devices. 3 lectures. Crosslisted as BMED 434/EE 423/MATE 430.

EE 424. Introduction to Remote Sensing. 4 units

Term Typically Offered: W

Prerequisite: MATH 244; senior or graduate standing in engineering.

Radiation characteristics, sensor technology and platforms, satellite systems, system design tradeoffs, collection and transmission of radio-metric data, GPS, thermal remote sensing, active radar and microwave remote sensing, interpretation and exploitation of remotely sensed data for various applications. 3 lectures, 1 laboratory.

EE 425. Analog Filter Design. 3 units

Term Typically Offered: SP

Prerequisite: EE 409 & EE 449. Concurrent: EE 455.

Approximation Theory. All pole filters. Frequency transformations. Elements of passive synthesis. Time delay filters. Theory and design of active filter. Sensitivity analysis. 3 lectures.

EE 428. Computer Vision. 4 units

Term Typically Offered: W

Prerequisite: CPE 327 or CPE/CSC 357 or EE 328 or ME 305.

Introduction to the concepts of 2D and 3D computer vision: low-level image processing methods such as filtering and edge detection; feature extraction; segmentation and clustering; stereo vision; appearance-based and model-based algorithms. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 428.

EE 431. Computer-Aided Design of VLSI Devices. 4 units

Term Typically Offered: W

Prerequisite: EE 307 and EE 347. Recommended: EE 308 and EE 348, for students interested in analog design.

Design of VLSI circuits using state-of-the-art CAD software. Design issues and algorithms related to design using CAD. Full custom design through automated design and a major multi-week chip design project in lab. 3 lectures, 1 laboratory. Crosslisted as CPE 441/EE 431.

EE 432. Digital Control Systems. 3 units

Term Typically Offered: F

Prerequisite: EE 302 and EE 342; or CPE 327 and CPE 367. Concurrent: CPE/EE 472. Recommended: EE 328 and EE 368.

Theory and applications of digital computers in linear control systems. Analysis and design of microprocessor-based controls. Introduction of continuous and discrete transform methods for design of closed-loop dynamic systems. Applications in robotics, automotive, aircraft and industrial process control. 3 lectures. Crosslisted as CPE/EE 432.

EE 433. Introduction to Magnetic Design. 4 units

Term Typically Offered: TBD

Prerequisite: EE 255 and EE 295.

Design of magnetic components. Fundamentals of magnetics, magnetic cores, design of power transformer, three-phase transformer, dc inductor, ac inductors, dc-dc converter transformer design, actuators. Use of commercially available software. 3 lectures, 1 laboratory.

EE 434. Automotive Engineering for a Sustainable Future. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing in any engineering or physical science major.

Multidisciplinary investigation of automotive renewable fuels and electric/hybrid vehicles. Analyze and design related technologies and systems. Methods for complete-cycle energy and GHG analysis. Comparative emissions, efficiency, power output, and infrastructure requirements. Laboratory projects converting engines and vehicles to operate on alternative fuels or electric propulsion. 3 lectures, 1 laboratory. Crosslisted as BRAE/EE 434.

EE 435. Industrial Power Control and Automation. 1 unit

Term Typically Offered: SP

Prerequisite: EE 255, EE 295, EE 302, and EE 342.

Introduction to programmable automation controllers including custom developed functions, electrical hardware interfaces, communications networking to intelligent electronic devices, and machine operator interface terminals. Applications of industrial power control and automation systems including protection equipment, motor controllers, renewable energy, and sensors. 1 laboratory.

EE 439. Introduction to Real-Time Operating Systems. 4 units

Term Typically Offered: TBD

Prerequisite: CPE/EE 329 or CPE 316.

Theory, design and implementation of real-time operating system-based embedded systems. Scheduling algorithms, operating system resources, peripheral device interfacing and embedded system architecture. Resource management issues in a resource-limited (microcontroller-based) environment. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 439.

EE 440. Wireless Communications. 3 units

Term Typically Offered: W

Prerequisite: EE 335, EE 314. Concurrent: EE 480.

Wireless microwave system design and analysis. RF transmission lines, microwave networks, receiver design, modulation techniques, and mixer characterization and realizations. Noise and distortion, RF oscillators and frequency synthesizers, filter design. Radiating systems and electromagnetic wave propagation, microwave amplifier design. 3 lectures.

EE 442. Real Time Embedded Systems. 4 units

Term Typically Offered: F

Prerequisite: CPE/EE 329 or CPE/EE 336 or CPE 316.

Theory, design and implementation of modern embedded systems. Scheduling algorithms and operating system resources. System on Chip (SoC) design issues such as interfacing with custom hardware description language (HDL) peripherals, high-performance chip interconnect standards, energy use, area, and hardware versus software performance trade-offs. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 442.

EE 443. Introduction to Photonics and Fiber Optics Laboratory. 1 unit

Term Typically Offered: F

Prerequisite: EE 306 and EE 346; or PHYS 323. Concurrent: EE 403.

Experimental study of optical fibers, optical lens systems, fiber amplifiers, light sources, and optical detectors. Simulation of a simple fiber optical network using CAD tools. Design, build, and test of fiber optic and free-space optical communication systems. 1 laboratory.

EE 444. Power Systems Laboratory. 1 unit

Term Typically Offered: SP

Prerequisite: EE 406.

Protective relaying, coordination, and relay calibration. Power control using transformers, parallel operation of generators, and computer simulation of power systems. 1 laboratory.

EE 445. High Frequency Amplifier Design Laboratory. 1 unit

Term Typically Offered: F

Prerequisite: EE 308 & EE 348, EE 335. Corequisite: EE 405.

Experimental investigation employing advanced techniques. Design of high-frequency electronic amplifiers utilizing S-parameters of bipolar transistors, network analyzers, and computer simulation techniques. 1 laboratory.

EE 446. Design of Fault-Tolerant Digital Systems. 4 units

Term Typically Offered: F

Prerequisite: CPE/EE 329 or CPE/EE 336 or CPE 316. Recommended: STAT 350.

Hardware and software fault tolerance concepts: fault models, coding in computer systems, module and system level fault detection mechanisms, reconfiguration techniques for general purpose processors and ASICs, and software fault tolerance techniques such as recovery blocks, N-version programming, checkpointing, and recovery. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 446.

EE 447. Stringed Musical Instrument Acoustics, Mechanics, and Transducer Design. 4 units

Term Typically Offered: W

Prerequisite: EE/CPE 329 or EE/CPE 336 or CPE 316 or ME 305.

Acoustics, sound production, and transducer design in the context of stringed musical instruments. Introduces music theory, scales and temperament, sound radiation, structural dynamics of stringed instruments. Integrates engineering topics including frequency spectrum analysis, electromagnetics, properties of materials, digital and analog circuit design. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 447.

EE 449. Electronic Design Laboratory. 1 unit

Term Typically Offered: F, W

Prerequisite: EE 308 & EE 348; CPE/EE 328 & CPE/EE 368, or CPE 327 & CPE 367; CPE/EE 329 or CPE/EE 336 or CPE 316. Concurrent: EE 409.

Design of electronic systems and subsystems using integrated circuits. 1 laboratory.

EE 450. Solar Photovoltaic System Engineering. 4 units

Term Typically Offered: F

Prerequisite: one of the following: PHYS 104; PHYS 118; PHYS 121; or PHYS 141; and junior standing.

Engineering principles, design, and installation of solar photovoltaic power systems including grid-tie and off-grid systems. Photonic energy conversion, solar module engineering, solar power electronics, photovoltaic site planning, mechanical and structural considerations, permit processes, government incentives, and analysis of financial and investment issues. Field trips required. 3 lectures, 1 laboratory. Crosslisted as BRAE/EE/HNRS 450.

EE 452. Advanced Analog Circuits Laboratory. 1 unit

Term Typically Offered: W

Prerequisite: EE 314, EE 409 & EE 449. Concurrent: EE 412.

Advanced laboratory study of LC and VCO oscillators, phase detectors, phase-locked loop circuits, transducer interface circuits, noise sources and signal-to-noise determination, ADC and DAC for data conversion. Formal experiments and computer SPICE simulation. 1 laboratory.

EE 455. Analog Filter Design Laboratory. 1 unit

Term Typically Offered: SP

Prerequisite: EE 409 & EE 449. Concurrent: EE 425.

Advanced laboratory study of sensitivity and stability of active networks prescribed for realization of transfer functions by active network synthesis techniques. Formal experiments and individual project work. 1 laboratory.

EE 456. Digital Communication Systems Laboratory. 1 unit

Term Typically Offered: TBD

Prerequisite: EE 314; EE 328 & EE 368 or CPE 327 & CPE 367.

Methods of digital modulation and demodulation. Emphasis on spectral analysis, bandwidth requirements and other practical considerations of modulation and demodulation. 1 laboratory.

EE 458. Photonic Engineering Laboratory. 1 unit

Term Typically Offered: SP

Concurrent: EE 418.

Experimental investigation of the techniques used in processing optical signals. Formal experiments on electro-optic modulation, acousto-optic modulation. Construction of an RF spectrum analyzer. Analog processing of optical signals, and charge-coupled array devices. 1 laboratory.

EE 459. Digital Signal Processing Laboratory. 1 unit

Term Typically Offered: W

Prerequisite: CSC 101 or CSC 231; CPE 327 and CPE 367 or EE 328 and EE 368. Concurrent: EE 419.

Experiments in digital filter design and digital signal processing emphasizing various areas of application. Formal experiments and individual project work, including DSP algorithm and digital filter analysis, design and implementation using Matlab, and real-time implementations using C on an embedded DSP processor. 1 laboratory.

EE 460. Senior Project Preparation. 2 units

Term Typically Offered: F, W

Sustainability Related

Prerequisite: EE 314, EE 335. Corequisite: EE 409 & EE 449.

Introduction to teamwork and team-oriented project execution. Project planning, scheduling and analysis. Usage of tools for project management including Gantt and Pert Charts. Project development, cost and time estimation using top-down and bottom-up approaches. Ethics and ethical issues as they pertain to the conduct of engineering. Development of senior project proposal. 1 lecture, 1 laboratory.

EE 461. Senior Project I. 2 units

Term Typically Offered: W, SP

Prerequisite: EE 409, EE 449 and EE 460.

Investigation and design of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report.

EE 462. Senior Project II. 2 units

Term Typically Offered: F, SP

Prerequisite: EE 461.

Continuation and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report.

EE 463. Senior Project Design Laboratory I. 2 units

Term Typically Offered: W, SP

Prerequisite: EE 409, EE 449 and EE 460.

Investigation and design of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Not open to students with credit in EE 461. 2 laboratories.

EE 464. Senior Project Design Laboratory II. 2 units

Term Typically Offered: F, SP
Prerequisite: EE 463.

Continuation and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Not open to students with credit in EE 462. 2 laboratories.

EE 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

EE 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

EE 472. Digital Control Systems Laboratory. 1 unit

Term Typically Offered: F
Concurrent: CPE/EE 432.

Design and programming of microprocessor-based digital controls for electro-mechanical plants. Topics include digital control laws, translation of transfer functions into algorithms, assembly language programming, real-time software design, sample rate selection, finite word-length considerations. 1 laboratory. Crosslisted as CPE/EE 472.

EE 473. Microfabrication Laboratory. 1 unit

Term Typically Offered: W
Corequisite: BMED 434/EE 423/MATE 430.

Application of basic processes involved in microfabrication: cleanroom protocol, oxidation, diffusion, photolithography etching and sputtering. Explore process development through fabrication of electronic, photonic or microfluidic devices. Each student will be part of a team that will fabricate and test a device. 1 laboratory. Crosslisted as BMED 435/EE 473/MATE 435.

EE 475. Communication Networks and Systems Laboratory. 1 unit

Term Typically Offered: F
Prerequisite: CPE 327 and CPE 367; or CPE/EE 328 and CPE/EE 368.

Methods of wireline and wireless communication networks and systems. Emphasis on TCP/IP wired networks and modern mobile communication standards. 1 laboratory.

EE 480. Wireless Communications Laboratory. 1 unit

Term Typically Offered: W
Prerequisite: EE 335, EE 314. Concurrent: EE 440.

Wireless microwave system design and analysis. RF transmission lines, microwave networks, receiver design, modulation techniques, and mixer characterization and realizations. Noise and distortion, RF oscillators and frequency synthesizers, filter design. Radiating systems and electromagnetic wave propagation, microwave amplifier design. 1 laboratory.

EE 493. Cooperative Education Experience. 1-2 units

Term Typically Offered: F,W,SP,SU
CR/NC
Prerequisite: Sophomore standing.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 6 units. Credit/No Credit grading only.

EE 494. Cooperative Education Experience. 6-12 units

Term Typically Offered: F,W,SP,SU
CR/NC
Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

EE 495. Cooperative Education Experience. 6-12 units

Term Typically Offered: F,W,SP,SU
Prerequisite: Two consecutive quarters of EE 494 immediately preceding EE 495; sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units.

EE 500. Individual Study. 1-3 units

Term Typically Offered: F, W, SP
Prerequisite: Consent of department chair, graduate advisor, and supervising faculty member.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limit at discretion of graduate advisor, not to exceed 9 units.

EE 502. Microwave Component and System Engineering. 4 units

Term Typically Offered: W
Prerequisite: Graduate standing; or EE 306, EE 346, EE 335, and EE 375.

Passive and active microwave/millimeter wave system theory, design and project construction. Microwave components such as power splitters, filters, mixers, detectors, oscillators, modulators, and amplifiers are designed, fabricated and tested. Components are combined for system-level functionality projects. 3 lectures, 1 laboratory.

EE 504. Software Defined Radio. 4 units

Term Typically Offered: SP
Prerequisite: EE 314; and EE 328 or CPE 327; or graduate standing.

Introduction to software defined radios, including architectures of software defined radio receivers and transmitters, design principles and trade-offs, signal processing techniques, and applications of the technologies. 3 seminars, 1 laboratory.

EE 509. Computational Intelligence. 4 units

Term Typically Offered: SP

Prerequisite: Senior or graduate standing.

Theory, design, and applications of biologically inspired computational paradigms, including artificial neural networks, evolutionary computation, swarm intelligence, and hybrid intelligent systems. 4 seminars.

EE 511. Electric Machines Theory. 4 units

Term Typically Offered: W

Prerequisite: EE 255 or equivalent, and graduate standing or consent of instructor.

Advanced topics in electric machines theory. Introduction to Park's transformation. Analysis of electric machines using Kron's generalized concept. Vector control of induction machines. 4 seminars.

EE 513. Control Systems Theory. 4 units

Term Typically Offered: W

Prerequisite: EE 302 or equivalent, and graduate standing or consent of instructor.

State representation of dynamic systems. Mathematical models of physical devices, controllability and observability. Design of closed-loop systems. Optimal control theory. 4 seminars.

EE 514. Advanced Topics in Automatic Control. 4 units

Term Typically Offered: SP

Prerequisite: EE 513 or equivalent, EE 328 or similar course on discrete-time linear systems.

Summary course covering five selected graduate-level topics in automatic control theory and practice; implementation issues in digital control, nonlinear control theory and design, LQ and time optimal control, variable structure control, and fuzzy logic/model-free control. 4 seminars.

EE 515. Discrete Time Filters. 4 units

Term Typically Offered: F

Prerequisite: EE 314 or equivalent, and graduate standing or consent of instructor.

Advanced topics in filter design and implementation. Emphasis placed on current applications and on the processing of real signals. Topics may include signal analysis via spectral estimation, short time Fourier transforms, and spectrograms. Effects of coefficient quantization, and limits of practical filters. State space realization. Optimal and adaptive filters for signal prediction, system identification, and noise cancellation. Techniques implemented in programming assignments. 4 seminars.

EE 516. Pattern Recognition. 4 units

Term Typically Offered: SP

Prerequisite: STAT 312 or STAT 350.

Fundamental topics in statistical pattern recognition including Bayesian decision theory, Maximum-likelihood and Bayesian estimation, non-parametric density estimation, feature selection, dimension reduction, and clustering, with application to image pattern recognition. 3 seminars, 1 laboratory.

EE 518. Power System Protection. 4 units

Term Typically Offered: SP

Prerequisite: EE 406 and graduate standing.

Unsymmetrical faults. Protection fundamentals. Instrument transformers. Power system grounding. Generator protection, transformer protection, busbar protection, line and motor protection. 3 seminars, 1 laboratory.

EE 519. Advanced Analysis of Power Systems. 4 units

Term Typically Offered: TBD

Prerequisite: EE 406 or equivalent, and graduate standing or consent of instructor.

Advanced power system stability analysis, numerical methods in power system analysis. 4 seminars.

EE 520. Advanced Solar-Photovoltaic Systems Design. 4 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: Graduate standing or consent of instructor.

Solar radiation and insolation variability. Solar cell theory. Photovoltaic module and array design. Interfacing PV generators with various kinds of loads. Power processing circuits and systems. Energy storage options. Stand-alone and grid-connected systems. Life Cycle Assessment and Recycling of Solar PV equipment. Economic, policy and sustainability issues. 4 seminars.

EE 521. Computer Systems. 4 units

Term Typically Offered: SP

Prerequisite: CPE 316 or CPE/EE 329; and CPE 315 or CPE 333; graduate standing or consent of instructor.

Organization of modern general purpose, high speed digital computer systems. Design of arithmetic units, control units, memories and memory subsystems. Cost, power and speed trade-offs in the design of such systems. 3 seminars, 1 laboratory. Crosslisted as CPE/EE 521.

EE 522. Advanced Real-Time Operating Systems Design. 4 units

Term Typically Offered: TBD

Prerequisite: CPE/EE 439.

Define and implement a microcontroller-based Real-Time Operating System (RTOS). Advanced real-time concepts, kernel structure, task and time management, various intertask communication constructs including semaphores, queues and mailboxes. Scheduler design, memory management and shared resource management in a resource-constrained microcontroller environment. 3 seminars, 1 laboratory. Crosslisted as CPE/EE 522.

EE 523. Digital Systems Design. 4 units

Term Typically Offered: F

Prerequisite: CPE 316 or CPE/EE 329; and graduate standing.

Full-custom design and analysis of digital circuits using full CMOS, pass-transistor and dynamic circuit topologies. Transistor sizing for minimizing power consumption, delay and other design criteria. 3 seminars, 1 laboratory. Crosslisted as CPE/EE 523.

EE 524. Solid State Electronics. 3 units

Term Typically Offered: TBD

Prerequisite: PHYS 412 or equivalent, and graduate standing or consent of instructor.

Physical theory of solid-state devices. Properties of metal-semiconductor junctions and p-n junctions. Derivation of properties of diodes, transistors, and four-layer devices from basic physical and mathematical considerations. 3 seminars.

EE 525. Stochastic Processes. 4 units

Term Typically Offered: F

Prerequisite: STAT 350 or equivalent, and graduate standing or consent of instructor.

Probability and stochastic processes used in random signal analysis. Response of linear systems to random inputs. Auto-correlation and power spectral densities. Applications in signal processing using the discrete Kalman filter. 4 seminars.

EE 526. Advanced Digital Communications. 4 units

Term Typically Offered: W

Prerequisite: EE 314, EE 416, and graduate standing.

Modern digital communication systems. M-ary signals. Vector space representation of signals. Optimum receiver principles. Common signal sets. Signal space dimensionality versus time-bandwidth product. 4 seminars.

EE 527. Advanced Topics in Power Electronics. 4 units

Term Typically Offered: SP

Prerequisite: EE 410 or equivalent, and graduate standing or consent of instructor.

Selected advanced topics in power electronics such as dc-dc converters, phase-controlled rectifiers, switched-mode inverters, ac and dc drives, HVDC transmission, or utility applications of power electronics. 4 seminars.

EE 528. Digital Image Processing. 4 units

Term Typically Offered: F

Prerequisite: CPE 327 or EE 328; and graduate standing or consent of instructor.

Processing and interpretation of images by computer. Emphasis on current applications with real images used in programming assignments. Topics include intensity transformation, histogram equalization, spatial filtering, frequency-domain filtering, image restoration, Wavelet and other image transforms, image compression, morphological operations, intro to object recognition. 3 lectures, 1 laboratory.

EE 529. Microwave Device Electronics. 4 units

Term Typically Offered: W

Prerequisite: EE 306, EE 315, or graduate standing.

Emphasis on device theory of operation, fabrication techniques and circuit principles of active microwave solid-state devices, their noise aspects and systems applications. 3 lectures, 1 laboratory.

EE 530. Fourier Optics. 4 units

Term Typically Offered: W

Prerequisite: EE 402 or equivalent, EE 314 or equivalent, and graduate standing or consent of instructor.

Approach to the design and analysis of optical systems using linear communication theory, including Fourier analysis. Analysis of two-dimensional signals and systems, foundations of scalar diffraction theory. Fresnel and Fraunhofer diffraction. Wave-optics analysis of coherent optical systems, frequency analysis of optical imaging systems, holo-graphy. 4 seminars.

EE 531. Advanced VLSI Design. 4 units

Term Typically Offered: SP

Prerequisite: CPE 441/EE 431.

Advanced Very Large Scale Integrated (VLSI) design using state-of-the-art software. Advanced topics in digital, analog and mixed signal circuit design to enable a quarter-long design project culminating in a tapeout-ready integrated circuit design. 3 lectures, 1 laboratory. Crosslisted as CPE 541/EE 531.

EE 532. VLSI Circuit Testing. 1 unit

Term Typically Offered: F

Prerequisite: EE 531/CPE 541.

Characterization, testing and documentation of custom-fabricated Very Large Scale Integrated (VLSI) circuits. Use of specialized test equipment. 1 laboratory. Crosslisted as CPE/EE 532.

EE 533. Antennas. 4 units

Term Typically Offered: SP

Prerequisite: EE 402 or equivalent.

Principles of antenna theory. Antenna parameters, radiation integrals. Duality and reciprocity theorems. Wire antennas. Antenna arrays. Traveling wave antennas. Broadband and frequency independent antennas. Aperture and reflector antennas. Microstrip antennas. Antenna design. 4 seminars.

EE 534. Advanced Photonic Systems. 4 units

Term Typically Offered: W

Prerequisite: EE 335 or graduate standing. Recommended: EE 403 and EE 443.

Design, implementation, and characterization of advanced photonic systems including optical sensors, holography, optical coherence tomography (OCT), and light detection and ranging (LIDAR) systems. 3 lectures, 1 laboratory.

EE 541. Advanced Microwave Laboratory. 2 units

Term Typically Offered: W

Prerequisite: EE 402 or equivalent and graduate standing.

Experimental measurement in waveguide and microstrip circuits employing the advanced Network Analyzer. Design of both passive and active microwave circuits using microstrip. Graphical and analytical design techniques as well as the use of computer-aided design codes. 2 laboratories.

EE 542. Advanced Real Time Embedded Systems. 4 units

Term Typically Offered: SP
Prerequisite: CPE/EE 442.

Advanced study and application of modern embedded systems. Memory bandwidth matching, clock-domain crossing, IP creation and verification, and student-led lectures on modern System on Chip (SoC) design topics. Building a prototype embedded system. 3 lectures, 1 laboratory. Crosslisted as CPE/EE 542.

EE 544. Solid-state Electronics and VLSI Laboratory. 1 unit

Term Typically Offered: TBD
Prerequisite: Graduate standing; EE 431 or EE 524 (EE 524 may be taken concurrently).

Experimental procedures in solid-state electronics and integrated circuits. Investigation and improvement of the characteristics of solid-state electronic devices and integrated circuits. 1 laboratory.

EE 563. Graduate Seminar. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Current developments in the fields of electrical and electronic engineering. Participation by students, faculty and guest lecturers. Open to graduate students with a background in electrical or electronic engineering. Credit/No Credit grading only. Total credit limited to 3 units. Course may be offered in classroom-based or online format. 1 seminar.

EE 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to graduate students and selected seniors with electrical and electronic engineering background. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 seminars.

EE 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD
Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

EE 594. Cooperative Education Experience. 6-12 units

Term Typically Offered: F,W,SP,SU
CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Total credit limited to 24 units.

EE 595. Cooperative Education Experience. 6-12 units

Term Typically Offered: F,W,SP,SU
CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Total credit limited to 12 units.

EE 599. Design Project (Thesis). 1-9 units

Term Typically Offered: F, W, SP
Prerequisite: Graduate standing and consent of instructor.

Each individual or group will select, with faculty guidance and approval, a topic for independent research or investigation resulting in a thesis or project to be used to satisfy the requirement for the degree. An appropriate experimental or analytical thesis or project may be accepted.

Engineering (ENGR)

undefined

ENGR Courses

ENGR 101. Engineering Student Success. 1 unit

Term Typically Offered: TBD
CR/NC

Strategies for success as an engineering student, including development of intrinsic motivation, time management, self-advocacy, campus resources, and career preparation. Engineering design process, teamwork, and communication skills. Credit/No Credit grading only. 1 activity.

ENGR 110. Introduction to Engineering. 2 units

Term Typically Offered: F
Introduction to engineering and the computing disciplines with emphasis on the design process, professionalism, communication, teamwork, diversity and skills for academic success in engineering. 2 lectures.

ENGR 234. Introduction to Design Thinking. 4 units

Term Typically Offered: F
Prerequisite: Entrepreneurship minors only.

Introduction to the process of design thinking and human centered design, including design process, methodology, and implementation. Empathy, creativity, iterative prototyping, and contextual design of products and services. 4 lectures. Crosslisted as BUS/ENGR 234.

ENGR 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ENGR 301. Engineering Professional Success. 1 unit

Term Typically Offered: F

CR/NC

Prerequisite: Consent of instructor. Recommended: ENGR 101.

Strategies for success as an engineering professional. Preparation for job searches, including networking and building a professional identity. Exploration of engineering within context of society and community. Intended for First Generation and new transfer students. Credit/ No Credit grading only. 1 activity.

ENGR 310. Introduction to Entrepreneurship. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better.

Role and impact of entrepreneurship and technology startups; characteristics and traits of entrepreneurs; opportunity identification and assessment; frameworks for building startups; the founding team; organizational and legal issues; business and value proposition models; acquiring resources; entrepreneurial risk; realizing and harvesting value. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as BUS/ENGR 310.

ENGR 322. The Learn By Doing Lab Teaching Practicum. 2 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Early teaching experience in an informal science, technology, engineering, and mathematics (STEM) teaching and learning environment. Principles of inquiry-driven STEM education, lesson design, implementation and assessment. Intended for undergraduates exploring STEM teaching as a career. Total credit limited to 4 units. Credit/No Credit grading only. 1 seminar, 1 laboratory. Crosslisted as ENGR 322/SCM 302/HNRS 302.

ENGR 334. Needfinding in New Product Design. 4 units

Term Typically Offered: TBD

Prerequisite: BMED 212, ENGR 234, IME 144, or ME 234.

Identification and characterization of human needs for future products, systems, services, and environments. Observation and interview techniques based on ethnographic approaches and building design empathy. Emphasis on development of broad and flexible thinking skills for designers to address the needs of a changing society. Field trips required. 4 lectures.

ENGR 350. The Global Environment. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/ historical/political perspectives. Use of remote sensing maps. Sustainable solutions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as AG/EDES/ENGR/GEOG/ISLA/SCM/UNIV 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ENGR 400. Special Problems for Advanced Undergraduates. 2-4 units

Term Typically Offered: F,W,SPSU

Prerequisite: ME 212 or consent of department head.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units.

ENGR 440. Engineering as a Profession. 3 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Preparation for the transition from academia to industry. Working knowledge of key topics such as leadership, organizational structure, intellectual property, business models, and product development cycles, along with an appreciation of impact of technology on society. 3 lectures.

ENGR 459. Interdisciplinary Senior Design Project I. 2 units

Term Typically Offered: F

Prerequisite: Senior standing.

First of three courses taken sequentially in a team based interdisciplinary senior design project. Development of sponsor's needs and generation of design solutions. Project management, cost analysis, intellectual property, test plans, impact analysis on society, and ethical considerations. Communication of results to project sponsor. 2 laboratories.

ENGR 460. Interdisciplinary Senior Design Project II. 2 units

Term Typically Offered: W

Prerequisite: ENGR 459.

Continuation of ENGR 459 and senior project. Activities focus on detail design, analysis and material procurement. 2 laboratories.

ENGR 461. Interdisciplinary Senior Design Project III. 2 units

Term Typically Offered: SP

Prerequisite: ENGR 460.

Continuation of ENGR 460 and completion of senior project. Design verified through prototyping and testing. 2 laboratories.

ENGR 462. Senior Project. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: ME 212, junior standing, and consent of instructor.

Selection and completion of project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results presented in a formal report. Minimum commitment of 150 hours.

ENGR 463. Interdisciplinary Entrepreneurial Senior Design Project I. 2 units

Term Typically Offered: F

Prerequisite: Senior standing.

First of three courses taken sequentially in a team based interdisciplinary senior design project with engineering and business students. Entrepreneurial process through design of a product or service, using customer development and agile engineering. 2 laboratories.

ENGR 464. Interdisciplinary Entrepreneurial Senior Design Project II. 2 units

Term Typically Offered: W

Prerequisite: ENGR 463.

Continuation of ENGR 463 and a team based interdisciplinary senior design project with engineering and business students. 2 laboratories.

ENGR 465. Interdisciplinary Entrepreneurial Senior Design Project III. 2 units

Term Typically Offered: SP

Prerequisite: ENGR 464.

Continuation of ENGR 464 and a team based interdisciplinary senior design project with engineering and business students. 2 laboratories.

ENGR 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ENGR 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ENGR 493. Cooperative Education Experience. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units.

ENGR 494. Cooperative Education Experience. 6 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units.

ENGR 495. Cooperative Education Experience. 12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

ENGR 500. Individual Study. 2-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing and consent of Program Director.

Advanced study planned and completed under the direction of faculty. Open to graduate students who have demonstrated the ability to do independent work. Total credit limited to 8 units.

ENGR 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ENGR 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ENGR 581. Biochemical Engineering. 4 units

Term Typically Offered: TBD

Prerequisite: CHEM 312 and MCRO 221.

Types of microorganisms and microbially-mediated biochemical reactions for biotechnology applications. Stoichiometric and thermodynamic principles for microbial growth and metabolism. Material and energy balances for aerobic and anaerobic growth and bioreactor design. Kinetics of enzyme catalyzed reactions. Field trips required. 3 seminars, 1 laboratory. Crosslisted as ENGR/ENVE 581.

ENGR 593. Cooperative Education Experience. 2 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

ENGR 594. Cooperative Education Experience. 6 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

ENGR 595. Cooperative Education Experience. 12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only.

ENGR 596. Industry Sponsored Project Experience. 1-9 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing.

Designed for MS students who are performing a work-for-others research project that requires a Non-disclosure Agreement. Students who qualify will be required file a detailed, supervised report and undergo an examination on the work performed. Total credit limited to 9 units. 1 to 9 supervision.

ENGR 599. Design Project (Thesis). 1-9 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing.

Each individual or group will select, with faculty guidance and approval, a topic for independent research or investigation resulting in a thesis or project to be used to satisfy the degree requirement. An appropriate experimental or analytical thesis or project may be accepted.

English (ENGL)

undefined

ENGL Courses

ENGL 131. Writing and Rhetoric Stretch (Part I). 4 units

Term Typically Offered: F

CR/NC

Part one of a two-part stretch course sequence. Rhetorical principles of and strategies for producing effective academic writing. Writing as a recursive process that leads to greater organizational coherency, stylistic complexity, and rhetorical awareness. Credit/No Credit grading only. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

ENGL 132. Writing and Rhetoric Stretch (Part II). 4 units

Term Typically Offered: W

2020-21 or later catalog: GE Area A2

2019-20 or earlier catalog: GE Area A1

Prerequisite: ENGL 131. Concurrent: ENGL 135.

Part two of a two-part stretch course sequence. Rhetorical principles and strategies for producing effective writing. Writing as a recursive process that leads to greater coherency, stylistic complexity, and rhetorical awareness. Not open to students with credit in ENGL 133 or ENGL 134. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs).

ENGL 133. Multilingual Writing and Rhetoric. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area A2

2019-20 or earlier catalog: GE Area A1

Prerequisite: GE Area A2 eligibility for Written Communication Placement upon admissions.

Rhetorical principles of and strategies for producing effective academic writing for multilingual audiences. Focus on genre awareness, responding to a range of rhetorical situations across multiple languages and cultures, and stylistic elements appropriate for bilingual and multilingual writers. Not open to students with credit in ENGL 134. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs).

ENGL 134. Writing and Rhetoric. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area A2

2019-20 or earlier catalog: GE Area A1

Prerequisite: GE Area A2 eligibility for Written Communication Placement upon admissions.

Rhetorical principles and strategies for producing effective writing. Writing as a recursive process that leads to greater coherency, stylistic complexity, and rhetorical awareness. Not open to students with credit in ENGL 133. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs).

ENGL 135. Writing and Rhetoric Tutorial. 1 unit

Term Typically Offered: F,W,SP,SU

CR/NC

Corequisite: ENGL 129, ENGL 130, ENGL 131, ENGL 132, ENGL 133, or ENGL 134.

Guided discussion and practice of writing strategies for students seeking support for first-year composition-related coursework. Weekly, individualized hour-long sessions with a peer writing consultant offering feedback based on the audience, purpose, and context of a writing task. Open to all students enrolled in ENGL 129, ENGL 131, ENGL 133, or ENGL 134; required of all students enrolled in ENGL 130 or ENGL 132. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

ENGL 145. Writing Arguments. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area A3

2019-20 or earlier catalog: GE Area A3

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for student on the 2019-20 or an earlier catalog).

Examination of rhetorical principles and ethical rhetorical action. Application of these principles and practices to arguments across a range of genres and media. Evaluate credibility of evidence and sources. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ENGL/HNRS 145. Fulfills GE Area A3 with a grade of C- or better.

ENGL 147. Writing Arguments about STEM. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area A3

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for student on the 2019-20 or an earlier catalog).

Critical analysis of arguments about STEM topics. Examination and application of logical and rhetorical principles. Evaluation of sources and evidence. Composing arguments across a range of genres and media. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area A3 with a grade of C- or better. Crosslisted as ENGL/HNRS 147.

ENGL 150. Writing Tutorial. 1 unit

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs) and consent of instructor.

Guided discussion and practice of writing strategies for students seeking support for writing-related coursework and/or the GWR. Weekly, individualized and group sessions with a peer writing consultant offering feedback based on the audience, purpose, and context of a writing task. Credit/No Credit only. Total credit limited to 4 units. 1 activity.

ENGL 202. Introduction to Literary Studies. 4 units

Term Typically Offered: W, SP

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs); for English majors only.

Introduction to literary genres, concepts, and terms. Emphasis on explication and interpretation, and on writing about literature. 4 lectures.

ENGL 203. Sequence I: Fifth Century to Fifteenth Century. 4 units

Term Typically Offered: F, SP

Prerequisite: Completion of GE Area A with grades of C- or better. For English majors only.

Representative canonical and non-canonical readings in the literature of the period. Will include an Old English (Anglo-Saxon) text; an Anglo-Norman text; a work of the Alliterative Revival; Chaucer; de Pizan; Dante; and others, as chosen by the instructor. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

ENGL 204. Sequence II: Sixteenth Century to Late Seventeenth Century. 4 units

Term Typically Offered: F, W

Prerequisite: ENGL 203; and English major.

Representative canonical and non-canonical readings in American and British literature of the period. Will include Bradstreet, Harriot, Lanyer, Native American creation stories and/or trickster tales, Shakespeare, Wroth, and others, as chosen by the instructor. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

ENGL 205. Sequence III: Mid-Seventeenth to Late Eighteenth Century. 4 units

Term Typically Offered: W, SP

Prerequisite: ENGL 204; and English major.

Representative canonical and non-canonical readings in American and British literature of the period. Will include Behn, Equiano, Murray, Occom, Swift, Wheatley, and others, as chosen by the instructor. 4 lectures.

ENGL 220. Introduction to Writing Studies. 4 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area A with grades of C- or better.

How writing and rhetoric shape and are shaped by social and cultural activity. The relationship between literacies and discourses. Focus on the materiality of print, online, and digital writing. Considers both historical and contemporary perspectives. 4 lectures.

ENGL 221. Introduction to Technical and Professional Communication. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs); completion of GE Area A3 with a grade of C- or better; and one course in GE Area B.

Introduction to the rhetorical, stylistic, and genre conventions used in technical and professional communication. Emphasis on the analysis, evaluation, and production of technical and professional documents. Required for Technical and Professional Communication Certificate Program. 4 lectures.

ENGL 230. British Literature: Beginnings to 1789. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area C2
 2019-20 or earlier: GE Area C1 or C2
 Prerequisite: Completion of GE Area A with grades of C- or better.

Covers a thousand years of British literature, from the eighth to the eighteenth century and may include such readings as Beowulf, The Canterbury Tales, Utopia, Othello, The Blazing World, Paradise Lost, Oroonoko and The Interesting Narrative of the Life of Olaudah Equiano. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area C2 (GE Area C1 for students on the 2019-20 or earlier catalogs).

ENGL 231. British Literature: 1789 to the Present. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area C2
 2019-20 or earlier: GE Area C1 or C2
 Prerequisite: Completion of GE Area A with grades of C- or better.

Broadly surveys Romantic, Victorian, Modern, and Contemporary British literature in an historical-cultural context. Investigates works from several genres and a variety of national and cultural voices. May include such writers as Wordsworth, Wollstonecraft, Dickens, G. Eliot, Wilde, Woolf, Yeats, and Gordimer. 4 lectures. Crosslisted as ENGL 231/HNRS 232. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

ENGL 241. American Literature: Beginnings to 1865. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area C2
 2019-20 or earlier: GE Area C1 or C2
 Prerequisite: Completion of GE Area A with grades of C- or better.

Survey of early U.S. American literature from pre-Columbian era to end of Civil War. A range of writers and genres, including Indigenous creation stories, early exploration documents, first contact narratives, colonial histories, sermons, poetry, essays, autobiographies, drama, and fiction. Not open to students with credit in ENGL 240. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

ENGL 242. American Literature: 1830 to the Present. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area C2
 2019-20 or earlier: GE Area C1 or C2
 Prerequisite: Completion of GE Area A with grades of C- or better.

A broad survey of later U.S. American literature from the rise of literary nationalism to the present. A wide range of writers and genres, including novels, short stories, poems, plays, essays, and autobiographies. Not open to students with credit in ENGL 240. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as ENGL/HNRS 242. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

ENGL 251. Introduction to Classical Literature. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area C2
 2019-20 or earlier: GE Area C1 or C2
 Prerequisite: Completion of GE Area A with grades of C- or better.

Examination of the ancient epics and classical literature of Mesopotamia, Greece, and Rome. May include such readings as The Epic of Gilgamesh, the Iliad, the Odyssey, Genesis, Sappho's Poetry, Antigone, the Symposium, the Aeneid, and Marcus Aurelius's Meditations. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ENGL/HNRS 251. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

ENGL 252. Introduction to Medieval through Enlightenment Literature. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area C2
 2019-20 or earlier: GE Area C1 or C2
 Prerequisite: Completion of GE Area A with grades of C- or better.

Examination of key works marking the transition from Mediterranean Classicism (c. 500 CE) to an emergent European tradition (c. 1800 CE). May include such readings as Confessions, Beowulf, Lais of Marie de France, Oroonoko, Life of Olaudah Equiano, and Faust. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area C2 (GE Area C1 for students on the 2019-20 or earlier catalogs).

ENGL 253. Introduction to Romantic through Modernist Literature. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area C2
 2019-20 or earlier: GE Area C1 or C2
 Prerequisite: Completion of GE Area A with grades of C- or better.

Examination of major works from the Age of Revolution, beginning with the Romantics at the end of the eighteenth century and concluding with the Modernists of the late-twentieth century. Considers the relationship between literary revolution, political revolution, and colonial-capitalist expansion. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

ENGL 255. Children's Literature in a Diverse Society. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area C2
 2019-20 or earlier: GE Area C1 or C2
 Prerequisite: Completion of GE Area A with grades of C- or better.

Culturally diverse children's literature with a focus on analysis and evaluation of literary elements and structures, critical perspectives, trends, and issues. A wide range of authors, genres and formats including folktales, fantasy, poetry, informational, historical and realistic fiction books. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as ENGL/LS 255. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

ENGL 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
 Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ENGL 272. Introductory Topics in Cinematic Expression. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Prerequisite: Completion of GE Area A with grades of C- or better.

Active viewing and critical analysis of cinema from the silent era to today as revealing and changing our cultural values. Study of narrative structures, cinematic techniques such as cinematography, editing, and sound, technological innovations, and contributions made by many different communities and individuals. The Class Schedule will list topic selected. 3 lectures, 1 laboratory. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

ENGL 290. Introduction to Linguistics. 4 units

Term Typically Offered: F, W

Prerequisite: Completion of GE Area A with grades of C- or better.

Introduction to the nature of language; concepts and methods of linguistic science. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

ENGL 303. Sequence IV: Late Eighteenth to Mid-Nineteenth Century. 4 units

Term Typically Offered: F, SP

Prerequisite: ENGL 205; and English major.

Representative canonical and non-canonical readings in American and British literature of the period. Will include Austen, Hawthorne, Jacobs, Ridge (Yellow Bird), Wollstonecraft, Wordsworth, and others, as chosen by the instructor. 4 lectures.

ENGL 304. Sequence V: Mid-Nineteenth Century to Late Nineteenth Century. 4 units

Term Typically Offered: F, W

Prerequisite: ENGL 303; and English major.

Representative canonical and non-canonical readings in American and British literature of the period. Will include Chesnut, Chopin, G. Eliot, Hopkins, C. Rosetti, Whitman, and others, as chosen by the instructor. 4 lecture.

ENGL 305. Sequence VI: Late Nineteenth to Mid-Twentieth Century. 4 units

Term Typically Offered: F, SP

Prerequisite: ENGL 304; and English major.

Representative canonical and non-canonical readings in American, British, and global Anglophone literature of the period. Will include H.D., T. Eliot, Hurston, Joyce, McKay, Woolf, and others, as chosen by the instructor. 4 lecture.

ENGL 306. Sequence VII: Mid-Twentieth Century to Present. 4 units

Term Typically Offered: F, SP

Prerequisite: ENGL 305; and English major.

Representative canonical and non-canonical readings in American, British and global Anglophone literature of the period. Will include Boland, Diaz, Ginsberg, Rushdie, Silko, Z. Smith, and others, as chosen by the instructor. 4 lectures.

ENGL 310. Corporate Communication. 4 units

Term Typically Offered: F,W,SP,SU

GWR

Prerequisite: Completion of GE Area A with grades of C- or better.

Recommended: Junior standing.

Instruction and practice in forms of communication characteristic of business and industry. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GWR for students with junior standing (90 units).

ENGL 311. Advanced Rhetorical Inquiry and Composing. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Analysis of multi-genre and multi-modal pieces. Focus on rhetorical strategies implemented across disciplines, histories, cultures. Rhetoric, persuasion, and composing will be studied as an art form and a humanistic endeavor. Not open to students with credit in ENGL 302 or ENGL 312. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 312. Translingual Rhetorical Inquiry and Writing. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C. Recommended: ENGL 133.

Writing and analysis of multi-genre and multi-modal projects for bilingual and multilingual audiences. Focus on rhetorical strategies writers implement across disciplines, histories, cultures. Rhetoric studied as an art form. Field trip may be required. Not open to students with credit in ENGL 302 or ENGL 311. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 316. Writing Sustainability. 4 units

Term Typically Offered: W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Place-based writing course investigating the social and humanistic impacts of environmental issues and sustainability. Writing in the major genres of social life cycle assessment and a final research paper. Instruction in designing effective data visualizations. Field trip may be required. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ENGL 317. Technical Editing. 4 units

Term Typically Offered: TBD

GWR

Prerequisite: Completion of GE Area A with grades of C- or better.

Recommended: Junior standing.

Instruction and practice in editing skills commonly used in workplace settings. Includes practical instruction in copyediting, sentence level editing, and substantive editing for accuracy and consistency. Editing documents, illustrations, web pages for consistency and use. Application of grammar and punctuation. 4 lectures. Fulfills GWR for students with junior standing (90 units).

ENGL 319. Information Design and Production. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better.

Recommended: Junior standing.

Mid-level presentation of the theory and practice involved with the production of technical documents. Focus on history, typography, information design principles, the effective integration of text and graphics, project management, and recent industry trends in software use. 4 lectures.

ENGL 330. British Literature: Beginnings to 1485. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The historical development of medieval English literature through selected canonical and non-canonical works of various genres. Medieval authorship and textual practice, the relationship between gender and writing, and the forging of a national poetic identity. Interdisciplinary support material (artwork and music) illustrating key themes. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 331. British Literature: 1485-1660. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The literary, historical, political, religious and scientific concerns of the Age of the Renaissance. May include such readings as More's *Utopia*, Spenser's *Faerie Queene*, Shakespeare's *Othello*, Donne's *Songs and Sonnets*, Milton's *Paradise Lost*. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 332. British Literature: 1660-1798. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth exploration of the dominant themes and preoccupations of the Age of Enlightenment. Historical and cultural contexts of canonical and non-canonical literature emphasized to illustrate 18th century Britons' views of themselves and their changing world. May include such writers as Dryden, Behn, Defoe, Swift, Pope, and Johnson. 4 lectures. Crosslisted as ENGL/HNRS 332. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 333. British Literature: 1798-1832. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth exploration of the literature of the British Romantic period. Cultural, historical, and philosophic contexts will also be examined in both canonical and non-canonical works. May include such writers as Blake, Wordsworth, Keats, and Wollstonecraft. 4 lectures. Crosslisted as ENGL/HNRS 333. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 334. British Literature: 1832-1914. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth study of historical, philosophical, and literary reaction to the rise of the modern industrial state. Special focus on the literary response to the following: industry, democracy, class, art, and culture. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 335. British Literature: 1914-Present. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth exploration of the dominant concerns and achievements of British literature from Modernism through Postmodernism. Historical and cultural contexts of canonical and non-canonical literature explored to illustrate 20th century Britain's reactions to the breakdown of traditional beliefs, the World Wars, the legacy of colonialism, the changing politics and problems of a multicultural nation. May include such writers as Conrad, Joyce, Woolf, Yeats, Heaney, Ishiguro, Walcott. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 339. Introduction to Shakespeare. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Shakespeare's works as texts, productions and major historical, aesthetic and cultural touchstones. The author's intellectual and social influences on four centuries of theatre and his subsequent impact on literature and other arts. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 340. American Literature: Beginnings-1865. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The literature of the United States from its sources in the accounts of the early British and Spanish explorers to the works of the American Renaissance. The relationship between mainstream and marginalized voices in the American character. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 341. American Literature: 1865-1914. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Analysis of literary Realism and Naturalism in their cultural and historical contexts. May include such writers as Whitman, Dickinson, Twain, Chopin, James, Wharton, Dreiser, Norris, and Crane who are seen to accommodate the sense of danger, doubt, and disorder of the time. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 342. American Literature: 1914-1956. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The writers of the modern period and those of the early post-modern age, including writers marked by stylistic innovation and a willingness to challenge traditionally accepted standards. May include such writers as Hemingway, Fitzgerald, Stein, Hughes. 4 lectures. Crosslisted as ENGL/HNRS 342. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 343. American Literature: 1956-Present. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth study of American fiction, poetry, and drama written since 1956. How contemporary literature examines enduring American themes and breaks new ground with the inclusion of diverse voices. 4 lectures. Crosslisted as ENGL/HNRS 343. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 345. Women Writers of the Twentieth and Twenty-First Centuries. 4 units

Term Typically Offered: SU
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR
 USCP

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth exploration of works of 20th and 21st century women authors within their historical and cultural contexts. Analysis of canonical and non-canonical writing by women of differing classes, races, ethnicities, and sexual orientations. Literary techniques through which texts reflect or challenge such cultural constructs as gender, identity, sexuality, motherhood, etc. The emergence of a female literary tradition. May include such writers as Adichie, Aoki, Lorde, Mukherjee, Olds, Rich. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ENGL/HNRS 345. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); USCP; and GWR.

ENGL 346. Ethnic American Literature. 4 units

Term Typically Offered: F, W
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR
 USCP

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Investigation of the primary issues, themes, and tropes of literature written in English by African-American, Asian-American, Native American, Hispanic and Jewish writers. Cultural and historical contexts explored to consider effects of marginalization on this literature, and its subsequent relation to the American canon. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); USCP; and GWR.

ENGL 347. African American Literature. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR
 USCP

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The writings of African Americans from the end of the eighteenth century to the present. Individual works and literary trends among African Americans of various periods and contexts: intellectual, political, and cultural. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as ENGL/HNRS 347. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); USCP; and GWR.

ENGL 348. Asian American Literature. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR
 USCP

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Investigation of the primary concerns, themes, and historical, cultural, and sociopolitical contexts of literature produced by people of West Asian, East Asian, South Asian, and/or Southeast Asian descent in the United States. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); USCP; and GWR.

ENGL 349. Gender in Twentieth and Twenty-First Century Literature. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR
 USCP

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth study of issues related to male and female identity and the relations between men and women as depicted in 20th and 21st century fiction, poetry, non-fiction, and/or drama. How gender issues are created and viewed from different perspectives, such as social/economic class, ethnicity, and sexual orientation. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); USCP; and GWR.

ENGL 350. The Modern Novel. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Readings in the modern novel in its historical and cultural context. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 351. Modern Poetry. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Modern poetry, considered in its historical and cultural context. The rise of experimental styles designed to reflect the disorder of the twentieth century - fragmentation, alienation, dislocation, and the absence of connections. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 352. Modern Drama. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Reading and analysis of world drama of the last 150 years, thereby enhancing student awareness of modern culture, history, ethics, politics, and the human condition. Design work, multi-media forms, art, music, and cinema as components or informing elements of the works under consideration. 4 lectures. Crosslisted as ENGL/HNRS 352. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 354. The Bible as Literature and in Literature and the Arts. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The most important and representative books of the Bible. Exposure to works based on the Bible in literature, painting, sculpture, architecture, music, and film. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 361. Reading Instruction for the Teaching of Young Adult Literature. 5 units

Term Typically Offered: SP

Prerequisite: Junior standing; completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2 (GE Area C1 for students on the 2019-20 or earlier catalogs). Recommended: EDUC 300.

Analysis and evaluation of young adult literature appropriate for classroom instruction in grades 6-12. Special attention paid to metacognitive strategies of making sense of text with an emphasis on pedagogical approaches. Twenty hours of fieldwork in secondary schools required. Participation in public schools requires mandated fingerprint clearance. 4 lectures, 1 activity.

ENGL 368. Theory and Practice of Peer-to-Peer Writing Instruction. 4 units

Term Typically Offered: F, W

Prerequisite: Junior standing; and completion of GE Area C2 (GE Area C1 for students on the 2019-20 or earlier catalogs) or consent of instructor.

Discussion and application of theories and practices central to writing center work, such as collaborative learning, the writing process, social dimensions of the peer/tutor relationship, and strategies for working with specific student populations including second-language writers and writers from across the disciplines. Recommended for those interested in becoming tutors in the Writing and Learning Center and/or new teaching assistants in English. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 activity.

ENGL 370. World Cinema. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Major works of international cinema with emphasis on critical interpretation, on the ways film communicates visually and aurally, and on the historical and cultural contexts in which films are created. 3 lectures, 1 laboratory. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 371. Film Styles and Genres. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Major films within particular cinematic genres or styles, with emphasis on critical interpretation, aesthetic appreciation, and the films' historical and cultural contexts. The Class Schedule will list topic selected. Total credit limited to 12 units. 3 lectures, 1 laboratory. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 372. Film Directors. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Films of one or more major film directors, with emphasis on critical interpretation, aesthetic appreciation, and the films' historical and cultural contexts. The Class Schedule will list topic selected. Total credit limited to 12 units. 3 lectures, 1 laboratory. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 373. Topics on Gender Representations in Film. 4 units

Term Typically Offered: W
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Focus on how films reinforce and challenge gender norms. Films will be studied through an intersectional lens. Attention given to technical elements of filmmaking, film criticism, and film history. The Class Schedule will list topic selected. 3 lectures, 1 laboratory. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 374. Disability and Diversity in American Film. 4 units

Term Typically Offered: F
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR
 USCP

Prerequisite: Junior standing; GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

An overview of cinematic representations of disability in film within the United States. Emphases on critical interpretation, history, aesthetics, and sociocultural contexts. Field trip may be required. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); GWR; and USCP.

ENGL 380. Literary Themes. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Literature selected according to a particular theme. Emphasis on critical interpretation, aesthetic appreciation, and historical and cultural contexts. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ENGL/HNRS 380. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

ENGL 381. Diversity in Twentieth and Twenty-First Century American Literature. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR
 USCP

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Literature selected according to a particular theme, with a focus on issues of ethnicity and gender. Emphasis on critical interpretation, aesthetic appreciation, and historical and cultural contexts. The Schedule of Classes will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); USCP; and GWR.

ENGL 382. LGBT Literature and Media. 4 units

Term Typically Offered: W, SP
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR
 USCP

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Representations of lesbian, gay, bisexual, transgendered (LGBT) individuals and issues, late 19th century to the present. Topics include the closet, homophobia, coming out, AIDS, same-sex marriage, intersections of sexuality, race, class, gender identity. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); USCP; and GWR.

ENGL 386. Creative Nonfiction. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Writing creative nonfiction (the memoir, the nature essay, the personal narrative, cultural criticism, literary journalism) by adding composition skills of fictional and poetic techniques. A publication workshop. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ENGL 387. Fiction Writing. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

How to write and read fiction. Exploring and understanding the elements of fiction writing, employing models by established writers. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ENGL 388. Poetry Writing. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

How to write and read poetry. Exploring a variety of formal options, employing model poems by established writers and identifying and enhancing what is best in poetry written in class. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ENGL 390. The Linguistic Structure of Modern English. 4 units

Term Typically Offered: W

Prerequisite: Completion of GE Area A with grades of C- or better.

Linguistic analysis of the English language, including phonology, morphology, syntax, and style and dialect variation. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

ENGL 391. Topics in Applied Linguistics. 4 units

Term Typically Offered: F, SP

Prerequisite: Junior standing and completion of GE Area A with grades of C- or better.

Topics in applied linguistics including sociolinguistics, first and second language acquisition, literacy, bilingualism, and dialectology. Applications to teaching the English language. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

ENGL 395. History of the English Language. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area A with grades of C- or better.

Linguistic approach to the history of the English language: evolution of phonology, morphology, lexicon, syntax, and semantics within the changing cultural context of the last 2000 years. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

ENGL 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of the department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units.

ENGL 408. Internship. 2-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of instructor.

Advanced study and part-time work experience; current innovation, practices, and problems in administration, supervision, and organization. Must be able to do independent work in career field. Weekly reports and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only.

ENGL 411. New Media Arts I. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing; and completion of GE Area A with grades of C- or better.

Advanced-level presentation of new media theory, design and practice. Topics covered include, but are not limited to, interactivity theory, user-centered system design, cognitive psychology, media analysis, and basic web design theory. Total credit limited to 8 units. 4 lectures. Crosslisted as ENGL/HNRS 411.

ENGL 412. New Media Arts II. 4 units

Term Typically Offered: TBD

Prerequisite: ENGL 411.

Advanced level of work with the primary technologies and design/critique theories currently at use in the professional creation of new media works. Lectures and readings expand upon material presented in ENGL 411. 4 lectures. Crosslisted as ENGL/HNRS 412.

ENGL 421. Advanced Topics in Technical and Professional Communication. 4 units

Term Typically Offered: F

Prerequisite: Junior standing; ENGL 221; and ENGL 317 or ENGL 319.

Advanced inquiry into themes, genres, or applications of technical and professional communication. Required for Technical and Professional Communication Certificate Program. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

ENGL 424. Teaching English in Secondary Schools. 5 units

Term Typically Offered: F

Prerequisite: Completion of GE Area A with grades of C- or better; Senior or graduate standing and admission to the teacher education program.

Research-based methods of teaching English in secondary schools, with emphasis on practical approaches to teaching grammar/mechanics and the writing process in a literature-based classroom. Attention to lesson and unit planning and integration of state standards and technology. 5 lectures.

ENGL 425. English Clinical Experience Seminar. 2 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: Acceptance into the Single Subject Credential Program in English. Concurrent: EDUC 469 or EDUC 479.

Principles and practices in effective teaching of English at the middle and high school level, learning theories, curriculum content and structure, classroom issues, and the teaching profession. Credit/No Credit grading only. Total credit limited to 4 units. 2 seminars.

ENGL 433. Race, Gender, and Sexuality in Early Modern English Drama. 4 units

Term Typically Offered: F

Prerequisite: Junior standing; and two of the following: ENGL 203, ENGL 204, ENGL 205, ENGL 303, ENGL 304, or ENGL 305. Recommended: ENGL 204.

Focus on representations of race, gender, and sexuality in early modern English drama, including texts by Cary, Jonson, Marlowe, Shakespeare, Sidney Herbert, and Wroth. Course may be offered in classroom-based, online, or hybrid format. 4 seminars.

ENGL 439. Topics in British Literature. 4 units

Term Typically Offered: F

Prerequisite: Junior standing and two of the following: ENGL 203, ENGL 204, ENGL 205, ENGL 303, ENGL 304, ENGL 305, ENGL 306. Recommended: English Major Sequence class in the relevant period.

Selected British writers, as individual writers or in groups. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based, online, or hybrid format. 4 seminars.

ENGL 449. Topics in American Literature. 4 units

Term Typically Offered: W, SP

Prerequisite: Junior standing and two of the following: ENGL 203, ENGL 204, ENGL 205, ENGL 303, ENGL 304, ENGL 305, ENGL 306. Recommended: English Major Sequence class in the relevant period.

Selected American writers, as individual writers or in groups. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

ENGL 459. Topics in Transatlantic and/or World Literature. 4 units

Term Typically Offered: F, SP

Prerequisite: Junior standing and two of the following: ENGL 203, ENGL 204, ENGL 205, ENGL 303, ENGL 304, ENGL 305, ENGL 306. Recommended: English Major Sequence class in the relevant period.

Selected world writers, as individual writers or in groups. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based, online, or hybrid format. 4 seminars.

ENGL 461. Senior Project. 4 units

Term Typically Offered: F, SP

Prerequisite: Senior standing; completion of the GWR; four of the following: ENGL 203, ENGL 204, ENGL 205, ENGL 303, ENGL 304, ENGL 305; and three of the following: ENGL 430, ENGL 431, ENGL 432, ENGL 439, ENGL 449, ENGL 459.

Capstone course which must be taken during the last two quarters of the student's undergraduate career.

ENGL 467. Topics in Rhetoric and Writing. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one upper-division course in GE Area C.

The study of rhetorical concepts and theories. Rhetorical analysis of various historical and contemporary texts -- including social, cultural and technological genres, compositions, and performances -- to understand how they communicate and persuade. Field trip may be required. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

ENGL 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ENGL 487. Advanced Creative Writing: Fiction. 4 units

Term Typically Offered: F, W

Prerequisite: ENGL 387.

Instruction and practice in advanced writing, revising and evaluating of fiction. Total credit limited to 8 units. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

ENGL 488. Advanced Creative Writing: Poetry. 4 units

Term Typically Offered: F, W

Prerequisite: ENGL 388.

Instruction and practice in advanced writing, revising and evaluating of poetry. Total credit limited to 8 units. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

ENGL 495. Topics in Applied Language Study. 4 units

Term Typically Offered: F

Prerequisite: ENGL 290 or ENGL 390.

Application of linguistics to human communications, human relations, and language policy and planning, or literature. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based, online, or hybrid format. 4 seminars.

ENGL 497. Theories of Language Learning and Teaching. 4 units

Term Typically Offered: F

Prerequisite: Two of the following: ENGL 290, ENGL 390, ENGL 391, ENGL 395, ENGL 495.

Theories of first and second language learning and acquisition in the context of teaching English to speakers of other languages. 4 lectures.

ENGL 498. Approaches to Teaching English to Speakers of Other Languages. 4 units

Term Typically Offered: W

Prerequisite: ENGL 497.

Approaches to teaching English to speakers of other languages. Attention to materials development and testing. 4 lectures.

ENGL 499. Practicum in Teaching English to Speakers of Other Languages. 2 units

Term Typically Offered: SP

CR/NC

Prerequisite: ENGL 498.

Practical experience in teaching English to speakers of other languages under the supervision of a cooperating classroom teacher. Teaching materials development and curriculum design. Credit/No Credit grading only. 1 seminar and supervised work.

ENGL 501. Introduction to English Studies. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing in English.

Purposes and methods of research in English studies, including literature, linguistics, rhetoric, and composition. Acquaintance with printed and on-line materials of research and practical experience in collecting material, weighing evidence, reaching conclusions, and writing scholarly articles. Discussion of areas of disciplinary specialization and ethics of scholarship. 4 seminars.

ENGL 502. Seminar in Critical Analysis. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing in English.

Basic approaches used by critics. Multiple points of view. Application to literary works. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 seminars.

ENGL 503. Graduate Introduction to Linguistics. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in English.

Introduction to linguistics for graduate students. Phonology, morphology lexicon, syntax, and variation within language; application of linguistics to real-world issues. 4 seminars.

ENGL 505. Composition Theory. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing in English.

Special problems in composition. Direct application of composition and rhetorical theory to composition instruction. 4 seminars.

ENGL 506. Pedagogical Approaches to Composition. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in English and ENGL 505, or consent of instructor. Concurrent: Teaching of ENGL 134.

Practical problems in the teaching of English composition. Application and study of practical approaches. Discussion of classroom organization and management. Discussion of research into the nature and resolution of student writing problems. Recommended for all new teaching assistants in English. 4 seminars.

ENGL 510. Seminar in Authors. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in English. Recommended: ENGL 501.

Intensive study of major British and American literary figures, singly, doubly or in small groups. Written and oral reports of individual investigation. The Class Schedule will list topic selected. Total credit limited to 16 units. 4 seminars.

ENGL 511. Seminar in American Literature. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing in English. Recommended: ENGL 501.

American periods. Written and oral reports of individual investigation. The Class Schedule will list topic selected. Total credit limited to 20 units. 4 seminars.

ENGL 512. Seminar in British Literature. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing in English. Recommended: ENGL 501.

British periods. Written and oral reports of individual investigation. The Class Schedule will list topic selected. Total credit limited to 20 units. Course may be offered in classroom-based, online, or hybrid format. 4 seminars.

ENGL 513. Seminar in Special Topics. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing in English. Recommended: ENGL 501.

Themes and ideas in language and literature not ordinarily covered in the routine graduate course offerings. Written and oral reports of individual investigation. The Class Schedule will list topic selected. Total credit limited to 16 units. 4 seminars.

ENGL 515. Apprenticeship in Teaching Literature, Composition, or Linguistics at College Level. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing in English and 8 units of successful graduate work.

Supervised experience in planning, teaching, and evaluating a 100-, 200- or 300-level linguistics, composition, or literature class taught by English faculty member. Planning, selecting texts, conferring with students, discussing and constructing assignments, lecturing, leading small group discussions. Credit/No Credit grading only. Total credit limited to 8 units.

ENGL 518. Graduate Technical Communication. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Introduction to technical communication scholarship for graduate students. Addresses usability, visual theory, information design, technical editing, and writing for professional and public audiences. Analysis and critique of technical communication documents. 4 seminars.

ENGL 519. Seminar in Rhetoric and Writing. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in English; and ENGL 505.

Themes and ideas in rhetoric and composition not ordinarily covered in the routine graduate course offerings. Written and oral reports of individual investigation. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

ENGL 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

ENGL 590. Directed Study. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in English and the permission of the graduate advisor.

Supervised independent or group study of special problems in selected areas of language, composition, or literature. Total credit limited to 12 units.

ENGL 598. Graduate Project. 2 units

Term Typically Offered: F, SP

Prerequisite: Consent of graduate advisor; ENGL 501; ENGL 502; ENGL 503; and ENGL 505.

Development, revision, and conclusion of a portfolio of graduate writing in literary criticism, linguistics, rhetoric, and/or composition. Students engage in research and present their completed projects to the graduate advisor. To be taken in the final term of the graduate program. 2 seminars.

Environmental Design (EDES)

undefined

EDES Courses

EDES 101. Introduction to Architecture and Environmental Design. 2 units

Term Typically Offered: TBD

Familiarization with the professional fields of architecture, landscape architecture, structural engineering, construction, and city planning. Introduction to the college's programs as they relate to individual aptitudes. The design process. Visiting speakers. 2 lectures.

EDES 123. Principles of Environmental Design. 4 units

Term Typically Offered: F, W, SP

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

Sustainability Related

Recommended: ARCH 131 for Architecture major.

How design relates and impacts environmental and social justice, equity, identity, community, and well-being. Design thinking, process, and tools in describing and planning the built environment. Divergent and inclusive thinking, engaging multiple publics, and expert knowledge in planning and design. Course may be offered in classroom-based or online format. 2 lectures, 2 discussions. Fulfills GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

EDES 350. The Global Environment. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/historical/political perspectives. Use of remote sensing maps. Sustainable solutions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as AG/EDES/ENGR/GEOG/ISLA/SCM/UNIV 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

EDES 406. Sustainable Environments. 4 units

Term Typically Offered: F

Sustainability Focused

Prerequisite: Fourth year or graduate standing.

Collaboration of interdisciplinary faculty and guest speakers/panelists. Introduction, illustration and analysis of concepts and principles for sustainability to be used in all aspects of environmental design. Integration and application of knowledge of human and natural systems with environmental, social and economic concerns, from a global-to-local perspective. 4 lectures.

EDES 408. Implementing Sustainable Principles. 4 units

Term Typically Offered: W, SP

Sustainability Focused

Prerequisite: EDES 406.

A primarily project-based course, intended to aid students who wish to collaborate with the purpose of implementing sustainability principles by developing tools, process or designs, for community-based projects and proposals at various scales of planning, architecture and design of the human environment to address social, environmental and economic issues. 4 lectures.

EDES 410. Advanced Implementation of Sustainable Principles. 4 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: EDES 408.

Advanced continuation of community-based projects defined and initiated in EDES 408. Ongoing projects, individual and group, address variable scales of planning, architecture, and environmental design, with required completion at the end of the course. 2 seminars and supervised work.

Environmental Engineering (ENVE)

undefined

ENVE Courses

ENVE 111. Introduction to the Environmental Engineering Profession. 1 unit

Term Typically Offered: F

CR/NC

Introduction to the Environmental Engineering Program including course planning, opportunities for global and regional problems such as water quality, waste management, and sustainability. Credit/No Credit grading only. 1 activity.

ENVE 264. Environmental Fluid Mechanics. 4 units

Term Typically Offered: F

Prerequisite: MATH 241, PHYS 132, and ME 211.

Theory and application of fluid statics and fluid dynamics to environmental problems in air and water systems. Fluid properties, pressure within stationary and moving systems, fluid momentum, pipe and channel flow including Bernoulli's Equation and friction effects, flow measurement systems. 4 lectures.

ENVE 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ENVE 304. Process Thermodynamics. 3 units

Term Typically Offered: W

Corequisite: CHEM 125 or CHEM 129; ENVE 331.

First and second laws of thermodynamics, properties of gases, liquids and mixtures, vapor-liquid equilibria, solubility and absorption, equilibrium in chemical reactions, thermodynamic applications in environmental engineering. 3 lectures.

ENVE 309. Noise and Vibration Control. 3 units

Term Typically Offered: W

Prerequisite: MATH 241 and PHYS 132.

Impact of noise and methods for noise reduction in industrial environments. Behavior of sound waves, selection of instrumentation, practical measurements, criteria for noise and vibration control. Laboratory and field measurements to investigate the basic principles of sound propagation and control. Assessment of noise produced by transportation and other engineering facilities. 2 lectures, 1 laboratory.

ENVE 323. Engineering for the Environment. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B1 and one course in GE Area B4 with grades of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Societal importance of air and water quality and land resources. Pollutant transport and treatment technologies, including the scientific basis for these technologies. Local examples of applied pollution control technologies to meet regulatory requirements. Field trip required. Not for engineering majors. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ENVE 324. Introduction to Air Pollution. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course each in GE Areas B1, B2, and B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Causes and effects of air pollution on the individual, the community and industry. Legal and economic aspects. For non-majors. Not open to students in engineering or computer science. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ENVE 325. Air Quality Engineering. 4 units

Term Typically Offered: F

Sustainability Related

Prerequisite: CHEM 125 or CHEM 128.

Causes and effects of air pollution on individual, regional, and global scales including meteorology, pollutant chemistry, global and regional transport, health impacts, regulations, air pollution control technology, and global climate change. Engineering principles to understand, model, and predict air quality. 4 lectures.

ENVE 331. Fundamentals of Environmental Engineering. 4 units

Term Typically Offered: F, W, SP

Sustainability Related

Prerequisite: CHEM 125 or CHEM 128, MATH 242 or MATH 244 (or concurrent).

Description and quantification of water and air quality characteristics important for water and wastewater treatment and air pollution control. Fundamentals of kinetics, reactor configurations, toxicity and dose-response relationship. Regulations governing ambient pollutant levels and discharges. Introduction to the modeling of pollutant fate and transport. Overview of solid waste management and global environmental issues. Course may be offered in classroom-based or online format. 4 lectures.

ENVE 400. Special Problems. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ENVE 405. Environmental Engineering Research. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor. Recommended: Prior or concurrent enrollment in ENVE 434 and ENVE 438.

Participation in environmental engineering research projects with emphasis on professional safety procedures for lab and field work and data quality assurance/quality control. Research projects focus on developing technologies or techniques that improve the sustainability of environmental engineering infrastructure. Total credit limited to 8 units; technical elective credit limited to 4 units. 1 laboratory.

ENVE 407. Environmental Engineering Design Competition. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: consent of instructor. Recommended: ENVE 331.

Design, build, test, and present a solution to an environmental problem posed by a student design competition. 1 laboratory. Total credit limited to 4 units.

ENVE 411. Air Pollution Control. 4 units

Term Typically Offered: F

Prerequisite: CE 251 or CSC 231; ENVE 304 or ME 302; ENVE 264 or ME 341; ENVE 325; and ENVE 331.

Theory, principles, and practices related to the control of particulate and gaseous emissions. Mechanical and chemical separations. Cost and design of control systems. 4 lectures.

ENVE 421. Mass Transfer Operations. 4 units

Term Typically Offered: SP

Prerequisite: ENVE 325, ENVE 331, ENVE 304 or ME 302, ENVE 264 or ME 341.

Theory of mass transfer principles applied to environmental problems. Diffusion and dispersion modeling of contaminant transport. Design principles of scrubbers, absorbers, and membrane systems for air and water pollution control. 4 lectures.

ENVE 426. Air Quality Measurements. 3 units

Term Typically Offered: SP

Prerequisite: ENVE 325, CHEM 212/312, ENVE 264 or ME 341, and STAT 312.

Planning and conducting air quality measurements in the atmosphere, indoors and at the source. Topics include quality control, calibration, and instrument operation for particulate matter, gas and meteorological measurements. 2 lectures, 1 laboratory.

ENVE 434. Water Chemistry and Water Quality Measurements. 4 units

Term Typically Offered: W

Prerequisite: CHEM 125 or CHEM 129, ENVE 330 or ENVE 331.

Aquatic environmental chemistry and water quality measurements. Equilibrium chemistry, carbonate systems, redox reactions, and electrochemistry. Laboratories include topics such as measurement of suspended solids, turbidity, alkalinity, BOD, and coliform detection. Quality analysis and control. 3 lectures, 1 laboratory.

ENVE 436. Introduction to Hazardous Waste Management. 4 units

Term Typically Offered: SP

Sustainability Related

Prerequisite: ENVE 325 and ENVE 331.

Overview of hazardous waste generation, federal and state regulations, storage, transport, treatment, and remediation. Principles of toxicology, unit operations and processes for the treatment, reduction, and remediation of wastes. Ultimate disposal including incineration, solidification, and bioremediation 4 lectures.

ENVE 438. Water and Wastewater Treatment Design. 3 units

Term Typically Offered: SP

Prerequisite: ENVE 331 and ME 341 or ENVE 264.

Theory and design of facilities for physical and chemical treatment of water and wastewater, biological treatment of wastewater, and treatment and disposal of sludge. 3 lectures.

ENVE 439. Sustainable Solid Waste Engineering. 4 units

Term Typically Offered: W

Prerequisite: ENVE 325 and ENVE 331; or graduate standing.

Design and analysis of recycling, composting, anaerobic digestion, gasification, and combustion systems for the recovery of resources and energy from solid wastes. Field trips required. 3 lectures, 1 laboratory.

ENVE 443. Bioremediation Engineering. 4 units

Term Typically Offered: SP

Prerequisite: ENVE 331.

State-of-the-art bioremediation technologies for soil, groundwater and contaminated air stream remediation and pollution prevention. Introduction to engineering design combining biogenetics, reactor configuration, and basic biological and engineering principles. Various in-situ and ex-situ technologies. Field trip may be required. 3 lectures, 1 laboratory.

ENVE 450. Industrial Pollution Prevention. 4 units

Term Typically Offered: F

Sustainability Focused

Prerequisite: ENVE 331.

Theory and case studies of innovative industrial waste minimization and resource conservation through principles of pollution prevention. Life-cycle assessment, pollution prevention, economic analysis, and sustainable designs. 3 lectures, 1 laboratory.

ENVE 455. Environmental Health and Safety. 4 units

Term Typically Offered: W

Prerequisite: ENVE 331.

Physical, chemical and biological hazards associated with industrial processes. Toxicology. Safety analysis and design. Causes and prevention of occupational and environmental hazards. Development and implementation of industrial hygiene programs. 4 lectures.

ENVE 466. Senior Project Design Laboratory I. 2 units

Term Typically Offered: W

Prerequisite: ENVE 438, CE 336 and senior standing. Corequisite: CE 465.

Capstone team project on a complex, integrated design problem typical of the environmental engineering profession. Formal reports and presentations are prepared. Non-technical issues addressed: ethics, teamwork, leadership, communication, and professional practice. 2 laboratories.

ENVE 467. Senior Project Design Laboratory II. 2 units

Term Typically Offered: SP

Prerequisite: ENVE 466.

Continuation of ENVE 466. Continuation of capstone project by individuals or teams with submission of final reports and presentations 2 laboratories.

ENVE 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ENVE 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ENVE 480. Environmental Engineering of Energy. 4 units

Term Typically Offered: F

Prerequisite: ENVE 304 or ME 302; ENVE 331. Recommended: ENVE 325.

Environmental impacts of conventional and renewable energy production and of emerging renewable energy development. Environmental engineering methods for mitigation of impacts of fossil fuel processing, including hydrofracking. Greenhouse gas inventory and management. Field trips required. 3 lectures, 1 laboratory.

ENVE 490. Environmental Nanotechnology. 4 units

Term Typically Offered: F

Sustainability Related

Prerequisite: ENVE 331 or MATE 370; and CHEM 125. Recommended: ENVE 421.

Nanotechnology basics, unique properties of nanomaterials, synthesis and characterization of nanomaterials from an environmental life-cycle perspective, environmental remediation using nanomaterials, environmental fate, transport, and toxicity of nanomaterials, sustainable nanotechnology, nanotechnology ethics and regulations, and careers in nanotechnology. 3 lectures, 1 laboratory.

ENVE 495. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

ENVE 500. Individual Study. 1-3 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of department chair.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Total credit limited to 4 units.

ENVE 525. Indoor Air Quality Engineering. 4 units

Term Typically Offered: TBD

Prerequisite: ENVE 264 or ME 341; senior or graduate standing.

Recommended: ENVE 325.

Pollutants sources and sinks indoors, transport processes, ventilation, and engineering controls. Human factors and engineering factors that influence the quality of the indoor environment. 4 lectures.

ENVE 535. Physico-Chemical Water and Wastewater Treatment. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or consent of instructor.

Physical and chemical processes used in potable water treatment and advanced wastewater treatment. Coagulation, flocculation, sedimentation, filtration, membrane separation, disinfection, and absorption. Wastewater recycling regulations. Integration of treatment processes. 4 lectures.

ENVE 536. Biological Wastewater Treatment Processes Engineering. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing or consent of instructor.

Fundamentals of biological wastewater treatment. Suspended and attached growth bioreactors. Activated sludge, biotower, and anaerobic process design. Biological nutrient removal. 4 lectures.

ENVE 537. Decentralized Wastewater Management. 4 units

Term Typically Offered: SP

Prerequisite: ENVE 438 or Graduate standing.

Design and management of decentralized wastewater treatment systems. Septic tanks, aerobic nutrient removal systems, ponds, constructed wetlands, and improved latrines; surface and subsurface effluent recycling or disposal; and septage management. 4 lectures.

ENVE 540. Advanced Membrane Technology and Applications. 4 units

Term Typically Offered: W

Prerequisite: ENVE 421 or graduate standing. Recommended: ENVE 438.

Membrane materials, structure, and fabrication. Membrane transport theory, performance factors, monitoring, and control. Mathematical modeling of membrane operations, design using WAVE, IMS and computational fluid dynamics. Desalination plant design, energy, and cost analyses. Membranes applications in water and energy. Field trip required. 3 lectures, 1 laboratory.

ENVE 542. Sustainable Environmental Engineering. 4 units

Term Typically Offered: W

Prerequisite: Graduate or senior standing or consent of instructor.

Critical analysis of environmental engineering practices such as solid waste management, recycling, and wastewater treatment from the viewpoint of energy efficiency, lifecycle cost, and sustainability. Both laboratory experiments and computer models to assess sustainability. Course offered in hybrid format with classroom-based and online learning. 3 lectures, 1 laboratory.

ENVE 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1-4 seminars.

ENVE 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ENVE 581. Biochemical Engineering. 4 units

Term Typically Offered: TBD
Prerequisite: CHEM 312 and MCRO 221.

Types of microorganisms and microbially-mediated biochemical reactions for biotechnology applications. Stoichiometric and thermodynamic principles for microbial growth and metabolism. Material and energy balances for aerobic and anaerobic growth and bioreactor design. Kinetics of enzyme catalyzed reactions. Field trips required. 3 seminars, 1 laboratory. Crosslisted as ENGR/ENVE 581.

ENVE 599. Design Project (Thesis). 1-9 units

Term Typically Offered: F, W, SP
Prerequisite: Graduate standing.

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis.

Environmental Sciences (ESCI)

undefined

ESCI Courses

ESCI 500. Individual Study. 1-4 units

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Advanced independent study planned and completed under the direction of a member of the NRES department faculty. Open only to graduate students who have demonstrated ability to do independent work. Total credit limited to 16 units; with a maximum of 4 units per quarter. Formerly NR 500.

ESCI 501. Research Planning. 4 units

Term Typically Offered: F, W
Prerequisite: Senior standing.

Problem solving and research planning for agriculture, natural resources and related sciences. Preparation of study plans that identify problems, review appropriate literature, formulate objectives, develop methods and provide for presentation and interpretation of results. Oral reports. 4 lectures. Formerly SS 501.

ESCI 502. Research Methods and Data Analysis. 4 units

Term Typically Offered: W
Prerequisite: Graduate standing or consent of instructor; ESCI 501; and STAT 217.

Quantitative and qualitative survey of research methods for environmental science and management including research design, sampling, data collection, analysis, and interpretation. 3 lectures, 1 laboratory.

ESCI 539. Graduate Internship in Environmental Sciences and Management. 2-4 units

Term Typically Offered: F,W,SP,SU
CR/NC
Prerequisite: Graduate standing.

Independent internship experience conducted under faculty supervision focusing on a discipline area of environmental science/management. Total credit limited to 4 units. Credit/No Credit grading only. Minimum of 60-120 hours required.

ESCI 550. Advanced Environmental Science. 4 units

Term Typically Offered: F
Prerequisite: Graduate standing or consent of instructor. Recommended: An environmental science/management course.

Advanced study of earth system processes and environmental problems. Advanced application of systems thinking to study of energy, geologic systems, groundwater and surface water resources, soils, environmental pollution and degradation, atmospheric and ocean dynamics, and the global climate system. 3 lectures, 1 activity.

ESCI 581. Graduate Seminar in Environmental Sciences. 2 units

Term Typically Offered: SP
Prerequisite: Consent of instructor.

Student study and presentation of selected developments, trends and problems in environmental science, forest and natural resources, earth and soil sciences, and environmental management. Total credit limited to 4 units. 2 seminars. Formerly NR/SS 581.

ESCI 590. Advanced Environmental Management. 4 units

Term Typically Offered: W
Prerequisite: Graduate standing or consent of instructor; and ESCI 501.
Recommended: An environmental science/management course.

Scientific principles of environmental issues and environmental management practices focusing on sustainable development and systems thinking centered around the health of humans and ecosystems. Analysis of fundamental and emerging environmental factors that impact management practices. 3 lectures, 1 activity.

ESCI 596. Environmental Sciences and Management Project. 5 units

Term Typically Offered: SU
Prerequisite: Graduate standing or consent of instructor; ESCI 502; ESCI 550; ESCI 581; and ESCI 590.

Individual research or study toward a professional project that leads to an improved understanding of the physical environment, solution of an environmental problem, natural resources management, or an improved interaction between society and the natural environment. 5 lectures.

ESCI 599. Thesis. 1-9 units

Term Typically Offered: F,W,SP,SU
Prerequisite: Consent of instructor.

Individual research in environmental science, environmental management under the general supervision of faculty, leading to a graduate thesis. Degree credit limited to 9 units. Formerly NR 599.

Ethnic Studies (ES)

undefined

ES Courses

ES 112. Race, Culture, and Politics in the United States. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: GE Area D1

2019-20 or earlier catalog: GE Area D1

USCP

Interdisciplinary study of race and ethnicity as created by historical processes and American institutions (social, political, economic, legal and cultural institutions). Attention to interlocking systems of race, class, gender and sexuality. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ES/HNRS 112. Fulfills GE D1 and USCP.

ES 114. Introduction to Ethnic Studies. 4 units

Term Typically Offered: W

USCP

Racial equality movements, including the history of Ethnic Studies (1960's & 70's), and the social practices, institutions, cultural representations/discourses, and public policies that construct and reinforce racism, racist ideology, and pseudo-scientific conceptions of race and intersections with gender and class. 4 lectures. Fulfills USCP.

ES 134. Writing & Rhetoric. 4 units

Term Typically Offered: F

2020-21 or later catalog: GE Area A2

2019-20 or earlier catalog: GE Area A1

Writing and rhetorical strategies and practices that produce sound academic writing; foregrounds a process-based, recursive approach to writing. 4 Lectures. Fulfills GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs).

ES 145. Reasoning, Argumentation, & Writing. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area A3

2019-20 or earlier catalog: GE Area A3

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for student on the 2019-20 or an earlier catalog). Recommended: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for student on the 2019-20 or an earlier catalog).

Principles of reasoning and argumentation. Application of these principles to written and oral communication. Effective use of research methods and sources. 4 lectures. Fulfills GE Area A3 with a grade of C- or better.

ES 200. Special Problems. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 4 units.

ES 215. Planning for and with Multiple Publics. 4 units

Term Typically Offered: SP

USCP

Prerequisite: Completion of GE Area D1. Recommended: ES 112.

How the social/spatial relationships among racial/ethnic and gender groups are expressed in terms of human settlement patterns, civic involvement and everyday negotiations. Ways in which segregation and marginalization are expressed in western and non-western contexts. 4 lectures. Crosslisted as CRP/ES 215. Fulfills USCP.

ES 252. Global Origins of Race in the U.S.. 4 units

Term Typically Offered: F, W, SP

GE Area F: Ethnic Studies

Explores global origins of race in the U.S. including forced slavery, removal, displacement, and migration of Native Americans, Latinas/os, African Americans, and Asian Americans. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ES/HNRS 252. Fulfills GE Area F.

ES 253. Introduction to American Indian Studies. 4 units

Term Typically Offered: F, W, SP

GE Area F: Ethnic Studies

Introduction to social, political, economic, legal, and cultural traditions of American Indians in the U.S. Special attention to the interlocking systems of race, class, gender, and sexuality. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area F.

ES 254. Introduction to African American Studies. 4 units

Term Typically Offered: F, W, SP

GE Area F: Ethnic Studies

Introduction to social, political, economic, legal, and cultural traditions of African Americans in the U.S. Special attention to the interlocking systems of race, class, gender, and sexuality. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area F.

ES 255. Introduction to Latino/a/x Studies. 4 units

Term Typically Offered: F, W, SP

GE Area F: Ethnic Studies

Introduction to social, political, economic, legal, and cultural traditions of Chicanas/os and Latinas/os in the U.S. Special attention to the interlocking systems of race, class, gender, and sexuality. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area F.

ES 256. Introduction to Asian American Studies. 4 units

Term Typically Offered: F, W, SP

GE Area F: Ethnic Studies

Introduction to social, political, economic, legal, and cultural traditions of Asian Americans in the U.S. Special attention to the interlocking systems of race, class, gender, and sexuality. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area F.

ES 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ES 300. Chicano/a Non-Fiction Literature. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Overview of contemporary Chicano/a non-fiction literature since 1848. Thematic concerns, literary criticism, literary techniques, historical and socio-cultural factors influencing non-fiction Chicano/a literary genres. Instructor reserves option to select non-fiction genres to be studied. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

ES 301. Latina/o Literature of the United States. 4 units

Term Typically Offered: F, W
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Latina/o literature written by/for/about Latinas/os in the United States. Topics include literary representation of Latinos/as in the U.S. related to race/ethnicity, gender, sexuality, class, etc. Primary focus on Latina/o literary texts in the mid 20th to early 21st centuries. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

ES 302. Chicana/o Literature. 4 units

Term Typically Offered: W, SP
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Chicana/o literature written by/for/about Chicanas/os in the United States. Topics include literary representation of Chicanos/as in the U.S. related to race/ethnicity, gender, sexuality, class, etc. Primary focus on Chicana/o literary texts in the mid 20th to early 21st centuries. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

ES 303. Latina/o Poetry and Politics. 4 units

Term Typically Offered: SP
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Significant Latinx/a/o poetry and poetics from the 19th century to the present. Topics include genre, form, content, politics, and poetics of Latina/o writers of poetry; comparisons/contrasts of different Latina/o ethnic poets and their poetry in different historical periods. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

ES 304. Race & American Literature. 4 units

Term Typically Offered: W, SP
 GE Area F: Ethnic Studies

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on 2019-20 or earlier catalogs).

Comparative approach to the Native American, African American, Asian American and Latina/o literary canons. 4 lectures. Fulfills GE Area F.

ES 308. Fire and Society. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Prehistorical and historical record of human use of and attitude toward fire. Mythology and religion of fire. Traditional, cultural and ethnic variations and their influence on modern U.S. institutions involved in managing fire. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as ES/NR 308. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

ES 310. Hip-Hop, Poetics and Politics. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: Lower-division Ethnic Studies (ES) course in GE Area D.

Dynamics of hip-hop culture, its historical development, political significance, and social influence. How hip-hop exemplifies cross-cultural hybridization within not only Black communities nationally and internationally, but also amongst indigenous, Latino/a, and Asian peoples in the U.S. and beyond. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

ES 311. Beyoncé: Race, Feminism and Politics. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; completion of GE Area D1; and completion of one USCP course.

Employing an Ethnic Studies lens, Beyoncé body of work and image will serve as a lens through which to explore pop constructions and representations of race, gender, and sexuality as well as the use of those intersecting identities as political tools. 4 lectures.

ES 312. Race & Media Studies. 4 units

Term Typically Offered: W, SP

GE Area F: Ethnic Studies

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on 2019-20 or earlier catalogs).

Engagements with qualitative analysis, social, cultural, and political theories, and power relations related to the representations of Native Americans, African Americans, Asian Americans and Latinas/os in the contemporary mass media in the United States. 4 lectures. Fulfills GE Area F.

ES 320. African Americans in Popular Culture. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: Lower-division Ethnic Studies (ES) course in GE Area D.

Cultural studies analysis of the representations of, and counter-representations by, American racial/ethnic groups, with particular emphasis on African Americans. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

ES 321. Native Americans in Popular Culture. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: Lower-division Ethnic Studies (ES) course in GE Area D.

Cultural studies analysis of the representations of, and counter-representations by racial/ethnic groups, with particular emphasis on Native Americans. The cultural images of Native peoples in the United States that have characterized relationships. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

ES 322. Asian Americans in Popular Culture. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: Lower-division Ethnic Studies (ES) course in GE Area D.

Cultural studies analysis of the representations of, and counter-representations by, American racial/ethnic groups, with particular emphasis on Asian-Americans. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

ES 323. Latina/os in Popular Culture. 4 units

Term Typically Offered: F, W, SU

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: Lower-division Ethnic Studies (ES) course in GE Area D.

Cultural studies analysis of the representations (racializing images and discourses) of, and counter-representations by, American cultural/ethnic groups with particular emphasis on Mexican Americans/Latinos. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

ES 324. Chicana/o Film. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Exploration of how Chicanas/os and their experiences are represented in major films by/for/about them in the United States. Topics include visual/popular culture and film theories, race and representation; film genre; key film concepts. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

ES 325. African American Gender & Sexuality. 4 units

Term Typically Offered: TBD

USCP

Prerequisite: One lower-division course in GE Area D. Recommended: ES 112 or ES 212.

Issues around genders and sexualities that influence the social, political, economic and cultural development of Black America, and challenging anti-Black thought on Black sexual expression. Special attention given to racism, intersectionality, and myths about Black sexuality and gender conventions. 4 lectures. Fulfills USCP.

ES 326. Native American Architecture and Place. 4 units

Term Typically Offered: W
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The role of culture and setting in the construction of spatial, material and landscape concepts and artifacts, through the introduction of selected North American cultures, with focus from 1300 AD through contemporary time. 4 lectures. Crosslisted as ARCH/ES 326. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

ES 330. The Chinese American Experience. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: Lower-division Ethnic Studies (ES) course in GE Area D.

History and current status of Chinese Americans, with emphasis on the international contexts, organizations and institutions of Chinese America, and on Chinese Americans' demographic compositions, spatial patterns, and cultural, socioeconomic, and political adaptation experiences. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

ES 335. The Filipina/o American Experience. 4 units

Term Typically Offered: W
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: Lower-division Ethnic Studies (ES) course in GE Area D.

An interdisciplinary examination of the historical development of Filipina/o American identities and communities. The social, cultural and political institutions that have influenced Filipina/o immigration, participatory citizenship, activism and cultural practices. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

ES 340. Cultural Production and Ethnicity. 4 units

Term Typically Offered: F, W, SU
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C. Recommended: Completion of an Ethnic Studies (ES) course.

Culture and ethnicity as key factors in the production, perception, and interpretation of art and the humanities. Critical analysis of cultural attitudes and knowledge in expressive arts and cultural production, and of the contexts of cultural production as reflective of ethnicity. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ES 345. Queer Ethnic Studies. 4 units

Term Typically Offered: F, W
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Theories, research and methods focused on the interlocking systems of sexuality, race, racialization, and ethnicity in local, national and comparative global/transnational contexts. Relationships between racialization and heteronormativity; queer of color critique; queer migration; decolonizing queer organizing, theory, and knowledge production. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ES/WGQS 345. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP. Formerly WGS 345.

ES 350. Gender, Race, Culture, Science & Technology. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later: Upper-Div GE Area B
 2019-20 or earlier catalog: GE Area B5, B6, or B7
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Area B2; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: STAT 130, 217, 218, 251, 301, 312, or 321.

Examines the complex relationships between gender, race, culture, science, and technology via intersectional quantitative and qualitative inquiry, centering the perspectives/contributions of historically marginalized people in the U.S. Explores, evaluates, and develops proposals to create more diverse, equitable, ethical, humane science/technology. Course may be offered in classroom-base, online, or hybrid format. 3 lectures, 1 activity. Crosslisted as ES 350/HNRS 353/WGQS 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog); and USCP. Formerly WGS 350.

ES 351. Gender, Race, Class, Nation in Global Engineering, Technology & International Development. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Cross-cultural exploration of the intersections of gender, race, class, nation in the global engineering workforce, small- and large-scale technological systems, and international development programs; special attention to 21st century challenges and efforts to create more socially responsible engineering and technology. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ES/WGQS 351. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs). Formerly WGS 351.

ES 360. Ethnicity and the Land. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C. Recommended: Lower-division Ethnic Studies (ES) course and introductory natural resources course.

Comparative study of how race and culture shape landscapes, and how social hierarchies allocate the use of natural resources and the burdens of environmental pollution. 4 lectures. Crosslisted as ES/NR 360. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

ES 380. Critical Race Theory. 4 units

Term Typically Offered: W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

History and evolution of the critical race theory movement. Defining issues of the field; in particular, the relationship between race, power and the law. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

ES 381. The Social Construction of Whiteness. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: Lower-division Ethnic Studies (ES) course in GE Area D..

The investigation of the social construction of race in the United States through historicizing the category of 'whiteness.' Why 'white' was invented as a racial category and how white privilege has been sustained through social, political, economic and legal practices. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

ES 382. Racial Capitalism. 4 units

Term Typically Offered: W, SP

GE Area F: Ethnic Studies

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Advanced investigation of the theoretical and historical linkages between race, economic exploitation, and struggles for liberation. 4 lectures. Fulfills GE Area F.

ES 390. Research Methodology in Comparative Ethnic Studies. 4 units

Term Typically Offered: F

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; STAT 217; ES 112; and three courses from ES 241, ES 242, ES 243, ES 244.

Theory and practice of research methodology in comparative ethnic studies. Topics include the scientific method, qualitative and quantitative methodologies, and ethical practices. Research report prepared from start to finish, including database searching, collecting pilot data, and proper formatting of a research report. Issues of race in research practice and use foregrounded throughout. 3 lectures, 1 activity.

ES 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of department chair.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units.

ES 406. Indigenous Peoples and International Law and Policy. 4 units

Term Typically Offered: TBD

Prerequisite: ES 253; and NR 141 or NR 142; and junior standing required.

Interdisciplinary examination of the evolution of international law effecting indigenous peoples in the U.S. and in the Americas. Development of international legal and sociological norms and their impact on human rights of indigenous peoples with particular attention to environmental issues. 4 lectures. Crosslisted as ES/NR 406.

ES 410. Advanced Topics in Comparative Ethnic Studies. 4 units

Term Typically Offered: TBD
Prerequisite: ES 390.

Selected topics and issues in comparative ethnic studies. The Class Schedule will list topic selected. Repeatable for a maximum of 8 units. 4 seminars.

ES 450. Fieldwork in Comparative Ethnic Studies. 4 units

Term Typically Offered: W
Prerequisite: ES 390.

Supervised project based on fieldwork in comparative ethnic studies. 4 seminars.

ES 461. Senior Project. 4 units

Term Typically Offered: SP
Prerequisite: ES 390 and departmental approval.

Completion of a project under faculty supervision. Results presented in a formal paper or project.

ES 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: At least one course in Ethnic Studies and consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1-4 lectures.

Fire Protection Engineering (FPE)

undefined

FPE Courses

FPE 500. Individual Study. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of graduate coordinator and supervising faculty member.

Advanced study planned and completed under the direction of a member of the program faculty. Open only to graduate students in the FPE program who have demonstrated ability to do independent work. FPE 500 must be taken as a 4-unit class when substituting for a required course in the FPE program.

FPE 501. Fundamental Thermal Sciences. 4 units

Term Typically Offered: F
Prerequisite: Graduate standing or consent of instructor.

Introduction to the thermal sciences, including thermodynamics, fluid dynamics and heat transfer, as they relate to fire protection engineering. Includes 1st and 2nd laws of thermodynamics, conservation relations, hydrostatics, internal and external flows, and heat transfer by conduction, convection and radiation. 4 lectures.

FPE 502. Fire Dynamics. 4 units

Term Typically Offered: W
Prerequisite: FPE 501 or consent of instructor.

First exposure to fire dynamics phenomena. Includes fundamental fire and combustion topics such as thermodynamics of combustion, fire chemistry, premixed and diffusion flames, ignition, burning of liquids and solids, heat release rates, flame spread and fire plumes. 4 lectures.

FPE 503. Flammability Assessment Methods. 4 units

Term Typically Offered: SP
Prerequisite: FPE 502.

Characterization of flammability properties of gaseous, liquid and solid materials. Fire test methods for evaluating flammability properties of materials and burning characteristics of products. Overview of regulatory requirements for restricting the flammability of products and materials used in buildings. 4 lectures.

FPE 504. Fire Modeling. 4 units

Term Typically Offered: SU
Prerequisite: FPE 502, FPE 503.

Fire modeling techniques for fire safety assessment. Application of various engineering correlations and computer-based fire models, including zone models and computational fluid dynamics models, to representative fire problems. 4 lectures.

FPE 521. Egress Analysis and Design. 4 units

Term Typically Offered: F
Prerequisite: Graduate standing or consent of instructor.

Regulatory requirements for egress systems in buildings, including occupancy classifications, occupant loads, means of egress components and exit capacities. Introduction to human behavior in fire and to methods for calculating people movement under emergency conditions, including computer-based evacuation models. 4 lectures.

FPE 522. Fire Detection, Alarm and Communication Systems. 4 units

Term Typically Offered: SP
Prerequisite: Graduate standing or consent of instructor.

Analysis of the operating characteristics of fire detection devices and alarm notification appliances. Introduction to modern fire alarm systems and components. Introduction to mass communication systems. Current installation and approval standards. 4 lectures.

FPE 523. Water-based Fire Suppression. 4 units

Term Typically Offered: W
Prerequisite: Graduate standing.

Analysis and design of water-based fire suppression systems, including water supply analysis and hydraulic calculations. Overview and design considerations for automatic sprinkler, water spray, water mist and foam suppression systems. Typical contemporary installations and current installation and approval standards. 4 lectures.

FPE 524. Structural Fire Protection. 4 units

Term Typically Offered: SU
Prerequisite: Graduate standing or consent of instructor.

Regulation and analysis procedures for structural components of wood, steel, concrete, composites. Structural capabilities, modifications under fire induced exposures. Calculation methods for predicting fire resistance of structural components. Definition of types of building construction. 4 lectures.

FPE 551. Fire Safety Regulation and Management. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or consent of instructor.

Use of model building and fire codes, administrative regulation, retrospective codes, performance-based codes, and risk-based regulation to manage fire safety. Identification and application of different fire risk management tools and techniques. 4 lectures.

FPE 552. Smoke Management and Special Hazards. 4 units

Term Typically Offered: W

Prerequisite: FPE 502 and FPE 504.

Analysis and design of smoke management systems. Assessment of smoke hazards. Identification of special hazards. Analysis and design of fire suppression systems used for fire control of special hazards, including gaseous and chemical agents and systems. 4 lectures.

FPE 554. Forensic Fire Analysis. 4 units

Term Typically Offered: SP

Prerequisite: Consent of graduate coordinator and instructor.

Recommended: FPE 504.

Introduction to the processes of fire investigation and reconstruction. Engineering analysis of structural and wildland fires. Identification of failure mechanisms in fire safety systems. Case studies of actual fire incidents to address and reinforce concepts related to different types of system and performance failures. 4 lectures.

FPE 555. Fire Protection Management in the Wildland-Urban Interface (WUI). 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor. Recommended: LA/NR 318 and NR 340.

Social, economic, political, and technological issues affecting fire management in urbanized landscapes where fire continues its ecological role. Fire risk analysis; needs assessment, legislative codes, standards and policies; liability issues; evacuation; incident response planning. 3 lectures, 1 laboratory.

FPE 593. Curricular Practical Training (CPT) for Fire Protection Engineering. 1-5 units

Term Typically Offered: SU

Prerequisite: Consent of Graduate Coordinator.

Curricular Practical Training (CPT) to gain work experience directly related to fire protection engineering. Intended for international students. CPT work authorization is required for all paid or non-paid, part- or full-time employment and internships. Total credit limited to 5 units.

FPE 596. Culminating Experience in Fire Protection Engineering. 1-5 units

Term Typically Offered: W, SP

Prerequisite: FPE 504, advanced graduate standing, completion of, or concurrent enrollment in, engineering courses in program, and consent of instructor.

Performance of comprehensive fire and life safety evaluations of buildings and other structures. Communication of the results and findings of such evaluations in written report and by oral presentation. Conducted under supervision of faculty.

FPE 599. Design Thesis. 1-9 units

Term Typically Offered: TBD

Prerequisite: Consent of graduate coordinator and graduate standing.

Each individual will be assigned a thesis project for solution under faculty supervision as a requirement for the master's degree, culminating in a written thesis.

Food Science and Nutrition (FSN)

undefined

FSN Courses

FSN 101. Orientation to the Nutrition Major. 1 unit

Term Typically Offered: F

CR/NC

Understanding the depth and breadth of the Nutrition program. Emphasis on academic and career planning. Students are required to complete this course within their first year in the major. Credit/No Credit grading only. 1 lecture.

FSN 102. Orientation to the Food Science Major. 1 unit

Term Typically Offered: F

CR/NC

Understanding the depth and breadth of the Food Science program. Emphasis on the Food Science major, the Food Science and Nutrition Department, related club and professional organization activities, and academic and career planning. Credit/No Credit grading only. 1 lecture.

FSN 121. Fundamentals of Food. 4 units

Term Typically Offered: F, W, SP

Theoretical aspects and practical applications of the principles of culinary science and food preparation. 3 lectures, 1 laboratory.

FSN 125. Introduction to Food Science. 4 units

Term Typically Offered: F

Basic principles of food science. Chemical, physical, and microbiological properties of foods. Ingredient properties, preservation, and processing. Overview of the commercial food processing industry at state and national levels. Field trip may be required. Not open to students with credit in FSN 230. 3 lectures, 1 laboratory.

FSN 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 4 units per quarter.

FSN 201. Enterprise Project. 1-4 units

Term Typically Offered: TBD

CR/NC

Prerequisite: FSN 125 or FSN 230 or FSN 121 and consent of instructor.

Post-harvest processing of a high quality food product. Project participation is voluntary and subject to approval by the department head and the Cal Poly Corporation. Total degree credit for FSN 201 and FSN 401 combined limited to 12 units. Credit/No Credit grading only.

FSN 202. Introduction to Human Nutrition. 4 units

Term Typically Offered: F, W, SP

Introduction to the science of human nutrition. Nutrient structure, metabolism, function and requirements. Application of nutrition science principles to promote optimal health. Course may be offered in classroom-based or online format. 4 lectures.

FSN 204. Food Processing Operations. 4 units

Term Typically Offered: W

Prerequisite: FSN 125 or FSN 230; MATH 141 or MATH 161; PHYS 121.

Explore unit operations (drying, heating, etc.) in food processing. Introduction to basic concepts of engineering (unit conversion, mass balance and heat transfer). Operate pilot scale processing equipment and evaluate the results of those operations. Students produce processed foods in a pilot plant. Field trip required. 3 lectures, 1 laboratory.

FSN 230. Elements of Food Processing. 4 units

Term Typically Offered: W

Principles of food processing operations covering thermal processing, freezing, dehydration, fermentation and raw material handling. Overview of food technology, food quality, spoilage, packaging and label requirements. For non-Food Science majors only. Field trip may be required. Not open for students with credit in FSN 125. 3 lectures, 1 laboratory.

FSN 244. Cereal and Bakery Science. 4 units

Term Typically Offered: TBD

Prerequisite: FSN 125 or FSN 230.

Applied science of cereal-based products. Theory and practice underlying preparation of doughs, batters, fillings, and glazes. Chemistry of baking doughs and batters and storage of finished products. Marketing and product development of breads, cakes, cookies, and pastries. Comparative nutritional evaluation of flours, grains, and finished products. 3 lectures, 1 laboratory.

FSN 250. Food and Nutrition: Culture and Customs. 4 units

Term Typically Offered: F,W,SP, SU

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

USCP

Sustainability Related

Anthropological perspective of traditional and contemporary food customs and culture. Major emphasis on U.S. cultures including Native American, Hispanic American, African American, and Asian American. Opportunities to explore personal cultural food experiences. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs) and USCP.

FSN 275. Elements of Food Safety. 4 units

Term Typically Offered: F

Introduction to food safety from farm-to-fork. Topics include good agricultural practices, good manufacturing practices, food safety regulations, and an overview of Hazard Analysis Critical Control Point (HACCP). Emphasis on control of biological, chemical, and physical hazards to assure food safety. Not open to Food Science majors. 4 lectures.

FSN 281. Writing in Nutrition Science. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs); completion of GE Area A3 with a grade of C- or better; and FSN 202.

Introduction to writing in nutrition science. Foundations in scientific writing processes, scientific reading, literature review, reference management. Emphasis on identifying and summarizing reliable sources, analyzing the audience, and revising for complexity and depth. 2 activities.

FSN 290. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

FSN 304. Advanced Culinary Principles and Practice. 4 units

Term Typically Offered: SP

Prerequisite: CHEM 127 and FSN 121.

Chemistry of starch, fat and proteins and its impact on texture, taste, flavor and appearance of food. Effects of microorganisms on changes of food during preparation and storage. 3 lectures, 1 laboratory.

FSN 305. Nutrition & Exercise for Health & Disease Prevention. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Introduction, integration, and application of nutrition and exercise sciences and recommendations for attaining health and preventing disease development, including obesity, diabetes, and cardiovascular disease. Development of personalized diet and exercise plan for health and disease prevention. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

FSN 310. Maternal and Child Nutrition. 4 units

Term Typically Offered: F, W, SP

Prerequisite: FSN 202 and junior standing.

Nutritional needs and related nutritional challenges of women and children, including fertility, pregnancy and lactation; physical, nutritional, social growth and development from infancy through adolescence. Current nutrition issues in maternal and child nutrition. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

FSN 311. Sensory Evaluation of Food. 4 units

Term Typically Offered: W

Prerequisite: FSN 125 or FSN 230; and STAT 314.

Sensory attributes of food, physiological basis of sensory evaluation, sensory panels, environment for sensory evaluation, sample preparation and presentation, types of score cards, statistical methods for data analysis and interpretation. Course may be offered in classroom-based or hybrid format. 3 lectures, 1 laboratory.

FSN 315. Nutrition in Aging. 4 units

Term Typically Offered: F, W, SP

Prerequisite: FSN 202 and sophomore standing.

Nutrition issues in the middle and later years. Changes in organ systems, nutrient needs, functional status, and food preferences as adults age. Nutrition and chronic disease. Nutritional assessment and screening. Nutrition-related health care and social services. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

FSN 319. The Science of Food for the Consumer. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Overview of the science and processes used to produce the foods consumed on a daily basis. Food science, biotechnology, food law, processing, preservation, ingredient functionality, package label information, and food safety information. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

FSN 321. Contemporary Issues in Food Choice and Preparation. 4 units

Term Typically Offered: F, W

Prerequisite: FSN 121, FSN 202 or FSN 210, sophomore standing.

Principles involved in the choice, purchase, and preparation of foods in a variety of settings and for various populations. Contemporary and ongoing issues associated with food and cooking in the context of nutrition and health. Planning and preparation of meals with emphasis on nutritional, aesthetic, economic and cultural aspects of food. 3 lectures, 1 laboratory.

FSN 323. Culinary Internship. 1 unit

Term Typically Offered: F

Prerequisite: FSN 121 and FSN 321.

Independent internship experience conducted under faculty supervision focusing on culinary science. This course is only open to students enrolled in the Culinology® concentration and satisfies the culinary internship requirement per the Research Chefs Association's Culinology® concentration. 1 laboratory.

FSN 328. Nutrient Metabolism I. 4 units

Term Typically Offered: TBD

Prerequisite: BIO 161; CHEM 313 or CHEM 371; FSN 210; and junior standing.

Metabolism of carbohydrates, fats and proteins as it applies to human nutrition. Integration and regulation of metabolic pathways. 4 lectures.

FSN 329. Nutrient Metabolism II. 4 units

Term Typically Offered: TBD

Prerequisite: FSN 328.

Continuation of FSN 328. Biochemical, molecular, and physiological functions of vitamins and minerals and their interaction with other nutrients. 3 lectures, 1 laboratory.

FSN 330. Principles of Food Engineering. 4 units

Term Typically Offered: F

Prerequisite: FSN 204.

Fundamental engineering principles related to heat transfer in food processing unit operations. Engineering properties of foods, mass and energy balances, thermodynamics, and heat transfer in various unit operations (drying, mixing, refrigeration). Sustainability applied to unit operations will be introduced. Field trip required. 3 lectures, 1 laboratory.

FSN 331. Macronutrient Metabolism. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing; BIO 161; FSN 202; and CHEM 313 or CHEM 371.

Metabolism of carbohydrates, fats, and proteins as it applies to human nutrition. Integration and regulation of metabolic pathways. Not open to students with credit in FSN 328. 4 lectures.

FSN 332. Micronutrient Metabolism. 4 units

Term Typically Offered: F, W, SP

Prerequisite: FSN 331.

Continuation of FSN 331. Biochemical, molecular, and physiological functions of vitamins and minerals and their interaction with other nutrients. Not open to students with credit in FSN 329. 4 lectures.

FSN 333. Nutrient Metabolism Lab. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: FSN 328 or FSN 331. Corequisite: FSN 332.

Application of biochemical, absorptiometry, calorimetry, and other methods to assess health indicators and nutritional status. 1 laboratory.

FSN 334. Food Packaging. 3 units

Term Typically Offered: SP

Prerequisite: FSN 204.

Function of food packaging in food processing and preservation. Packaging materials and forms. Regulations and testing of food packaging material. Oral presentation required. Field trip required. Course may be offered in classroom-based or online format. 3 lectures.

FSN 335. Food Quality Assurance. 4 units

Term Typically Offered: F

Prerequisite: Junior standing; FSN 125 or FSN 230; and STAT 218.

Recommended: STAT 314.

Microbiological and physical methods of analyses of foods used in food quality assurance and product development laboratories. Organization and management of quality assurance programs utilizing basic statistical control. Development of food production standards and interpretation of specifications. Packaging and container evaluation. 3 lectures, 1 laboratory.

FSN 340. Fermented Foods. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Processing, manufacturing, historical and bio-technical applications of fermentation technology for the production of food and beverages. Wines of the world, distilled beverages, beers, fermented dairy, vegetable and meat products important to the post-harvest economy of California. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

FSN 342. Brewing Science. 4 units

Term Typically Offered: TBD

Prerequisite: CHEM 313 and MCRO 221.

Scientific principles of malting and brewing. Chemistry, microbiology, and technology of the entire brewing process, from the raw ingredients (barley, malt, hops, water, yeast) to the production of beer and its quality assurance. 4 lectures.

FSN 343. Foodservice Operations I. 3 units

Term Typically Offered: F, W

Prerequisite: FSN 121 and junior standing.

Principles of equipment selection and foodservice facility, planning with emphasis on sanitation and safety. Field trip required. 2 lectures, 1 laboratory.

FSN 344. Foodservice Operations II. 4 units

Term Typically Offered: W, SP

Prerequisite: FSN 321 and FSN 343.

Continuation of FSN 343. Economic principles and problems involved in planning and preparing food using institutional equipment to meet specific product standards for large groups. Field trip may be required. 3 lectures, 1 laboratory.

FSN 346. Brewing Methods. 3 units

Term Typically Offered: TBD

Prerequisite: FSN 342.

Introduction to brewing practices and hands-on instruction on industry standard laboratory methods for the analysis of barley, malt, hops, water, yeast, and beer. Perform pilot brews and apply methodologies for the analysis of raw ingredients, process control, and final product. Field trip required. 1 lecture, 2 laboratories. Students must be 18 years of age or older.

FSN 354. Packaging Function in Food Processing. 3 units

Term Typically Offered: SP

Prerequisite: Junior standing.

Basic food spoilage and preservation mechanisms. The role of food packaging in food processing. Package and food compatibility. For non-Food Science majors. 3 lectures.

FSN 364. Food Chemistry. 4 units

Term Typically Offered: F

Prerequisite: FSN 125 or FSN 230, CHEM 313.

Study of molecular properties of major food components such as water, carbohydrates, lipids, proteins, vitamins, minerals, pigments, enzymes and other important molecules as well as chemical reactions of these compounds occurring as a result of processing and or storage. Laboratory focus on assessment of the role of food components in food systems and food products. 3 lectures, 1 laboratory.

FSN 368. Food Analysis. 4 units

Term Typically Offered: W

Prerequisite: FSN 364.

Principles of chemical and biochemical methods and techniques for measuring food protein, carbohydrates, lipids, water, vitamins, minerals and other components of foods using approved methods. 3 lectures, 1 laboratory.

FSN 370. Food Plant Sanitation and Prerequisite Programs. 4 units

Term Typically Offered: W

Prerequisite: FSN 204 and MCRO 221.

Principles and practice of food plant sanitation and prerequisite programs to ensure production of a safe and wholesome food supply. Topics include good manufacturing practices, sanitary design, cleaning and sanitizing compound selection, pest management, waste treatment, and allergen control programs. Field trips required. 4 lectures.

FSN 374. Food Laws and Regulations. 4 units

Term Typically Offered: F

Prerequisite: FSN 125 or FSN 230 or WVIT 102.

Federal, state, and local laws and regulations affecting the production, processing, packaging, marketing, and distribution of food. Emphasis on FDA, USDA and California codes. 4 lectures.

FSN 375. Food Safety. 4 units

Term Typically Offered: SP

Prerequisite: FSN 370.

Principles, practices, and regulations governing and ensuring the chemical, physical, and biological safety of the food supply. Topics include Hazard Analysis Critical Control Point (HACCP), risk assessment, import safety, food bioterrorism and defense, product recalls, and traceability. 3 lectures, 1 activity.

FSN 381. Critical Evaluation of Nutrition Research. 4 units

Term Typically Offered: F, W, SP

Prerequisite: FSN 281 and STAT 218. Corequisite: FSN 329 or FSN 332.

Nutrition research terminology and methods. Critical evaluation and interpretation of nutrition research with emphasis on human studies of diet-health relationships. Evidence based review. 4 seminars. Formerly FSN 420.

FSN 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 4 units per quarter.

FSN 405. Advanced Sport Nutrition & Exercise Metabolism. 4 units

Term Typically Offered: TBD

Prerequisite: FSN 328 or FSN 331.

Advanced topics in sports nutrition and interaction of exercise and nutrition, including classic and recent findings related to mechanisms of nutrient effects on exercise performance, metabolism, muscle physiology, body composition, and health. 4 lectures.

FSN 407. Food Ingredient Functionality. 3 units

Term Typically Offered: F, W

Corequisite: FSN 364.

Relationship between the structure of food ingredients and their functionality through the application of food chemistry and food processing principles. Functionality and application of various ingredients for the safe production of commercial food and beverage products. Course may be offered in classroom-based or hybrid format. 2 lectures, 1 laboratory.

FSN 408. Food Product Development. 4 units

Term Typically Offered: F, SP

Prerequisite: FSN 311; FSN 330; and senior standing. Recommended: FSN 407.

Functionality of water, carbohydrates, proteins, lipids, additives and other food ingredients used in the formulation, development, and processing of foods. Product development processes from idea generation to marketing to consumer guided technical prototype development will be completed. 3 lectures, 1 laboratory.

FSN 410. Nutritional Implications of Food Industry Practices. 4 units

Term Typically Offered: TBD

Prerequisite: FSN 210; FSN 125 or FSN 230; and junior standing.

Methods for assessing nutritional quality of foods/diets. Nutrient databases for raw and processed foods. Effects of food industry practices (e.g., processing, fortification, new product development, biotechnology) on nutritional quality of foods/diets. Evolution of public policy. 4 seminars.

FSN 415. Nutrition Education and Communications. 4 units

Term Typically Offered: F, W

Prerequisite: Senior standing; and FSN 328 or FSN 331. Corequisite: FSN 329; or FSN 332 and FSN 333.

Application of appropriate behavior and learning theories in nutrition education and communications across diverse population groups. Effective use of techniques, materials, and computer-based technology to enhance communications. Includes community-based learning projects. 4 lectures.

FSN 416. Community Nutrition. 4 units

Term Typically Offered: W, SP

Prerequisite: FSN 310; FSN 315; FSN 328 or FSN 331; and senior standing. Corequisite: FSN 415.

Federal, state and local nutrition assessment activities and program services. Emphasis on public health, health promotion and disease prevention. Development of skills in assessing community nutrition problems and planning community interventions. 4 lectures.

FSN 417. Nutrition Counseling. 4 units

Term Typically Offered: W, SP

Prerequisite: Senior standing, PSY 201/202. Corequisite: FSN 415.

Communication, behavioral, and counseling theories as they relate to nutrition counseling. Emphasis on development of skills to promote healthy eating behaviors. Examination of eating disorders and obesity, including preventative and therapeutic interventions. 4 lectures.

FSN 426. Nutrition and Foodservice Systems Management. 4 units

Term Typically Offered: F, SP

Prerequisite: FSN 344.

Principles of successful organization and management with their application to the effective operation of clinical, community and foodservice systems. Administrative responsibilities of nutrition and foodservice directors. Management theories and practice. Labor relations. Discipline and performance appraisal. 4 lectures.

FSN 429. Clinical Nutrition I. 4 units

Term Typically Offered: TBD

Prerequisite: BIO 231 (ZOO 331 equivalent); BIO 232 (ZOO 332 equivalent); and senior standing. Corequisite: FSN 329.

Application of the nutrition care process to physiological disorders which may alter nutritional requirements or require dietary modifications. Anthropometric, biochemical, clinical, and dietary assessment. Diabetes mellitus, electrolytes, acid-base balance, hydration and enteral and parenteral nutrition. Anemias, pharmacology, cardiovascular disease and obesity. 3 lectures, 1 laboratory.

FSN 430. Clinical Nutrition II. 4 units

Term Typically Offered: TBD

Prerequisite: FSN 429.

Continuation of FSN 429. Application of the nutrition care process to physiological and metabolic disorders which may alter nutritional requirements or require dietary modifications. GI disease, respiratory diseases, metabolic stress, burns, cancer, inborn errors of metabolism, cardiovascular disease, liver disease, and renal disease. 3 lectures, 1 laboratory.

FSN 431. Medical Nutrition Therapy I. 2 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 231. Corequisite: FSN 329; or FSN 332 and FSN 333.

An introduction to working in clinical nutrition. Topics include the Nutrition Care Process and the specialized practices of medical nutrition therapy documentation, nutrition assessment, and formulating a nutrition diagnosis. 1 lecture, 1 activity.

FSN 432. Medical Nutrition Therapy II. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 232; FSN 310; FSN 315; and FSN 431.

Application of the nutrition care process to physiological disorders which may alter nutritional requirements and require dietary modifications for: Diabetes Mellitus and parenteral nutrition, anemias, acid-base conditions, cardiovascular disease, obesity, and upper and lower GI diseases. Not open to students with credit in FSN 429 or FSN 430. 3 lectures, 1 laboratory.

FSN 433. Medical Nutrition Therapy III. 4 units

Term Typically Offered: F, W, SP

Prerequisite: FSN 432.

Continuation of Medical Nutrition Therapy series. Application of the nutrition care process to diseases and disorders including hepatobiliary, pancreatic, renal, and respiratory diseases, metabolic stress, trauma, burns, cancer, and metabolic disorders. Not open to students with credit in FSN 429 or FSN 430. 3 lectures, 1 laboratory.

FSN 440. Internship. 1-12 units

Term Typically Offered: TBD

Prerequisite: Junior standing and consent of instructor.

Career experience with private or public agencies. Total credit limited to 12 units. Maximum of 6 units may be applied toward degree requirements.

FSN 444. Food Engineering. 4 units

Term Typically Offered: W

Prerequisite: FSN 204 and FSN 330.

Engineering principles governing heat transfer, fluid flow, and introductory mass transfer and application of these principles to selected unit operations; theoretical aspects of the scientific and engineering principles of fluid flow and the transfer and change of materials and energy primarily by physical means during processing of food. 3 lectures, 1 laboratory.

FSN 457. Food Science Senior Project - Scientific and Technical Writing Course. 3 units

Term Typically Offered: W

Prerequisite: FSN 364; STAT 218 or STAT 314; and senior standing.

Directed culminating experience for Food Science students choosing the senior project scientific writing option. 3 lectures.

FSN 458. Food Science Senior Project - Research. 3 units

Term Typically Offered: F, W, SP

Prerequisite: FSN 364; STAT 218 or STAT 314; senior standing; and consent of instructor.

Directed culminating experience for Food Science students choosing the senior project research option. Required for Blended MS in Food Science.

FSN 459. Food Science Senior Project - Internship. 3 units

Term Typically Offered: F, SP, SU

Prerequisite: Two of the following: FSN 330, FSN 335, FSN 364, FSN 370, or FSN 375; and senior standing.

Directed culminating experience for Food Science students choosing the senior project internship option. Required for Culinology concentration. Students must complete a project as a component of their internship. Course may be offered in classroom-based or online format. Minimum 90 hours required.

FSN 461. Senior Project I. 3 units

Term Typically Offered: F, W, SP

Prerequisite: For FDSC majors: Senior standing; completion of GE Area A3 with a grade of C- or better; FSN 364; and STAT 218. For NUTR majors: Senior standing; completion of GE Area A3 with a grade of C- or better; and STAT 218. Corequisite for NUTR majors: FSN 329 or FSN 332 and 333; and FSN 381.

Selection of scientific research topic in major area. Development of literature review, research questions in Senior Project I. Research design, data collection, and analysis in Senior Project II. Project requires a formal report which must follow departmental guidelines. Minimum of 90 hours per quarter.

FSN 463. Professional Practice in Nutrition and Dietetics. 2 units

Term Typically Offered: F

CR/NC

Prerequisite: Senior standing. Recommended: FSN 329 or FSN 332.

Exploration of students' transition to professional practice, career opportunities, and factors to be considered in career decisions. Application of strategic planning, critical thinking, written and oral communication skills in preparation for nutrition and dietetics professions. 2 lectures.

FSN 469. Food Science Exit Exam. 0 unit

Term Typically Offered: F, SP

CR/NC

Concurrent: FSN 408.

Assessment of BS Food Science program through completion of a senior exit survey. Results will only be used to improve the curriculum. Course offered online only. Credit/No Credit grading only.

FSN 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

FSN 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

FSN 474. Advanced Food Processing. 4 units

Term Typically Offered: SP

Prerequisite: FSN 444 and senior standing.

Advanced topics in processing operations with emphasis on thermal processing. Non-traditional processing technology such as microwave, ionizing radiation, and high pressure. 3 lectures, 1 laboratory.

FSN 478. Senior Project Experiential Learning in Nutrition. 2 units

Term Typically Offered: TBD

Prerequisite: FSN 381; senior standing; and consent of instructor.

Directed individual or group experiential learning/research on advanced topics in nutrition. Content generated will be used for synthesizing students' senior project. 2 activities.

FSN 479. Senior Project Advanced Topics. 2 units

Term Typically Offered: TBD

Prerequisite: FSN 381; senior standing; and consent of instructor.

Directed group study of selected advanced topics for nutrition senior project. This course separates the report from learning advanced topics; FSN 481 is required in addition to FSN 479 for senior project credit. The Class Schedule will list topic selected. 2 lectures.

FSN 481. Advanced Nutrition Senior Project Scientific Writing. 1 unit

Term Typically Offered: TBD

Prerequisite: FSN 478 or FSN 479; and senior standing.

Directed culminating experience in writing across the curriculum. Senior project scientific writing for nutrition students.

FSN 485. Cooperative Education Experience in Food Science and Nutrition. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience with an approved Food Science or Nutrition firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 12 units. Degree credit limited to 6 units. Credit/No Credit grading only.

FSN 490. Food Safety Modernization Act: Human Food Safety. 2 units

Term Typically Offered: TBD

Prerequisite: FSN 375.

Food Safety Modernization Act training on the implementation of hazard analysis risk-based preventive controls for human food. 2 lectures.

FSN 491. Food Safety Modernization Act: Produce Safety. 2 units

Term Typically Offered: TBD

Prerequisite: FSN 375.

Produce safety, the Food Safety Modernization Act (FSMA) Produce Safety Rule, Good Agricultural Practices (GAPs), and co-management of natural resources and food safety. Field trip required. 2 lectures.

FSN 495. Cooperative Education Experience in Food Science and Nutrition. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full time work experience with an approved Food Science or Nutrition firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 12 units. Degree credit limited to 6 units. Credit/No Credit grading only.

FSN 500. Individual Study. 1-6 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing, consent of supervising faculty member and graduate advisor.

Advanced independent study planned and completed under the direction of a member of the department faculty. Total credit limited to 6 units.

FSN 505. Orientation to Graduate Studies. 1 unit

Term Typically Offered: F

CR/NC

Prerequisite: Graduate standing.

Orientation to graduate school and discussion on topics that will help students to be successful. Discussion of policy and ethical issues in the conduct of research, how to find appropriate resources, and understanding the process of presenting and publishing research. Intended for entering graduate students. Credit/No Credit grading only. 1 seminar.

FSN 508. Food Product Innovation. 4 units

Term Typically Offered: TBD

Prerequisite: FSN 408.

Focus on product innovation strategies, project management, product life cycle, project development team management, product innovation metrics, process optimization and cost management. Plan and execute an industry-relevant specialized project. 3 lectures, 1 laboratory.

FSN 516. Population Health and Epidemiology. 3 units

Term Typically Offered: TBD

Prerequisite: FSN 416 and graduate standing.

Advanced concepts and issues in population health and epidemiology. Covers epidemiologic methods, study design, and conceptual frameworks from public health perspective. Analytical considerations related to population health will be presented. Emphasis on nutrition-related issues at national and global levels. 3 lectures.

FSN 528. Biochemical and Molecular Aspects of Human Macronutrient Metabolism. 4 units

Term Typically Offered: F

Prerequisite: FSN 328 or FSN 331; and graduate standing.

Advanced topics in the human metabolism of carbohydrates, lipids and proteins. Classic and recent findings related to mechanisms of nutrient-regulated gene expression. Metabolism related to specific diseases will also be covered. 4 lectures.

FSN 529. Metabolic and Molecular Aspects of Vitamins. 2 units

Term Typically Offered: TBD

Prerequisite: FSN 329, or FSN 332 and FSN 333; and graduate standing.

Advanced topics in the molecular roles and functions of vitamins. Classic and recent findings related to mechanisms of vitamin-regulated gene expression. Specific aspects of vitamin deficiencies and toxicities will also be covered. 2 lectures.

FSN 530. Metabolic and Molecular Aspects of Minerals. 2 units

Term Typically Offered: TBD

Prerequisite: FSN 329, or FSN 332 and FSN 333; and graduate standing.

Advanced topics in the molecular roles and functions of minerals. Classic and recent findings related to mechanisms of mineral-regulated gene expression. Specific aspects of mineral deficiencies and toxicities will also be covered. 2 lectures.

FSN 531. Lipid Metabolism and Nutrition. 3 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor. Recommended: FSN 331.

Digestion, absorption and metabolism of lipids with emphasis on lipoprotein metabolism, regulation of lipid metabolism, effects of gene expression, essential fatty acid requirements and functions. 3 lectures.

FSN 541. Dietetic Internship Seminar. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Acceptance into the Cal Poly, San Luis Obispo Dietetic Internship, a special session program in Extended Education.

A forum for dietetic interns to make presentations and share their experiences in their supervised practice. Guest presentations on current issues in nutrition therapy, foodservice management and community nutrition. Total credit limited to 6 units, with a maximum of 2 units per quarter. Credit/No Credit grading only. 2 seminars.

FSN 564. Chemistry of Food Systems. 4 units

Term Typically Offered: TBD

Prerequisite: FSN 364 or graduate standing.

Integration of food chemistry concepts to develop an in-depth understanding on the role of structural and functional properties of components in food systems. Research topics for components in specific food systems. 4 lectures.

FSN 570. Selected Topics in Food Science and Nutrition. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

FSN 571. Selected Advanced Laboratory in Food Science and Nutrition. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

FSN 574. Food Process Failure Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: FSN 335 or graduate standing; FSN 444; and FSN 474.

Analysis of root causes and impacts of failure scenarios within the food industry. Corrective actions relative to safety, quality, and economics of the affected products will be assessed. 3 lectures, 1 activity.

FSN 575. Advanced Food Safety. 4 units

Term Typically Offered: TBD

Prerequisite: FSN 375 or graduate standing; and MCRO 421.

In-depth analysis of food safety issues including outbreaks, risk assessment, Food Safety Modernization Act (FSMA), product and process assessments. Special emphasis on the critical evaluation, development and execution of food safety research. 3 lectures, 1 laboratory.

FSN 581. Graduate Seminar in Food Science and Nutrition. 1-3 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Current findings and research problems in the field and their application to food science and nutrition. The Class Schedule will list topic selected. Total credit limited to 6 units with approval of advisor. 1 to 3 seminars.

FSN 582. Current Nutrition Research. 1 unit

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study and presentation of selected nutrition research topics for graduate and advanced undergraduate students. Students will select, read, critically analyze and present nutrition research within designated themes. Total credit limited to 3 units. 1 seminar.

FSN 599. Thesis. 1-9 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Individual research in food science and nutrition under faculty supervision leading to a graduate thesis of suitable quality. Total credit limited to 9 units.

French (FR)

undefined

FR Courses

FR 101. Elementary French I. 4 units

Term Typically Offered: F

Beginning French. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context. Course may be offered in classroom-based or online format. 4 lectures.

FR 102. Elementary French II. 4 units

Term Typically Offered: W

Prerequisite: FR 101 or appropriate score on placement exam or consent of instructor.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context. To be taken in numerical sequence. Course may be offered in classroom-based or online format. 4 lectures.

FR 103. Elementary French III. 4 units

Term Typically Offered: SP

Prerequisite: FR 102 or appropriate score on placement exam or consent of instructor.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context. To be taken in numerical sequence. Course may be offered in classroom-based or online format. 4 lectures.

FR 201. Intermediate French I. 4 units

Term Typically Offered: F
 2019-20 or earlier catalog: GE Area C5
 Prerequisite: FR 103 or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in French within an intercultural context. To be taken in numerical sequence. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

FR 202. Intermediate French II. 4 units

Term Typically Offered: W
 2019-20 or earlier catalog: GE Area C5
 Prerequisite: FR 201 or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in French within an intercultural context. To be taken in numerical sequence. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

FR 203. Intermediate French III. 4 units

Term Typically Offered: SP
 2019-20 or earlier catalog: GE Area C5
 Prerequisite: FR 202 or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in French within an intercultural context. To be taken in numerical sequence. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

FR 230. French for Reading Knowledge. 4 units

Term Typically Offered: SP
 CR/NC
 For students aiming primarily to acquire a reading knowledge of French in the minimum amount of time. Covers essential grammar and vocabulary. Useful for students interested in translation, needing to conduct research based on French-language sources, or preparing for the French graduate-level reading knowledge exam. Course may be offered in classroom-based or online format. Credit/No Credit grading only. 4 lectures.

FR 233. Critical Reading in French Literature. 4 units

Term Typically Offered: F
 2020-21 or later catalog: GE Area C2
 2019-20 or earlier: GE Area C1 or C2
 Prerequisite: Completion of GE Area A with grades of C- or better; and FR 203 or consent of instructor.

Selected readings in French from Francophone authors that illustrate the French literary tradition from the Middle Ages to the present in both France and other French-speaking countries. May include film and other media. Conducted in French. 4 lectures. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

FR 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
 Prerequisite: Consent of instructor.

Directed group study of selected topics. Open only to undergraduate students. Conducted in French. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

FR 301. Advanced French Composition and Grammar. 4 units

Term Typically Offered: SP
 Prerequisite: FR 203 or consent of instructor.

Written and oral development of structural grammar, syntax and complex components of French. Expansion of vocabulary and idiomatic expressions through text study. Written compositions. May include French/English translation. Conducted in French. 4 lectures.

FR 302. Advanced French Conversation and Grammar. 4 units

Term Typically Offered: SP
 Prerequisite: FR 203 or consent of instructor.

Oral and written development of structural grammar, syntax and complex components of French. Expansion of vocabulary and idiomatic expressions through topics focusing on culture. Individual and/or group presentations. Conducted in French. 4 lectures.

FR 305. Significant Works in French. 4 units

Term Typically Offered: W
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and FR 233 or consent of instructor.

Critical analysis and oral discussion of poetry, essays, novels, plays, films, and other media by selected French and Francophone authors. Conducted in French. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

FR 350. French Literature in English Translation. 4 units

Term Typically Offered: SP
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2 (GE Area C1 for students on the 2019-20 or earlier catalogs).

Selected works to be read by students in English translation. Critical analysis, interpretation, and comparison of works by French and/or Francophone authors. Course may include film and other media. Discussion in English. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

FR 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Conducted in French. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

Geography (GEOG)

undefined

GEOG Courses

GEOG 150. Human Geography. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Sustainability Related

The interplay of cultures, places, and environments, with emphasis on diversity and globalization. Topics include characteristics and patterns of human population, migration, ethnicity, agriculture, geopolitics, language, religion, urbanization, industry, and international development. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

GEOG 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

GEOG 218. Applications in GIS. 4 units

Term Typically Offered: F, W

Introduction to Geographic Information System (GIS) computer software to explore environmental, natural resource, social and economic issues using spatial data. Principles of cartography and map interpretation.

Development of data base and software management competencies. 2 lectures, 2 laboratories. Replaces GEOG 318.

GEOG 250. Physical Geography. 4 units

Term Typically Offered: F, W

Sustainability Related

Addresses the origins and patterns of the earth's diverse assemblage of climates, landforms, biota and soils. A major focus on relationship between human cultures and these earthly environments. 4 lectures.

Crosslisted as ERSC/GEOG 250.

GEOG 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

GEOG 308. Global Geography. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area D1.

Examination of the major world regions such as Europe, the Middle East, Africa, Asia and Latin America. Focus on the origins and content of contemporary cultural landscapes and on their utility for understanding international differences, interactions, and current events. Particular attention to the relationship between humans and the environment. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

GEOG 325. Climate and Humanity. 4 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: Junior standing.

Geographic perspective on the interrelationships between climate and human cultures. Effects of people on climate and the influence of climate and weather upon human activities and behavior. Focus on global human conditions which are responsible for the alteration of climate and in turn are vulnerable to climate change. 4 lectures. Crosslisted as ERSC/GEOG 325.

GEOG 328. Applications in Remote Sensing and GIS. 4 units

Term Typically Offered: W, SP

Prerequisite: GEOG 218 or NR 218.

Introduction to the use of satellite imagery to analyze natural and human features on the earth. Applications in geology, water, climate, vegetation, agriculture, and urban land use. Fundamentals of processing digital satellite images. Emphasis on bridging the earth and social sciences. 3 lectures, 1 laboratory.

GEOG 333. Human Impact on the Earth. 4 units

Term Typically Offered: TBD

Sustainability Focused

Prerequisite: Junior standing.

Global assessment of the impact of humans on the earth's vegetation, animals, soil, water and atmosphere. Emphasis on problems stemming from the interactions of human attitudes, technologies, and population with natural resources. 4 lectures. Crosslisted as ERSC/GEOG 333.

GEOG 340. Geography of California. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing.

Analysis of the land and people of California from a geographical perspective. Patterns of environment, history, settlement, water, agriculture, ethnicity, economy, politics, and urban growth. Current issues are examined in a national and global context. 4 lectures.

GEOG 350. The Global Environment. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/historical/political perspectives. Use of remote sensing maps. Sustainable solutions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as AG/EDES/ENGR/GEOG/ISLA/SCM/UNIV 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

GEOG 370. Geography of Latin America. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Geographic analysis of the lands and peoples of Mexico, Central America, the Caribbean, and South America. Patterns of environment, culture, politics, economy, and development. Issues (local, regional, and global) shaping Latin America today, with emphasis on U.S.-Latin America relations. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

GEOG 380. Geography of the Caribbean. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Geographic analysis of the Caribbean including the Greater Antilles, Lesser Antilles, and the Caribbean coasts of Central and South America. Investigates patterns and relationships between the physical and cultural geographies from local, regional, and global perspectives. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

GEOG 384. Professional Preparation for Anthropologists/Geographers. 1 unit

Term Typically Offered: F, W

CR/NC

Prerequisite: Sophomore standing; ANT 201 or GEOG 150.

Preparation for professional advancement in the fields of anthropology and geography. Supervised career planning emphasizing resume development, selection of an internship or international experience, exploration of career options and graduate programs. Lectures from outside, practicing professionals. Credit/No Credit grading only. 1 seminar. Formerly GEOG 464.

GEOG 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

GEOG 408. Geography of International Development. 4 units

Term Typically Offered: W

Sustainability Focused

Prerequisite: GEOG 308.

Detailed analysis of international development from a geographical perspective. Survey of various theories of development and their cultural and ecological components at multiple geographic scales, including institutions and actors involved. Applicable skills for development research and practice, emphasizing sustainability. 4 lectures.

GEOG 414. Global and Regional Climatology. 4 units

Term Typically Offered: W, SP

Sustainability Related

Prerequisite: Junior standing.

The earth's pattern of climates and the physical processes that account for them. Focus on interrelationships between climate and the physical/biological and cultural environments. Special emphasis on modern climate changes and their consequences. 3 lectures, 1 laboratory. Crosslisted as ERSC/GEOG 414.

GEOG 415. Applied Meteorology and Climatology. 4 units

Term Typically Offered: W, SP

Prerequisite: ERSC/GEOG 250.

Physical processes in the atmosphere that determine regional weather, climate and climate variability. Surface and satellite systems for weather observation, and weather/climate modeling. Dynamics of weather systems, including thunderstorms and hurricanes. Emphases on weather/climate affecting agriculture and other human activities. 3 lectures, 1 activity. Crosslisted as ERSC/GEOG 415.

GEOG 435. Biodiversity and Biogeography Methods. 4 units

Term Typically Offered: TBD

Prerequisite: ERSC/GEOG 250.

Origins and spatial patterns of the earth's flora and fauna across gradients of climate, landforms, geology and time. Will focus on the history of biogeography and new applications of geospatial technology such as GIS and remote sensing. 3 lectures, 1 laboratory.

GEOG 441. Advanced Applications in Geospatial Technologies. 4 units

Term Typically Offered: SP

Prerequisite: GEOG 218 or LA/NR 218. Recommended: BRAE 345 or GEOG 328.

Advanced applications in Geographic Information Systems (GIS), Remote Sensing, and other geospatial technologies. Emphasizing research, methodologies, and career fields in geography, earth sciences, and the social sciences. The Class Schedule will list topic selected. Total credit limited to 12 units. 2 lectures, 2 laboratories.

GEOG 455. Anthropology-Geography Research Design and Methods. 4 units

Term Typically Offered: F, SP

Prerequisite: Completion of GE Area B2; and two upper-division ANT or GEOG courses.

Development of knowledge and skills needed to conduct original scientific anthropology-geography research and prepares students for senior projects. Various empirical methodologies highlighted, with a focus on quantitative design and measurement of human culture, biology, behavior, environment and ecology. Course may be offered in classroom-based, online, or hybrid. 3 lectures, 1 laboratory. Crosslisted as ANT/ GEOG 455.

GEOG 461. Senior Project I. 2 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

GEOG 462. Senior Project II. 2 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

GEOG 465. Internship. 3-8 units

Term Typically Offered: TBD

CR/NC

Prerequisite: GEOG 464, senior standing and/or consent of instructor.

Supervised training, research, and work in public and private organizations. Credit/No Credit grading only. Total credit limited to 18 units.

GEOG 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 lectures.

Geology (GEOL)

undefined

GEOL Courses

GEOL 102. Introduction to Geology. 4 units

Term Typically Offered: W

2020-21 or later catalog: GE Area B1

2019-20 or earlier catalog: GE Area B3

Processes responsible for the Earth's minerals, rocks, structure, and surface features. Volcanism; mountain building; plate tectonics; weathering. Erosion and deposition by streams, glaciers, wind and waves. Geological resources, earth hazards, and interaction of humanity with global processes. 3 lectures, 1 discussion. Fulfills GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs).

GEOL 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

GEOL 201. Physical Geology. 3 units

Term Typically Offered: F, W, SP

Prerequisite: MATH 119.

Processes responsible for the Earth's rocks, structural surface features, geologic hazards, and natural resources, with emphasis on interactions with human activities. 3 lectures.

GEOL 203. The Geologic Record: Fossils and the History of Life. 4 units

Term Typically Offered: W

2020-21 or later catalog: GE Area B1

2019-20 or earlier catalog: GE Area B5

A historical account of life on Earth interpreted from the fossil record. Paleoenvironmental controls on the rise and decline of lineages of organisms deduced from stratigraphy, and from the composition, character, and geochemistry of sedimentary rocks. Identification of fossils. 3 lectures, 1 discussion. Fulfills GE Area B1 (GE Area B5 for students on the 2019-20 or earlier catalogs).

GEOL 206. Geologic Excursions. 1 unit

Term Typically Offered: F, SP

CR/NC

Field trips to places of geologic interest. The Class Schedule will indicate destinations. Students must provide their own transportation, food, and camping equipment. May be repeated for a maximum of 3 units provided field trips are taken to different locations. Credit/No Credit grading only. 1 laboratory.

GEOL 241. Physical Geology Laboratory. 1 unit

Term Typically Offered: F, W, SP

Corequisite: GEOL 102 or GEOL 201.

Properties and identification of minerals and rocks. Topographic maps and landform analysis. Geologic maps and interpretation of rock structure. 1 laboratory.

GEOL 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

GEOL 301. Physical Models in the Geosciences. 4 units

Term Typically Offered: F

Prerequisite: MATH 142; PHYS 141; and GEOL 201.

Development and analysis of geodynamical models. Stress and strain, flexure, heat flow, faulting, and elastic waves in the solid earth. Additional topics may include fluid flow, flow of natural materials, geochronology, and equations of state in high pressure mineral physics. 4 lectures.

GEOL 303. Computation and Visualization in the Geosciences. 3 units

Term Typically Offered: W

Prerequisite: GEOL 301 and one of the following: STAT 217, STAT 218, STAT 301, STAT 312, or STAT 321.

Introduction to scientific programming and data visualization for solving problems in the geosciences. Import and export of data, plotting data and maps, time series analysis, statistical description of data, and numerical approximations of equations. 2 lectures, 1 laboratory.

GEOL 305. Seismology and Earth Structure. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); GEOL 303; or PHYS 132 and MATH 242 or MATH 244.

Elastic waves in layered media. Principle of the seismometer. Magnitude, seismic moment and energy calculations. Source mechanics. Major California faults and paleoseismology. Theory of plate tectonics. Seismic properties, structure, and composition of the Earth. Field trip required. 3 lectures, 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

GEOL 309. Igneous Petrology. 3 units

Term Typically Offered: W

Prerequisite: GEOL 102 or GEOL 201; and ERSC 223.

Processes associated with melt generation and igneous crystallization with special attention to relationships with tectonic setting. Field trip required. Not open to students with credit in GEOL 310. 2 lectures, 1 laboratory.

GEOL 311. Metamorphic Petrology. 3 units

Term Typically Offered: SP

Prerequisite: GEOL 309.

Textures and minerals associated with the metamorphism of igneous and sedimentary rocks. Principles of metamorphic reactions and thermobarometry. Special attention to metamorphic processes in the context of plate tectonics. Field trip required. Not open to students with credit in GEOL 310. 2 lectures, 1 laboratory.

GEOL 330. Principles of Stratigraphy. 4 units

Term Typically Offered: SP

Prerequisite: GEOL 102 or GEOL 201, and GEOL 241.

Description and analysis of stratified rock and sediment. Sedimentology, diagenesis, transgressive/regressive sequences, bedform interpretation, marine and terrestrial sediment and sedimentary-rock sequence interpretation, and sequence stratigraphy. Required field trips. 3 lectures, 1 laboratory.

GEOL 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigations, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

GEOL 404. Research Experience for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of department chair.

Individual investigations, research, studies, or surveys of selected problems. Credit/No Credit grading only. Total credit limited to 4 units, with a maximum of 2 units per quarter.

GEOL 415. Structural Geology. 4 units

Term Typically Offered: F

Prerequisite: GEOL 241 and ERSC 223.

Recognition, interpretation, and depiction of geological structures. Understanding rock deformation through the study of faults and folds. 3 lectures, 1 laboratory. Required weekend field trips.

GEOL 416. Field-Geology Methods. 4 units

Term Typically Offered: W

Prerequisite: GEOL 102 or GEOL 201; and GEOL 415.

Collecting and interpreting field-geologic data. Description of sedimentary rocks and construction of stratigraphic columns. Mapping geologic structures in the field. Surficial geologic stratigraphy and surficial geologic mapping. Understanding geologic processes through field study. Communicating results of field study. 1 lecture, 3 activities. Crosslisted as ERSC/GEOL 416. Formerly ERSC/GEOL 401.

GEOL 417. Geologic Mapping. 4 units

Term Typically Offered: SP

Prerequisite: ERSC/GEOL 401 or ERSC/GEOL 416.

Bedrock geologic mapping on topographic maps and aerial photos. Surficial geologic mapping on topographic maps and aerial photos. Correlating and defining surficial geologic map units on the basis of soil development. Understanding landscape evolution using soil development 4 activities. Crosslisted as ERSC/GEOL 417. Formerly ERSC/GEOL 402.

GEOL 420. Applied Geophysics. 3 units

Term Typically Offered: F

Prerequisite: GEOL 201 and PHYS 141.

Introduction to geophysical exploration of the shallow subsurface: seismic refraction, seismic reflection, electrical resistivity, magnetic and gravity methods. Application to determination of subsurface structure, groundwater and mineral resources. Field trip required. 2 lectures, 1 laboratory.

GEOL 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

GEOL 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

German (GER)

undefined

GER Courses

GER 101. Elementary German Language and Culture I. 4 units

Term Typically Offered: F

Elementary language acquisition and introductions to German literature, film, history, music and contemporary politics in an intercultural context. To be taken in numerical sequence. Course may be offered in classroom-based or online format. 4 lectures.

GER 102. Elementary German Language and Culture II. 4 units

Term Typically Offered: W

Prerequisite: GER 101 or appropriate score on placement exam or consent of instructor.

Elementary language acquisition and introductions to German literature, film, history, music and contemporary politics in an intercultural context. To be taken in numerical sequence. Course may be offered in classroom-based or online format. 4 lectures.

GER 103. Elementary German Language and Culture III. 4 units

Term Typically Offered: SP

Prerequisite: GER 102 or appropriate score on placement exam or consent of instructor.

Elementary language acquisition and introductions to German literature, film, history, music and contemporary politics in an intercultural context. To be taken in numerical sequence. Course may be offered in classroom-based or online format. 4 lectures.

GER 201. Intermediate German I. 4 units

Term Typically Offered: F

2019-20 or earlier catalog: GE Area C5

Prerequisite: GER 103 or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in German within an intercultural context. To be taken in numerical sequence. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

GER 202. Intermediate German II. 4 units

Term Typically Offered: W

2019-20 or earlier catalog: GE Area C5

Prerequisite: GER 201 or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in German within an intercultural context. To be taken in numerical sequence. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

GER 203. Intermediate German III. 4 units

Term Typically Offered: TBD

2019-20 or earlier catalog: GE Area C5

Prerequisite: GER 202 or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in German within an intercultural context. To be taken in numerical sequence. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

GER 233. Critical Readings in German Literature. 4 units

Term Typically Offered: SP

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

Prerequisite: Completion of GE Area A with grades of C- or better; and GER 202 or consent of instructor.

Selected readings from German-language authors encompassing the literary tradition from the Middle Ages to the present. May include film and other media. Conducted in German. 4 lectures. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

GER 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics. Open only to undergraduate students. Conducted in German. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

GER 301. Advanced German Composition and Grammar. 4 units

Term Typically Offered: W

Prerequisite: GER 202 or consent of instructor.

Written and oral development of structural grammar, syntax and complex components of German. Vocabulary expansion and idiomatic construction. Written compositions. May include German/English translation. Conducted in German. 4 lectures.

GER 302. Advanced German Conversation and Grammar. 4 units

Term Typically Offered: W

Prerequisite: GER 202 or consent of instructor.

Oral and written development of structural grammar, syntax and complex components of German. Expansion of vocabulary and idiomatic expressions through topics focusing on culture. Individual and/or group presentations. Conducted in German. 4 lectures.

GER 305. Significant Works in German. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and GER 233 or consent of instructor.

Critical analysis and oral discussion of poetry, essays, novels, plays, films, and other media by selected German-language authors. Conducted in German. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

GER 350. German Literature in English Translation. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2 (GE Area C1 for students on the 2019-20 or earlier catalogs).

Selected works to be read by students in English translation. Critical analysis, interpretation, and comparison of works by German-language authors. Course may include film and other media. Discussion in English. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

GER 470. Selected Advanced Topics. 4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Conducted in German. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

Graduate Studies (GS)

undefined

GS Courses

GS 597. Continued Graduate Study. 1-15 units

Term Typically Offered:

CR/NC

Prerequisite: Must be in good standing in a graduate program at Cal Poly.

Activities other than regular coursework that are needed to complete the requirements for the degree. Analysis of data, thesis and project report writing, oral defense of the thesis/project, preparation for the comprehensive exam, and other activities related to the culminating experience for the student's program. Can be used to fulfill the continuous enrollment requirement for graduate students. Units earned in this course may not be used toward degree completion. Credit/No Credit grading only. Total credit limited to 15 units; repeatable in same term.

Graduate Studies-Accounting (GSA)

undefined

GSA Courses

GSA 501. Graduate Accounting Individual Research. 1-4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing in Accounting and formal petition with approval from the Associate Dean.

Advanced individual research in accounting topics planned and completed under the direction of a member of the college faculty. Designed to meet the needs of qualified students who wish to pursue investigations in accounting which cannot be followed effectively in regularly offered elective courses. A formal written proposal must be accepted by the Associate Dean of OCOB before work begins.

GSA 536. Taxation of Trusts, Estates, and Transfer Taxes. 4 units

Term Typically Offered: SP

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Income taxation of trusts and estates as flow-through entities; transfer taxation of gifts and estates, including generation-skipping transfers. 4 lectures.

GSA 537. State and Local Taxation. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Multi-state income and franchise taxation; property taxes; sales and use taxes; and the constitutional authority for the imposition of state taxes. 4 lectures.

GSA 538. Current Developments in Taxation. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Current developments in income taxation of individuals, trusts and estates and business entities; transfer taxation of gifts and estates; and ethics and professional responsibility in taxation. 4 lectures.

GSA 539. Clinical Tax Education Internship. 9 units

Term Typically Offered: W

CR/NC

Prerequisite: OCOB graduate standing in Specialization in Tax, MS Accounting program.

Accounting internship that allows graduate level accounting students the opportunity to apply skills and competencies to an employment opportunity. Placement in a full-time supervised work experience at a public accounting firm or in an accounting or internal audit department of a private enterprise or government agency. Credit/No Credit grading only.

GSA 540. Taxation of Corporations and Partnerships. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Comparative study of the taxation of C corporations and flow-through tax entities, including S corporations, partnerships and limited liability companies. Not open to students with credit in BUS 417. 4 lectures.

GSA 541. Advanced Financial Reporting Issues I. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Comprehensive coverage of selected advanced financial accounting and reporting topics. Topics include accounting changes and errors, leases, pensions and other post-employment benefits, income taxes, and consolidated financial statements. Course may be offered in classroom-based or online format. 4 seminars.

GSA 543. Advanced Financial Reporting Issues II. 5 units

Term Typically Offered: TBD

Prerequisite: GSA 541 and OCOB graduate standing or approval from the Associate Dean.

Comprehensive coverage of selected advanced financial accounting and reporting topics. Topics include financial statement footnote and MD&A disclosures and coverage of SEC statutes, regulations and filing forms. Course may be offered in classroom-based or online format. 5 seminars.

GSA 544. Advanced Enterprise Wide Business Processes for Accounting. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Study of various transactions in order to understand the underlying business processes and information flows between various business units, in order for a transaction to occur and be properly reported, and the information determined that is critical for the information system to capture. Emphasis of role of information systems in controlling the authorization of transactions, access to information, access to assets, preparation of accounting records and reports. 4 seminars.

GSA 545. Applied Accounting Research and Communications. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Advanced use of authoritative accounting and auditing data bases and actual filings by public companies. Frequent writing and speaking exercises. Real world accounting and auditing issues facing public and private enterprises. In-depth coverage of federal and state regulation of securities transactions. Course may be offered in classroom-based or online format. 4 lectures.

GSA 546. Tax Research and Administrative Procedures. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Research techniques applicable to tax issues including the communication of research results. Administrative procedures necessary for tax compliance with the various tax jurisdictions with primary emphasis on IRS practices. 4 seminars.

GSA 548. Advanced Individual Taxation and Tax Planning. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Advanced concepts concerning the impact of taxes on individuals. Introduction to transfer taxes imposed on individuals. Financial, estate and compensation tax planning issues. 4 seminars.

GSA 549. Advanced Taxation of Flow-Through Entities. 4 units

Term Typically Offered: SP

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Advanced and special topics related to the income tax treatment of partnerships, limited liability companies, trusts and S corporations and their owners and beneficiaries. Creation, operation, liquidation and sale of such organizations. 4 seminars.

GSA 550. Advanced Corporate Taxation. 4 units

Term Typically Offered: SP

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Advanced and special topics related to the income tax treatment of regular corporations and their shareholders. Mergers and acquisitions, tax accounting methods and periods, cross-boundary topics, and current issues. 4 seminars.

GSA 551. International Taxation. 4 units

Term Typically Offered: SP

Corequisite: BUS 417, or BUS 414 and BUS 415, and OCOB graduate standing or approval from the Associate Dean.

Fundamental tax concepts of inbound and outbound investments of U.S. taxpayers, controlled foreign corporations, Subpart F, the foreign tax credit, transfer pricing and contracting country treaties. 4 lectures.

GSA 552. Fraud Auditing and Examination. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Occupational and financial statement fraud; particular emphasis on the breakdown of corporate governance and ethics systems and developing internal control systems to prevent and detect fraudulent activities. 4 lectures.

GSA 553. International Accounting. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

International accounting, auditing, and corporate governance standards including international financial reporting standards (IFRS). 4 lectures.

GSA 554. Advanced Spreadsheet Modeling for Accounting. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Advanced topics in electronic spreadsheets and their use in accounting and financial applications. Developing spreadsheet models for data analysis and decision making. Integrating automation tools and external data sources into spreadsheets. Course may be offered in classroom-based or online format. 4 lectures.

GSA 555. Database Modeling and Analysis for Accounting. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Fundamental concepts in database analysis, design, implementation, administration, and audit including issues such as requirements specification, REA modeling, ER modeling, normalization, SQL, transaction control, database security, and query optimization. May also include topics such as data warehouses, XBRL and ebXML. Course may be offered in classroom-based or online format. 4 lectures.

GSA 556. Financial Accounting and Valuation. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Comprehensive coverage of approaches to the measurement of fair values that are used in accounting situations such as mergers and acquisitions, recognition of stock based compensation, and determination of impairments in the carrying amounts of long-lived assets including intangible assets and goodwill. Role of financial reporting in the valuation of securities, credit analysis, and the determination of the cost of capital. Course may be offered in classroom-based or online format. 4 lectures.

GSA 570. Selected Advanced Topics for Accounting. 1-4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

Graduate Studies-Business (GSB)

undefined

GSB Courses

GSB 500. Independent Study. 1-4 units

Term Typically Offered: F,W,SPSU

Prerequisite: OCOB graduate standing and formal petition with approval from the Associate Dean.

Advanced study planned and completed under the direction of the Director of Graduate Programs. Open only to graduate students who have demonstrated ability to do independent work. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins.

GSB 501. Individual Research. 1-4 units

Term Typically Offered: F,W,SPSU

Prerequisite: OCOB graduate standing and formal petition with approval from the Associate Dean.

Advanced individual research planned and completed under the direction of a member of the college faculty. Designed to meet the needs of qualified students who wish to pursue investigations which cannot be followed effectively in regularly offered elective courses. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins.

GSB 503. Collaborative Industry Project. 1-8 units

Term Typically Offered: F,W,SPSU

Prerequisite: OCOB graduate standing and formal petition with approval from the Associate Dean.

Collaborative business project with a client organization that allows graduate level students the opportunity to apply knowledge, skills and competencies to address a business problem. Small teams work in collaboration with a client organization and a faculty advisor. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. The project may last up to one year. Course may be offered in classroom-based or online format.

GSB 510. Data Visualization and Communication in Business. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Principles of data visualization and storytelling. Data visualization tools for different types of data in the context of business analytics. Communication of results for business actionable insights. Software use includes Excel, Tableau and R. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 511. Accounting for Managers. 4 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Emphasis on development of the ability to read and interpret public and internal financial reports. Public reporting responsibilities of companies and management's responsibilities for developing and maintaining effective internal control systems. 4 lectures.

GSB 512. Quantitative Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Focus on a variety of statistical techniques that help to transform data into useful information that can be used to make informed business predictions and decisions. Course may be offered in classroom-based, online, or hybrid format. 4 seminars.

GSB 513. Organizational Behavior. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Application of behavioral, social and organizational science concepts to management. Individual, team and organizational levels of analysis, including such topics as expectations, perception, motivation, communications, creativity, leadership, cultural and ethical behavior, group dynamics, team effectiveness, work design, organization change and development. 4 seminars.

GSB 514. The Legal and Regulatory Environment of Business. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Legal and regulatory environment in which business operates. Consideration of historical, societal, and global perspectives reflecting political, social and/or economic beliefs and values. Strong emphasis on fundamental concepts of law and analytical tools to understand interaction between law, ethics and management decisions. 4 seminars.

GSB 516. Strategic Marketing Analytics. 4 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Analysis of customer information, using a broad range of tools and techniques including predictive, statistical, and optimization models. Integration of data into reporting platforms. Application of findings to marketing decision-making. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 517. Strategic People Analytics. 4 units

Term Typically Offered: SP

Prerequisite: GSE 519; and OCOB graduate standing or approval from the Associate Dean.

Application of business analytics approaches and techniques to understanding and managing human resources. Emphasizes problems addressed using people analytics, including which methods are best and under what conditions, data quality and validity issues, and interpretation in the HR context. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 518. Essential Statistics for Business Analytics. 4 units

Term Typically Offered: SU

Prerequisite: OCOB graduate standing or approval from the instructor.

Statistics background needed for analysis of business data and econometrics. Topics include basics of probability theory, random variables, distribution functions, conditional distributions, independence, expectations, covariance, correlation, random samples, estimation, asymptotic theory, hypothesis testing, and confidence intervals. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 520. Data Management for Business Analytics. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Exploration of data management including relational databases, data warehouses, and NOSQL databases. Foundation for analyzing, designing, implementing and using information repositories in a business environment. Topics include the database development life cycle, data modeling, SQL programming, data quality and integration. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 521. Cloud Services & Applications for Business Analytics. 4 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean. Recommended: GSB 520.

Apply cloud resources for business analytics. Identify business benefits of cloud computing, storage, networking, data management and security. Use web services to analyze big data including query, statistical analysis, machine learning and visualization. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 522. Advanced Management Information Systems. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Analysis of the challenges, successes, and failures managers face when planning for and implementing information system initiatives, particularly enterprise systems such as supply chain management, customer relationship management and enterprise resource planning systems. Focus on the strategic and operational impact of emerging information technologies in modern day business management. Design and development of knowledge worker applications including database and decision support systems. 4 lectures.

GSB 523. Managerial Economics. 4 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Managerial economics, or microeconomics, focuses on private markets. Choices made by firms and consumers within topics that include demand, supply, efficiency, marketing structure, and government intervention. Development of an analytical framework for analyzing how these topics are important for managers. 4 lectures.

GSB 524. Marketing Management. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Introduction to marketing management. Concepts and principles necessary to plan, direct and control the product, promotion, distribution and pricing strategies of the firm. 4 lectures.

GSB 525. Project Management. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Focus on project management tools and processes required to establish priorities for and management of projects within normal and abnormal scope, money and time constraints. Planning, organizational and resource challenges common to a variety of project types. Product life cycle, normal operational, new product introduction and profit oriented product family projects reviewed in service and production environments. 4 lectures.

GSB 529. Effective Communication Skills for Managers. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Enhancement of business writing and oral presentation skills, organized around two areas: 1) preparing written business documents and reports, and 2) professional oral presentation skills. Preparation of a variety of business reports and documents. Multiple business presentations. 4 lectures.

GSB 530. Data Analytics and Mining for Business. 4 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Exploration of the concepts, tools and techniques of data mining in the business context, using case study and problem-solving approaches. Topics include multidimensional data modeling, predictive analytics, pattern discovery, forecasting, text mining, and data visualization. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 531. Managerial Finance. 4 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Theories, practices and tools of corporate financial decision making. Topics include valuation of fixed income securities and stocks, capital budgeting, capital structure, dividends, and an overview of financial markets and institutions. Introduction to valuation of derivative securities, market efficiency, and agency costs. 4 seminars.

GSB 533. Aggregate Economics Analysis and Policy. 4 units

Term Typically Offered: SP

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Development of the theoretical and empirical framework of the macroeconomy in which businesses must operate. Topics include GDP, inflation, unemployment, interest rates and monetary and fiscal policies. The dynamics of the macroeconomic environment over time. 4 lectures.

GSB 534. Lean Operations Management. 4 units

Term Typically Offered: SP

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Introduction to the operations function and its interaction with other areas in an organization. Emphasis on applying lean six sigma thinking to achieve competitive advantage in cost, quality, time, and flexibility in manufacturing and service operations. 4 lectures. Course may be offered in classroom-based or online format.

GSB 536. Data Ethics for Business Analytics. 2 units

Term Typically Offered: SP

Prerequisite: GSB 520; and OCOB graduate standing or approval from the Associate Dean.

Examination of ethical risks raised by data analysis, including data collection, ownership and usage. Philosophical examination of topics raised by data analysis, including consent, privacy, transparency, bias and potential harms from data collection and use. Course may be offered in classroom-based, online, or hybrid format. 2 lectures.

GSB 539. Graduate Internship in Business. 2-8 units

Term Typically Offered: W

CR/NC

Prerequisite: OCOB graduate standing and formal petition with approval from the Associate Dean.

Correlation of experience and academic knowledge. Placement in a supervised business or public organization. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Credit/No Credit grading only.

GSB 544. Computing and Machine Learning for Business Analytics. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Use of computers for advanced data analysis in business analytics. Topics include computer programming using statistical software, data gathering and cleaning, and machine learning. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 545. Advanced Machine Learning for Business Analytics. 4 units

Term Typically Offered: SP

Prerequisite: GSB 544; and OCOB graduate standing or approval from the Associate Dean.

Use of computers for advanced machine learning in business analytics. Topics include boosting, ensemble learning, Bayesian methods, and various types of neural networks. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 550. Bayesian Econometrics. 4 units

Term Typically Offered: TBD

Prerequisite: GSE 520.

Introduction to Bayesian econometrics with a focus on business decision making. Making appropriate use of prior information; computation of posterior densities; Bayesian forecasting and policy evaluation; model selection and diagnostic tools; alternative loss functions tailored to specific business applications. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 551. Prescriptive Analytics. 4 units

Term Typically Offered: SP

Prerequisite: GSE 519 or GSE 520.

Monte Carlo simulation. Decision making under uncertainty. Linear and non-linear programming. Dynamic models of growth and arrivals. Model risk. Applications to finance, operations, strategic planning, and marketing. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 555. Negotiation. 4 units

Term Typically Offered: SP

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Theory and practice of negotiation in a variety of professional and managerial contexts (e.g., business acquisitions, compensation, business disputes, transfer pricing, inter- and intra-organizational) and in one-on-one, group, and team-based arrangements. Includes impact of culture, ethics, dispute resolution, coalitions and use of creativity to develop integrative solutions. 4 seminars.

GSB 556. Entrepreneurship and New Venture Management. 4 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Exploration of entrepreneurship with emphasis on the formation and management of new business ventures. Analysis of typical operating problems of these firms and application of appropriate techniques for their solution. 4 seminars.

GSB 562. Seminar in General Management and Strategy. 4 units

Term Typically Offered: SP

Corequisite: OCOB graduate standing and GSB 511, GSB 513, GSB 523, GSB 531, GSB 533 and either GSB 512 or IME 503; and either GSB 524 or GSB 573; and either GSB 534 or IME 580, or approval from the Associate Dean.

Application of interdisciplinary skills to business and corporate strategy formulation and implementation. Analysis of interdependence between external environments and internal systems. Focus on responsibilities, tasks, and skills of general managers. Case studies, group problem solving. Integrating course of MBA core curriculum. Course satisfies comprehensive examination requirement. 4 seminars.

GSB 563. International Business Tour. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Business tour exposure to different management systems and their operating environments. Pre-trip and on-the-road meetings, readings, case studies and discussions. Tours of firms, government offices, ministries, etc; interviews of managers and government officials. Conducted in English. Passport required. The Class Schedule will list topic selected. Total credit limited to 8 units. 2 seminars, 2 activities.

GSB 564. Entrepreneurial Finance. 4 units

Term Typically Offered: TBD

Prerequisite: GSB 531; and OCOB graduate standing or approval from the Associate Dean.

The process of financing new and fast-growing firms. Preparation of pro forma financial statements for a new venture. Readings on the venture capital process, from seed capital through the initial public offering (IPO). Valuation of firms seeking venture capital, and those planning their IPO. Valuing convertible securities. Real options valuation. 4 lectures.

GSB 569. Managing Technology in the International Legal Environment. 4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Practical legal decisions required to conduct business for or with high technology companies. Methods to protect high technology developments in international markets, including copyrights, patents, trade secrets, trademarks and contracts. 4 seminars.

GSB 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Directed group study of selected topics for advanced students. Total credit limited to 8 units. The Class Schedule will list topic selected. 1 to 4 seminars.

GSB 575. Career Readiness in Data Analytics. 1 unit

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Career development and preparation with specific focus on the impact of organizational structures on the professions of business analytics and data science. Personal marketing in a dynamic technological environment. Course may be offered in classroom-based or online format. 1 lecture.

GSB 583. Management of Human Resources. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

An overview of the major functional and support activities in the personnel/human resource field, including strategic human resource planning, job analysis, recruitment, selection, performance appraisal, compensation, employee rights, and employee safety and health. 4 seminars.

GSB 590. Energy and Environmental Finance. 4 units

Term Typically Offered: SP

Prerequisites: GSB 511, GSB 523, and GSB 531; or OCOB graduate standing or approval from the Associate Dean.

Overview of theory and practical tools to improve financing and investment decisions as they relate to the energy industry and markets, and achieve environmental objectives including valuation models, real options, energy derivatives, project finance, impact investing, and managing climate and technological risks. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSB 595. Managing Change. 4 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

The knowledge and the elementary skills/competencies needed to intervene in an organization in order to improve its effectiveness. Design and use of action to improve organizational effectiveness. 4 seminars.

GSB 597. Seminar in Selected Economic Problems. 4 units

Term Typically Offered: TBD

Prerequisite: GSB 523 and OCOB graduate standing or approval from the Associate Dean.

Selected economic problems analyzed at an advanced level in a particular field, such as international trade, public finance, urban, industrial organization or transportation. 4 seminars.

Graduate Studies-Economics (GSE)

undefined

GSE Courses

GSE 500. Independent Study. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of department head.

Advanced study planned and completed under the direction of a departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Enrollment by petition.

GSE 510. Essential Mathematics for Economic Analysis. 4 units

Term Typically Offered: SU

Prerequisite: Graduate standing. Recommended: MATH 206, MATH 244, or MATH 408.

Review and discussion of the basic math tools needed for graduate work in economics, including set theory, linear algebra, properties of functions, static and dynamic optimization. 4 lectures.

GSE 511. Microeconomic Analysis. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing. Concurrent: GSE 510.

Preferences and choice, preferences over commodities, consumer demand theory, producer theory, choice under uncertainty, simultaneous and sequential move games, incomplete information games, mechanism and incentive design. 4 lectures.

GSE 512. Dynamic Stochastic Modeling. 4 units

Term Typically Offered: W

Prerequisite: GSE 511 and graduate standing.

Finite Markov chains, linear state space models, dynamic programming, rational expectations equilibrium, Markov perfect equilibrium, Stackelberg plans, general equilibrium under certainty and uncertainty, Arrow securities, consumption-based asset pricing, incomplete markets. 4 lectures.

GSE 518. Essential Statistics for Econometrics. 4 units

Term Typically Offered: SU

Prerequisite: Graduate standing. Recommended: MATH 206 or MATH 244 or GSE 510.

Statistical concepts for use in theoretical and applied econometric applications including random variables, independence, expectations, probability, distributions, covariance and correlation, large sample theory, and properties of estimators. 4 lectures.

GSE 519. Econometrics and Data Analysis. 4 units

Term Typically Offered: F

Prerequisite: GSB 518 or GSE 518. Corequisite: GSB 544 or GSE 524.

Identification and estimation of linear and nonlinear regression models for analyzing business data. Topics include multiple linear regression; model selection; robust standard errors; instrumental variables; maximum likelihood estimation; logit/probit, ordered logit/probit, and other microeconomic models. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

GSE 520. Advanced Econometrics I. 4 units

Term Typically Offered: F

Prerequisite: GSE 518 and graduate standing. Recommended: ECON 339.

The linear regression model. Confidence and prediction intervals. Hypothesis testing. The generalized regression model and heteroscedasticity. Identification and causal inference: randomization, regression, instrumental variables, regression discontinuity, differences in differences. 4 lectures.

GSE 522. Advanced Econometrics II. 4 units

Term Typically Offered: W

Prerequisite: GSE 520 and graduate standing.

Maximum likelihood estimation. Binary, multinomial, and ordered discrete response models. Truncated, censored regression. Structural equation modeling. Factor models, filtering and Bayes rule. Random utility and mixed logit models. Demand estimation. 4 lectures.

GSE 524. Computing and Machine Learning for Economics. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing.

Use of computers for advanced data analysis in economics and analytics. Topics include computer programming using statistical software, data gathering and cleaning, and machine learning. 4 lectures.

GSE 526. Microeconometrics. 4 units

Term Typically Offered: W

Prerequisite: GSE 520 and graduate standing. Recommended: GSE 524.

Potential outcomes framework and causal treatment effects. Unconfoundedness designs, including matching and propensity score methods. Selection on unobservable designs. Quantile regressions. The econometrics of randomized experiments. 4 lectures.

GSE 532. Environmental and Natural Resource Economics. 4 units

Term Typically Offered: TBD

Sustainability Focused

Prerequisite: GSE 511 and graduate standing.

Economic analysis of pollution, congestion, public good provision, and natural resource conservation. Static and dynamic efficiency, economic growth and sustainability, pollution taxes, marketable permits, and the design of market-based regulations. 4 lectures.

GSE 534. International Economics. 4 units

Term Typically Offered: TBD

Prerequisite: GSE 511 and graduate standing.

Analysis of the international movement of goods, services, capital and payments. The role of exchange rates, tariffs, quotas, and transport costs. Relationship between international trade and economic growth. 4 lectures.

GSE 536. Public Economics. 4 units

Term Typically Offered: TBD

Prerequisite: GSE 511 and graduate standing.

Economic analysis of the rationale for public expenditure and taxation. Externalities, pollution and public policy, income redistribution and public welfare, public goods, collective choice and political institutions, public budgeting techniques and cost-benefit analysis, taxation and tax policy, state-local finance and fiscal federalism. 4 lectures.

GSE 538. Industrial Economics. 4 units

Term Typically Offered: SP

Prerequisite: GSE 511 and graduate standing.

Economic theories of industrial organization with specific reference to such topics as cartels, market concentration and performance, vertical integration, franchise contracts, ownership and control of firms, multipart and discriminatory pricing, and tie-in sales. Economic aspects of antitrust law and government regulation of industry. 4 lectures.

GSE 542. Advanced Labor Economics. 4 units

Term Typically Offered: SP

Prerequisite: GSE 522 and graduate standing, or consent of instructor.

Recommended: GSE 526.

Research methods in labor economics and application of modern empirical techniques to the analysis of labor markets. Topics include labor supply and demand, discrimination, migration, and human capital accumulation. 4 lectures.

GSE 544. Evidence-Based Decision Analysis. 4 units

Term Typically Offered: SP

Prerequisite: GSE 520 and graduate standing. Recommended: GSE 524 and GSE 526.

Representing uncertainty using discrete and continuous conditional probabilities. Monte Carlo simulation of independent and correlated random variables. Optimization of decision variables. Randomization in program evaluation. Model mis-specification. Visualization and representation of the results of a decision analysis. Case studies. 4 lectures.

GSE 546. Incentives and Market Design. 4 units

Term Typically Offered: SP

Prerequisite: GSE 511 and graduate standing.

Ascending, first-price, second-price, and double auctions. Revenue equivalence, multi-unit auctions, the Vickrey-Clarke-Groves mechanism, and matching markets. The deferred acceptance algorithm, the immediate acceptance algorithm, and the many-to-one matching model. 4 lectures.

GSE 552. Machine Learning for Prediction and Causal Inference. 4 units

Term Typically Offered: SP

Prerequisite: GSE 526 and graduate standing.

Regularization, model selection, and supervised and unsupervised learning. Post model selection inference for causal effects. Double/debiased machine learning, causal trees, casual forests, and synthetic controls. 4 lectures.

GSE 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

GSE 580. Seminar in Economics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Advanced topics in economics chosen according to the common interests and needs of the students enrolled. The Class Schedule will list topic selected. 1 to 4 seminars. Total credit limited to 5 units.

GSE 599. Thesis. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing and consent of thesis committee.

Individual research under the general supervision of the faculty, leading to a graduate thesis of suitable quality. Minimum of 8 units required for degree.

Graduate Studies-Packaging (GSP)

undefined

GSP Courses

GSP 530. Packaging Value Chain. 2 units

Term Typically Offered: W, SU

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Packaging value chain from raw material supplier to retailers in the context of meeting current needs within the packaging arena. Global exploration of value chain strategies to increase innovation, sustainability, cost savings, quality, organizational agility, and responsiveness. Course may be offered in classroom-based or online format. 2 lectures.

GSP 532. Packaging Materials. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB. Corequisite: GSP 530.

Fundamental and physical properties of packaging materials. Processing of materials. Design and fabrication of packaging materials for efficient, economically viable and environmental sustainable product-package systems for global supply chain solutions. Course may be offered in classroom-based or online format. 4 lectures.

GSP 533. Advanced Packaging Laws and Regulations. 3 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean. Corequisite: GSP 530.

Overview of packaging laws and regulations. Content ranges from FDA, USDA, FTC, and EPA concepts, to labeling and structural issues such as bio-terror, product security and environmental packaging to materials issues, litigation, international concepts and intellectual property issues. Course may be offered in classroom-based or online format. 3 lectures.

GSP 535. Packaging Value in Logistics and Supply Chain Management. 3 units

Term Typically Offered: SU

Prerequisite: OCOB graduate standing or approval from the Associate Dean. Corequisite: GSP 530.

Integrated view of procurement, operations and logistics management. Management of the flow of products from raw material sourcing and acquisition through delivery to the final user. Capturing and understanding the value across these flows and how to increase it. Course may be offered in classroom-based or online format. 3 lectures.

GSP 536. Packaging Design. 4 units

Term Typically Offered: F

Prerequisite: OCOB graduate standing or approval from the Associate Dean. Corequisite: GSP 530.

Overview of structural and graphic design concepts for package design with focus on creating value throughout the entire packaging value chain. Topics include design thinking, innovation, design processes, two-dimensional and three-dimensional design elements, positioning, value creation, and distribution packaging considerations. Course may be offered in classroom-based or online format. 4 lectures.

GSP 537. Distribution Packaging for Business Managers. 4 units

Term Typically Offered: SU

Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB.

Physical properties of distribution packaging and equipment used in prototyping and testing of product-packaging systems for global supply chains. Application of packaging knowledge to solve distribution packaging problems in modern business, with a view towards costs and environmental sustainability. Course may be offered in classroom-based or online format. 4 lectures. Formerly ITP 537.

GSP 538. Quality Evaluation of Packaged Products. 4 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean. Corequisite: GSP 530.

Overview of the role of quality of packaged product and techniques used for testing and evaluating quality of consumer products as related to material quality assessment, product-package interaction and human-package interaction. Course may be offered in classroom-based or online format. 4 Lectures.

GSP 539. Marketing and Sales for Packaged Products. 4 units

Term Typically Offered: W

Prerequisite: OCOB graduate standing or approval from the Associate Dean. Corequisite: GSP 530.

Packaging as a means to increase sales of product. Package design, structure, materials and production costs. Exploration of color, imagery, sustainability, and recent trends. Course is offered online only. 4 lectures.

GSP 540. Quantitative Analysis for Packaging. 4 units

Term Typically Offered: SP

Prerequisite: OCOB graduate standing or approval from the Associate Dean. Corequisite: GSP 530.

Analytical and quantitative techniques. Summary measures, smoothing, interpolation curve fitting, root-finding, extrema. Numerical differentiation, integration. Boundary value problems. Numerical simulation. Course may be offered in classroom-based or online format. 4 lectures.

GSP 541. Corporate Finance for Packaging. 4 units

Term Typically Offered: SP

Prerequisite: OCOB graduate standing or approval from the Associate Dean. Corequisite: GSP 530.

Decisions with financial implications for firms' owners and stakeholders in the context of packaging. Choice of best packaging alternative from the financial standpoint. Course offered online only. 4 Lectures.

GSP 591. Applied Industry Project I. 5 units

Term Typically Offered: SP

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Initiation, completion and presentation of an individual project, involving research, allowing an opportunity to apply knowledge, skills, and competencies to address a significant issue in the field of packaging value chain, preferably in connection with the student's employment. Formerly ITP 591.

GRC Courses**GRC 101. Introduction to Graphic Communication. 3 units**

Term Typically Offered: F

Graphic communication history, theory, processes, applications, and practices. New technologies that affect day-to-day communication including traditional and digital printing and publishing, and non-print imaging including Internet applications. Overview of design technology, web and digital media, printing and imaging management, graphics for packaging, industry segments. 3 lectures.

GRC 102. Orientation to Graphic Communication. 2 units

Term Typically Offered: W, SP

Corequisite: GRC 101; Graphic Communication Majors and Minors only.

Orientation to Graphic Communication. Introduction to GRC curricula and applicable GRC resources that include advising, student success, and culture. Overview of laboratory fundamentals, laboratory safety, and acceptable practices for the operation and use of equipment. 2 lectures. Replaced GRC 172.

GRC 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor; Graphic Communication majors only.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

GRC 201. Digital Publishing Systems. 3 units

Term Typically Offered: F, W

Prerequisite: Graphic Communication majors or Liberal Arts and Engineering majors with concentration in Publishing Technology.

Introduction to web, e-publishing, and print publishing systems including hardware, software, design considerations, and file formats. Overview of print output technologies, networking, web design, and digital publishing standards. 2 lectures, 1 laboratory.

GRC 203. Digital File Preparation and Workflow. 4 units

Term Typically Offered: W, SP

Prerequisite: GRC 101; GRC 201, and Graphic Communication major.

Terminology and techniques used in the creation of digital files and workflow systems for print and web. Workflow options including automation, proofing, and output systems will be discussed in addition to digital file delivery and transfer. Course offered in hybrid format with classroom-based and online learning. 3 lectures, 1 laboratory.

GRC 204. Introduction to Contemporary Print Management and Manufacturing. 4 units

Term Typically Offered: W, SU

Prerequisite: GRC 101; Graphic Communication majors only.

Survey of management fundamentals and components relevant to graphic communication manufacturing, production, operations, and quality. Introduction to management theory and contemporary management trends and practices in the graphic communication industry. Course may be offered in classroom-based or online format. 4 lectures.

Graphic Communication (GRC)

GRC 211. Materials for Graphic Communication Applications. 4 units

Term Typically Offered: F, W

Prerequisite: Graphic Communication or Liberal Arts and Engineering majors or Graphic Communication minor.

Technical aspects of paper, other substrates, inks, toners, and other printable materials used in the printing and packaging industries. Manufacture, application and interaction of these materials in relation to particular processes and end use requirements. Hands-on testing of materials in relation to quality, properties, and performance. 3 lectures, 1 laboratory.

GRC 212. Materials for Graphic Communication Applications: Theory. 3 units

Term Typically Offered: F, W

Prerequisite: Graphic Communication minors only.

Technical aspects of paper, other substrates, inks, toners and other printable materials used in the printing and packaging industries. Manufacture, application, and interaction of these materials in relation to particular processes and end use requirements. Credit not allowed for GRC majors. 3 lectures.

GRC 220. Introduction to Applied Social Media in Graphic Communication. 2 units

Term Typically Offered: F, W, SP

Prerequisite: GRC 101; major or minor in GRC.

Practical application of social media tools used in the Graphic Communication industry. Students prepare social media marketing campaigns that require research, design, writing, and elementary analytics. Total credit limited to 6 units. 2 lectures.

GRC 224. Binding and Finishing Processes. 1 unit

Term Typically Offered: F

Prerequisite: GRC 211; Graphic Communication majors and minors only.

Imposition techniques, cutting, and folding. Stitch, case and perfect binding techniques and applications. Operational and aesthetic uses of die cutting, scoring, creasing, foil stamping and embossing techniques. 1 laboratory. Replaces GRC 324.

GRC 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor; Graphic Communication majors only.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

GRC 301. Digital Photography and Motion Graphics. 4 units

Term Typically Offered: F, SP

Prerequisite: GRC 203 for Graphic Communication major, or GRC 377 for Graphic Communication minor.

Digital photography and motion graphics for digital printing, interactive media, and web. Topics covered include lighting, exposure, composition, retouching, digital image processing, and color correction. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

GRC 316. Flexographic Printing Technology. 3 units

Term Typically Offered: F, SP

Prerequisite: GRC 203; Graphic Communication majors only.

Flexographic printing technology for flexible packaging, label printing, folding and corrugated cartons. Optimization of file preparation, plate imaging, and equipment settings. Specification and management of automated workflows. Course offered in hybrid format with classroom-based and online learning. 2 lectures, 1 laboratory.

GRC 318. Digital Typography. 4 units

Term Typically Offered: F, W

Prerequisite: Junior standing; GRC 203 and GRC 301 for Graphic Communication major, or GRC 377 for Graphic Communication minor.

Application of typography using current software tools for print and digital publishing. In-depth study of communication principles and visual organization using current software for the creative publishing industries. 3 lectures, 1 laboratory.

GRC 320. Managing Quality in Graphic Communication. 4 units

Term Typically Offered: W, SP

Prerequisite: GRC 328 and STAT 217; Graphic Communication majors only.

Theory and practices of quality management in the graphic communication industry. Quantifying customer expectations, specifications, standard operating procedures, SPC tools, and employee empowerment. Principles of Lean Management, Six Sigma, ISO, and Malcolm Baldrige. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

GRC 322. Advanced Digital Typography. 3 units

Term Typically Offered: SP

Prerequisite: GRC 318; Graphic Communication majors only.

Advanced typographic principles relating to print and electronic media. Page layout and font management with consideration for electronic media. Applied problems focusing on typographic design, typographic application and file preparation, including web typography and eBook creation. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 1 laboratory.

GRC 328. Digital and Offset Printing Methods. 4 units

Term Typically Offered: F, W, SP

Prerequisite: GRC 211; and Graphic Communication major or Graphic Communication minor only.

Digital and offset reproduction methods including reproduction principles, markets, workflow, and quality control as they relate to the profession. Finishing and binding methods in digital and offset printing. 3 lectures, 1 laboratory.

GRC 329. Tangible Interactive Product Development. 3 units

Term Typically Offered: F, SP

Prerequisite: GRC 328.

Introduction to product development processes for tangible interactive products. Incorporate printed and hybrid flexible electronics for tangible interactive functional and novelty applications, sensory marketing, including smart and interactive packaging, point-of-purchase displays, publications, and marketing materials through strategic designing, prototyping, and fabrication. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 1 laboratory.

GRC 331. Color Management. 4 units

Term Typically Offered: W

Prerequisite: Completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs); and ART 182 or GRC 301.

The physics, psychology, measurement, analysis and management of color for physical and digital outputs, including printing, apps, websites, and AR/VR. Practical applications of color correction, color proofing, and production workflows that ensure the best possible color representation across different media. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 activity.

GRC 337. Consumer Packaging. 4 units

Term Typically Offered: W, SP

Prerequisite: GRC 301.

Strategies for package printing that integrate concepts from marketing/branding, design, and technology. Package manufacturing, function, quality, visual appeal, sustainability, and economics are addressed. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

GRC 338. Web Development and Content Management. 4 units

Term Typically Offered: F, W

Prerequisite: GRC 203 and GRC 301.

Web development production techniques including creating, repurposing, and managing assets for web publishing. Digital content management for desktop, tablet, and mobile devices. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

GRC 339. Web Design and Production. 4 units

Term Typically Offered: F

Prerequisite: GRC 338; Graphic Communication majors only.

Advanced design and production techniques for web development. Current software applications and technologies for user interface design, site structure and information architecture. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

GRC 340. Front-end Web Development. 3 units

Term Typically Offered: SU

Prerequisite: GRC 338.

Introduction to JavaScript for web development. Write scripts and mini apps to make websites more interactive and automate functions that enhance user experience within a website. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 1 laboratory.

GRC 347. Packaging Graphics Technology and Design. 3 units

Term Typically Offered: F

Prerequisite: GRC 318; GRC 337; Graphic Communication major or minor.

Advanced creative problem-solving strategies associated with the technologies used in designing graphics for packaging and output methods. Advanced techniques in graphic software including file hygiene, color management, and printing methods. Integrated packaging campaigns which include multiple substrates and digital shelf. Professional portfolio produced. Field trip may be required. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 1 laboratory.

GRC 357. Specialty Imaging and Graphics Technologies. 3 units

Term Typically Offered: W

Prerequisite: GRC 301; and Graphic Communication major or Graphic Communication minor only.

Specialty imaging, graphic technologies, and materials used in textile decorating, grand and wide format printing, structural graphics for marketing, industrial printing, 3D printing, security printing, embellishment. Course may be offered in classroom-based or hybrid format. 2 lectures, 1 laboratory.

GRC 361. Marketing and Sales Management for Print and Digital Media. 4 units

Term Typically Offered: F, SP

Prerequisite: GRC 101 and GRC 204; Graphic Communication majors only.

Identification and development of target markets for products and services in the graphic communication industry. Deployment of strategies in pricing, promotion and distribution management. Application of customer relationship management techniques for personal selling, forecasting and planning. 3 lectures, 1 laboratory.

GRC 372. Applied Graphic Communication Practices. 2 units

Term Typically Offered: F, W, SP

Prerequisite: GRC 102 or GRC 172 for Graphic Communication Major; or GRC 101 for Graphic Communication Minor.

Application of theories and practices to University Graphic Systems as they apply to commercial printing, publication printing, digital media and graphic communication industries. Major credit limited to 2 units; total credit limited to 12 units. 2 seminars.

GRC 376. Web and Print Publishing. 4 units

Term Typically Offered: W

Prerequisite: Graphic Communication minor or Media Arts, Society, and Technology minor.

Web and print publishing technology and its impact on society. The technologies of digital photography, typography, graphics, layout, and design for print and web publishing including decision-making considerations. The application of scientific and mathematical principles to web and print publishing technologies. Not open to Graphic Communication majors. 3 lectures, 1 laboratory.

GRC 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor; Graphic Communication majors only.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 2 units per quarter.

GRC 402. Digital Printing and Emerging Technologies in Graphic Communication. 3 units

Term Typically Offered: W, SP

Prerequisite: Graphic Communication major; and GRC 318.

Study of the theory, technology, economics and application of digital printing processes and variable data publishing. Explores digital printing technology, databases, and database publishing techniques. Course may be offered in classroom-based, online, or hybrid format. 2 lectures, 1 laboratory.

GRC 404. Data Management, Estimating and Visualization in Graphic Communication. 4 units

Term Typically Offered: F, W

Prerequisite: Junior standing and GRC 328; Graphic Communication majors only.

Cost estimating of graphic communication products and data services. Study of data sources and entity relationship design. Exploration, uses, analysis and visualization of data used in digital advertising, marketing, graphic communications operations and finance. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Formerly GRC 403.

GRC 411. Strategic Trends and Profitability Issues in Print and Digital Media. 4 units

Term Typically Offered: W, SP

Prerequisite: GRC 403 or GRC 404; and senior standing; Graphic Communication majors only.

Graphic communication industry market trends and strategic positioning. Strategies for successfully positioning a business. Paradigms and business practices for graphic communication companies. Company analysis using case studies. Innovative management practices in the graphic communication industry. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 activity.

GRC 420. Graphic Communication in Integrated Marketing Communications. 4 units

Term Typically Offered: TBD

Prerequisite: GRC 361 for Graphic Communication major; or GRC 377.

Working with clients, participants will organize and demonstrate proficiency in the use of applicable Graphic Communication design, workflow and data-driven communication software and digital printing technologies using print and media software. GRC capstone for the Integrated Marketing Communications minor. Course offered in hybrid format with classroom-based and online learning. 3 lectures, 1 laboratory.

GRC 421. Production Management for Print and Digital Media. 4 units

Term Typically Offered: F

Prerequisite: GRC 320; Graphic Communication majors only.

Application of management principles and production control methodologies for print and digitally-imaged products. Organization and financial analysis, decision-making, equipment and inventory planning, resource optimization, and the application of practiced and newly innovative contemporary world-class techniques for improving profitability in the graphic communication industry. 3 lectures, 1 activity.

GRC 422. Human Resource Management Issues for Print and Digital Media. 4 units

Term Typically Offered: W, SP

Prerequisite: GRC 403 or GRC 404; and senior standing; Graphic Communication majors only.

Human resource management integrated into the success of graphic communication companies. A comprehensive management approach is utilized emphasizing employee development, training, promotion, and motivation. Conflict management, facilitation skills, team building empowerment, leadership, ethical and legal issues in the graphic communication industry. 3 lectures, 1 laboratory.

GRC 429. Mobile User Experience. 3 units

Term Typically Offered: W

Prerequisite: GRC 338 and Graphic Communication major; or GRC 301 and Graphic Communication minor.

Current technologies and production tools used for mobile user interface and experience design, and prototyping. Industry standards, digital rights management, file formats, and publishing options for digital media applications. Legal, ethical, and business issues surrounding digital media. 2 lectures, 1 laboratory.

GRC 433. User Experience Methods for Digital Innovation. 3 units

Term Typically Offered: W

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Area C; and Graphic Communication Major; or GRC 301 and Graphic Communication Minor.

Fundamental practices associated with user experience design including information architecture, scenario creation and usability testing as it relates to prototypes and interactive content. Structure and presentation of information will be analyzed to employ the principles garnered from the analysis and techniques learned. 2 lectures, 1 laboratory.

GRC 437. Advanced Consumer Packaging. 4 units

Term Typically Offered: TBD

Sustainability Related

Prerequisite: GRC 337; Graphic Communication major. Recommended: GRC 361.

Business processes associated with designing, selling packaging for consumer brands. 2D/3D software, user experience design, sustainability, prototyping, marketing, profitability, sales for global consumer product goods industry. 3 lectures, 1 laboratory.

GRC 439. Book Design Technology. 4 units

Term Typically Offered: F

Prerequisite: Senior standing; GRC 322; and Graphic Communication major only.

Advanced creative problem-solving strategies associated with the technologies used in book design and production. Advanced techniques in page layout, design, typography, type specification and image manipulation as they relate to output technology. Content, format and distribution of print and electronic books. 3 lectures, 1 laboratory.

GRC 440. Magazine Design Technology. 4 units

Term Typically Offered: SP

Prerequisite: Senior standing; GRC 318; and Graphic Communication major only.

Concept development and design for magazines and publications. Technical considerations as they relate to output technology and digital publishing. Application of organizational structures such as grids, formatting and sequential design. Advanced techniques in typography and image manipulation. Distribution of content for print and digital formats. 3 lectures, 1 laboratory.

GRC 451. Management Topics in Graphic Communication. 3 units

Term Typically Offered: TBD

Prerequisite: GRC 203; Graphic Communication majors and minors only.

Current trends and practices in select graphic communication management topics. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based, online, or hybrid format. 3 lectures.

GRC 452. Emerging Technologies in Graphic Communication. 3 units

Term Typically Offered: TBD

Prerequisite: GRC 203.

Current trends and practices in select graphic communication emerging digital topics. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based, online, or hybrid format. 3 lectures.

GRC 453. Design Reproduction Topics in Graphic Communication. 3 units

Term Typically Offered: TBD

Prerequisite: GRC 203.

Current trends and practices in select graphic communication design reproduction topics. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based, online, or hybrid format. 3 lectures.

GRC 461. Senior Project - Independent Study. 1-3 units

Term Typically Offered: TBD

Prerequisite: Senior standing; Graphic communication major; completion of GWR; and STAT 217 and consent of instructor.

Students will engage in collaborative projects in other disciplines without the constraint of a single quarter schedule. Formal presentation and report required. Minimum 90 hours of time. Total credit limited to 3 units.

GRC 462. Senior Project. 3 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing; Graphic communication major; completion of GWR; and STAT 217 and consent of instructor.

Selection and completion of a culminating project. Projects typical of problems that graduates must solve in their fields of employment. Project results presented in formal report and presentation. Course may be offered in classroom-based or online format. 1 lecture, 2 activities.

GRC 463. Senior Project - Applied Practices. 1-3 units

Term Typically Offered: TBD

Prerequisite: Senior standing; Graphic communication major; completion of GWR; and STAT 217 and consent of instructor.

Opportunities in individual or group-based projects in Graphic Communication competitions and/or sponsored projects. Formal presentation and report required. 30 hours per unit. Total credit limited to 3 units. 1-3 activities.

GRC 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: GRC 101 and GRC 201 and Graphic Communication majors only.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. Course may be offered in classroom-based, online, or hybrid format. 1 to 4 lectures.

GRC 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor; Graphic Communication majors only.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

GRC 485. Cooperative Education Experience. 6 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor; Graphic Communication majors only.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 12 units. Credit/No Credit grading only.

GRC 495. Cooperative Education Experience. 12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor; Graphic Communication majors only.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 12 units. Credit/No Credit grading only.

GRC 500. Special Problems in Graphic Communication for Graduate Students. 2 units

Term Typically Offered: TBD

Prerequisite: Graduate standing and consent of instructor.

Investigation, research, studies of problems in the graphic communication industry. Repeated course over four quarters working with University Graphic Systems, the Graphic Communication Institute at Cal Poly, and with individual faculty. Total credit limited to 8 units.

GRC 501. Survey of Functional Printing. 2 units

Term Typically Offered: TBD

Prerequisite: Consent of Printed Electronics and Functional Imaging Graduate Coordinator.

Foundations for emerging functional printing fields including printed electronics, active packaging, and security printing. Emphasis on processes, materials, electrical characterization, sensing, barrier properties, and anti-counterfeiting. Focus on applications including lighting, displays, novel electronics, energy harvesting, energy storage, sensors, scavengers, and brand security. Course offered online only. 2 lectures.

GRC 502. Orientation to Functional Printing. 2 units

Term Typically Offered: TBD

Prerequisite: Consent of Printed Electronics and Functional Imaging Graduate Coordinator.

Orientation and laboratory exploration for printed electronics, active packaging, and security printing. Introduction to curricula, lab activities, research opportunities, and the use of equipment. Active participation in laboratory experiments related to processes and materials. 1 lecture, 1 laboratory.

GRC 510. Materials for Functional Printing. 4 units

Term Typically Offered: TBD

Corequisite: GRC 501.

Study of functional materials including substrates, coatings, and inks. Focus on barrier and heat-stable substrates as well as conductive, semi-conductive, dielectric, transparent conductors, forensic, sensor, and other functional inks and coatings. Emphasis on rheology, morphology, sintering and annealing. Course offered online only. 4 lectures.

GRC 512. Printing and Coating Technologies. 4 units

Term Typically Offered: TBD

Corequisite: GRC 501.

Study of functional printing and coating technologies, including screen printing, flexography, gravure, ink jet, offset, slot die, blade coating and conventional deposition techniques. Course offered online only. 4 lectures.

GRC 514. Optical and Electrical Patterning. 4 units

Term Typically Offered: TBD

Corequisite: GRC 501.

Imaging technologies and processes for security, electronic, and active packaging printing. Focus on creating and evaluating images for applications in product security and electrical fabrication. Course offered online only. 4 lectures.

GRC 520. Functional Printing Product and Business Development. 4 units

Term Typically Offered: TBD

Prerequisite: GRC 501.

Principles of business and product development for electronic and functional applications. Focus on intellectual property rights, capital funding, entrepreneurship, and management of a technology business. Course offered online only. 4 lectures.

GRC 530. Functional Printing Workflows. 4 units

Term Typically Offered: TBD

Prerequisite: GRC 502.

Evaluation of advanced imaging technologies for functional printing applications. Imaging characteristics for ink/substrate combinations, focusing on print process attributes. Compensation for print characteristics. Enabling automated workflow technologies to improve throughput and minimize errors. 2 lectures, 2 laboratories.

GRC 551. Current Trends in Printed Electronics. 4 units

Term Typically Offered: TBD

Corequisite: GRC 502.

Current trends and practices in select printed electronics topics. Open to graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 3 lectures, 1 laboratory.

GRC 552. Current Trends in Active Packaging. 4 units

Term Typically Offered: TBD

Corequisite: GRC 502.

Current trends and practices in select active packaging topics. Open to graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 3 lectures, 1 laboratory.

GRC 553. Current Trends in Security and Anti-Counterfeiting. 4 units

Term Typically Offered: TBD

Corequisite: GRC 502.

Current trends and practices in select security and anti-counterfeiting topics. Open to graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 3 lectures, 1 laboratory.

GRC 560. Research Methods in Printed Electronics and Functional Imaging. 2 units

Term Typically Offered: TBD

Corequisite: GRC 530.

Methods for conducting qualitative and quantitative evaluations, testing, and experimentation as well as writing investigative, scholarly research papers and theses in functional printing. Topics include qualitative research, descriptive research, experimental design, statistical analysis, writing styles, and publishing options. 1 lecture, 1 activity.

GRC 595. Cooperative Education Experience. 4-12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 12 units. Credit/No Credit grading only.

GRC 596. Research Project in Printed Electronics and Functional Imaging. 3 units

Term Typically Offered: TBD

Prerequisite: GRC 560.

Comprehensive research project in printed electronics and functional imaging. Communication of the results and findings of scholarly work in written report and by oral presentation.

History (HIST)

undefined

HIST Courses

HIST 100. Introduction to the Study of History. 2 units

Term Typically Offered: F, W

Prerequisite: History major.

Introduction to the study of history, focusing on methods, topics, skills in the History major at Cal Poly, and internship and career opportunities. To be taken in the first year of study at Cal Poly. 2 seminars.

HIST 110. Western Civilization: Ancient to Renaissance. 4 units

Term Typically Offered: F, W

Beginnings of western civilization from the river valley societies of the Middle East, circa 3,000 BCE to the Renaissance in Western Europe to 1550 CE. Political, economic, social, intellectual, and artistic development of that period. 4 lectures.

HIST 111. Western Civilization: Reformation to the Present. 4 units

Term Typically Offered: W

Development of western civilization from 1550 CE to the present. Comparison of liberal modernization of the West with the conservative modernization in Central, East and Southeast Europe. Political, economic, social, intellectual, and artistic developments of that period. Particular attention to understanding dynamics that produce pluralistic mass societies such as Great Britain and France, and authoritarian mass societies such as Nazi Germany and the Soviet Union. 4 lectures.

HIST 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter.

HIST 201. United States History to 1865. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: GE Area D1

2019-20 or earlier catalog: GE Area D1

USCP

Survey of the first half of U.S. history, including: contact and settlement, American Revolution, slavery, westward expansion, early California, Civil War, and California and U.S. Constitutions. Particular attention to how race, class, and gender shaped changing definitions of freedom and equality. Not open to students with credit in HIST 206. 4 lectures. Crosslisted as HIST 201/HNRS 203. Fulfills GE Area D1 and USCP.

HIST 202. United States History Since 1865. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: GE Area D1

2019-20 or earlier catalog: GE Area D1

USCP

Survey of the second half of U.S. history, including reconstruction, industrialization, the regulatory state, foreign affairs, and the remaking of citizenship rights and society. Particular attention to how race, class, and gender shaped changing definitions of freedom and equality. Not open to students with credit in HIST 206. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as HIST/HNRS 202. Fulfills GE Area D1 and USCP.

HIST 206. United States Cultures. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: GE Area D1

2019-20 or earlier catalog: GE Area D1

USCP

The social, cultural, constitutional, and political history of African American, Asian American, Native American, Latinx and other underrepresented groups. Not open to students with credit in HIST 201 or HIST 202. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area D1 and USCP.

HIST 208. Survey of California History. 4 units

Term Typically Offered: W, SP

USCP

Survey of California history from the pre-Columbian period to the present. Native American culture, Spanish imperialism, the Mexican War, gold rush, immigration, dominance of the Southern Pacific Railroad, progressivism, growth of Los Angeles, and California's impact on national and world economy and politics. 4 lectures. Fulfills USCP.

HIST 210. World History to 1800. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Global history from the beginnings of organized agriculture to the Industrial Revolution. Focus on causation, using geography and cultural creation to highlight economic, political, social, and intellectual developments of the major civilizations of earth. Not open to students with credit in HIST 221 or HIST 222. Field trip may be required. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HIST 213. Modern Political Economy. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

The relationship between states and economies in the modern period. Modernization, industrialization, and colonialism. Modern systems of political economy, especially mercantilism, capitalism, communism, and social democracy. Modern theories of political economy, especially liberalism, Marxism, and Keynesianism. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as HIST/HNRS 213. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HIST 216. Comparative Social Movements. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

History of social movements worldwide from the late nineteenth century to the present. May include, but not limited to: socialism and other labor movements, feminism, white supremacy, pacifism, decolonization, Indigenous peoples, racial justice, LGBTQIA, environmentalism, fair trade, and independent living movement. 4 lectures. Crosslisted as HIST/HNRS 216. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HIST 221. World History, Beginnings to 1000 CE. 4 units

Term Typically Offered: SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

History of world societies in comparative global perspective. Cross-cultural exchange, interaction, and conflict in the making of the world to 1000, concentrating on the rise of earliest human communities, growth of states, economic, political, and cultural transformations. Not open to students with credit in HIST 210. Field trip may be required. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HIST 222. World History, 1000-1800. 4 units

Term Typically Offered: F, SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

History of world societies in comparative global perspective. Cross-cultural exchange, interaction, and conflict in the making of the world to 1800, concentrating on the global interaction and integration, cultural and ecological exchange, economic, political, and cultural transformations. Not open to students with credit in HIST 210. Field trip may be required. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HIST 223. World History, 1800 - Present. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Comparative history of Western and non-Western societies in global perspective. Examines the history of cross-cultural exchange, interaction, and conflict in the making of the modern world, concentrating on economic, political, and cultural transformations that facilitated and emerged from imperialism. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as HIST/HNRS 223. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HIST 225. The World at War. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Comparative history of the causes and consequences of global warfare for diverse societies and individuals from prehistory to the present. Relationships between global warfare and environment, technology, migration, economics, politics, religion, art, popular culture, law, ethnicity, class, and gender. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HIST 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

HIST 303. Research and Writing Seminar in History. 5 units

Term Typically Offered: F, W, SP

Prerequisite: HIST 100 or History minor; completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs); and completion of GE Area A3 with a grade of C- or better.

Designed to develop student's ability to research and write an interpretive paper on a specific topic. Seminar participants practice the skills of library research, historical and historiographical analysis, and writing and revising. Paper in lieu of final examination. The Class Schedule will list topic selected. Course may be offered in classroom-based or online format. 4 lectures and research project.

HIST 304. Historiography. 4 units

Term Typically Offered: F, W, SP

Prerequisite: HIST 303; History major.

Theoretical approaches used to study the past, including scholarship on history and memory, the influence of interdisciplinary studies, the significance of race and gender as categories of analysis, and the place of history and the historian in contemporary society. Course may be offered in classroom-based or online format. 3 seminar meetings and research project.

HIST 306. The Witch-Hunts in Europe, 1400-1800. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

A history of the development of witchcraft ideas, persecutions, and skepticism in the western world from 1400 to 1800, focusing on the legal, economic, social, and intellectual currents that produced, fired, and eventually ended the phenomenon. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 307. European Thought 1800-2000. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Intellectual and cultural history of Europe from the nineteenth century to the present. Liberalism, radical thought, feminism, evolutionary theory, psycho-analysis, structuralism, existentialism, and postmodernism. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 308. The Trans-Atlantic Slave Trade. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

The African, Islam and Euro-American dimensions of the trans-Atlantic slave trade, with focus on its varying roots, organization and impact on cross-cultural and global levels. 4 lectures. Crosslisted as HIST/HNRS 308. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 309. Cultures of West Africa and the African Diaspora. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

The cultures of West African and the African Diaspora, with special attention to the intersection of Animist, Islamic and Western cultures, and the survival of African cultures in the Americas as manifested in the artistic, religious, literary, and other humanistic legacies of the African Diaspora. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 310. East Asian Culture and Civilization. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

The pre-modern and modern histories of China and Japan. Focus on the traditional era, the transition to modernity, cultural uniqueness within East Asian civilization, and western images of Asia. 4 lectures. Crosslisted as HIST 310/HNRS 312. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 311. Comparative World Environmental History & Sustainability Since 1492. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Sustainability Focused

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Comparative history of landscape transformation, conservation policy, and environmental beliefs of North America, Latin America, Europe, China, and Africa from 1492 to the late 20th century. Historical comparison of biophysical, cultural, economic, and political change connected to issues of sustainability in world regions. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 313. Modern Middle East. 4 units

Term Typically Offered: F, W

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Political, social, and economic development of the Middle East from the late Ottoman and Qajar Empires in the 19th century through the formation of nation-states in the 20th. Special attention to imperialism, nationalism, orientalism, modernity/modernization, state-building, revolution, and oil. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs). Formerly HIST 314.

HIST 316. Modern East Asia. 4 units

Term Typically Offered: W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Modern histories of China, Japan and Korea: great disruptions of modernity that have transformed these societies, common characteristics of modernity in East Asia, great differences between Chinese, Japanese and Korean histories, and the mutually constitutive nature of these East Asian histories. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 317. The Lure of the Sea. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

The history of the sea, people who travel across it, live alongside or in the midst of it, or simply seek it out. Topics include imperialism, maritime commerce, port cities, littoral societies, piracy, tourism, popular culture. 4 lectures. Crosslisted as HIST/HNRS 317. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 318. The City in the Modern World. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Comparative history of social, economic, political, and cultural changes in urban life during the nineteenth and twentieth centuries. Topics may include but are not limited to: commerce and labor; disease and death; conservation and preservation; gender and sexuality; race and ethnicity. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 319. Modern South and Southeast Asia. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Modern histories of South and Southeast Asia: traditional empires and cultures, spread of modern capitalism, Western and Japanese colonialism, decolonization and independence, ethnic and religious tensions, roles in contemporary economy and geopolitics. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 320. Colonial and Revolutionary America. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Settlement and evolution of British America, background to the imperial dispute, events leading to the Revolution, Articles of Confederation, Constitution, the national economy, roles of and impact on African-Americans, women, Native Americans and Loyalists. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 321. Civil War America. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

The experiences of nineteenth-century Americans. Focus on industrialization, antebellum reform, slavery, the Civil War battlefield and homefront, Reconstruction, and the creation of a New South. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 322. Modern America. 4 units

Term Typically Offered: W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area D1.

American history since 1900. Focus on domestic and foreign policy interactions, struggle of disenfranchised groups for social and political equality, and changes in culture and identity. 4 lectures. Crosslisted as HIST 322/HNRS 323. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 326. United States Foreign Relations since 1898. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Topics include imperialism, the world wars, the Cold War, decolonization, and globalization. Particular attention to ideologies shaping U.S. policy; ethics and decision-making at multiple levels; and political, economic, social, and cultural consequences of U.S. activity for societies and individuals around the world. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 334. Modern Europe, 1789-1914. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D. Recommended: HIST 111.

Europe's 'long nineteenth century' reveals continuity and dramatic changes in politics, social structures and identities, forms of cultural expression, and scientific and technological knowledge. Topics include the French and Industrial revolutions; liberalism; nationalism; socialism; modernism; imperialism; and World War I. 4 lectures. Crosslisted as HIST/HNRS 334. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 335. Modern Europe, 1914-Present. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D. Recommended: HIST 111.

Examination of twentieth-century European history. Topics include: First World War, World Economic Crisis, communism, fascism, mass culture, shifting gender roles, Second World War, Cold War, Velvet Revolution, and the European Union. 4 lectures. Crosslisted as HIST/HNRS 335. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 336. Britain at War: The British, the Americans and the Struggle for Freedom, 1939-1945. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); completion of GE Area D1; and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Historical examination of Great Britain's challenge to its sovereignty and freedom by the regime of Nazi Germany from 1939-1945. An account of how Britain formed an alliance with the United States, and how that partnership forged a successful campaign that culminated in the survival of Britain and destruction of the Nazi regime. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 337. Colonial Latin America. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Survey of Latin American history in the colonial period from 1492 to the early nineteenth century. Special attention to the indigenous cultures, the Iberian civilization, and the evolving relationship between them. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 338. Modern Latin America. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Social, economic and political history of Latin America from the 19th century to the present. Historical development of economic structures and political and cultural institutions in the region, including Central America, the Hispanic Caribbean, and South America. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 341. Modern Central America. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing.

Political, social, and economic development of Central American countries in the context of regional history and international politics during the nineteenth and twentieth Centuries. 3 lectures and research project.

HIST 350. The Scientific Revolution, c. 1500-1800. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: One or more courses in GE Area B.

History of the intellectual, social, and cultural changes in the early modern period known as the 'Scientific Revolution.' Main topics include the Copernican Revolution, mechanical philosophy, natural history, and the social and material practices of early modern science. 4 lectures. Crosslisted as HIST/HNRS 350. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HIST 355. History of Network and Information Technologies. 4 units

Term Typically Offered: W

Prerequisite: Junior standing.

History of computer networks and other information technologies from the Cold War to the present. ARPANET, USENET, Internet, World Wide Web, Web 2.0. Cybernetics, information theory, data science. Issues of diversity and inclusivity in cyberspace and the information technology professions. 4 lectures.

HIST 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter.

HIST 401. Early America. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Age of exploration. European powers in eastern North America. English settlements, development of the English colonies, with emphasis on Virginia and Massachusetts. Proprietary interests, growth of internal control, and colonial conflicts. 3 lectures and research project.

HIST 405. African-American History to 1865. 4 units

Term Typically Offered: F

Prerequisite: HIST 303 or graduate standing.

History of African Americans from the colonial period to the Civil War, roughly 1619-1865. The slave trade, slavery in the colonies, plantation slavery, the Black West, and free Black culture and institutions. 3 lectures and research project.

HIST 406. African-American History from 1865. 4 units

Term Typically Offered: W

USCP

Prerequisite: HIST 303 or graduate standing.

History of African-Americans from the Civil War to the present. Reconstruction, racial segregation, the Harlem Renaissance, the Great Migration, the Civil Rights Movement, Black Feminism and Black Power. 3 lectures and research project. Fulfills USCP.

HIST 407. Science and Society in Cold War America. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing and HIST 303; or Junior standing; ISLA 123; and completion of GE Area A3 with a grade of C- or better; or Graduate standing.

American science during the Cold War, including the development of weapons-related technologies, the effects of economic change and foreign policy, ethical debates among scientists, and shifting public perceptions of science. 3 lectures and research project.

HIST 408. The Age of Roosevelt: Depression and World War, 1929-50. 4 units

Term Typically Offered: W

Prerequisite: HIST 303 or graduate standing.

Principle forces affecting the nation's political, social and economic life during the Age of Franklin Roosevelt. Included are the politics of the New Deal, government regulation of the economy and response to the Depression, the rise of the modern presidency, racial and ethnic conflict, the politics of class and gender, the home front at war and post-war tension. 3 lectures and research project.

HIST 409. Vietnam War at Home and Abroad. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Interaction of revolutionary Vietnamese nationalism with U.S. foreign policy. Analysis of the conduct of the war. Assessment of the impact of the war on U.S. society. 3 lectures and research project.

HIST 413. Turbulent Decades: The United States in the 1960s and 1970s. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Topics include liberalism, conservatism, civil rights, foreign policy, the war in Vietnam, stagflation and deregulation, and key social and cultural movements. Emphasis on politics, economic conditions, and ideology. 3 lectures and research project.

HIST 416. Modern Japan. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Japan's development as a modern state (1800-2000 CE). Themes include Japan's engagement with modernity and nationalism, the emperor system, Japanese imperialist expansion, and postwar reconstruction of Japanese society. 3 lectures and research project.

HIST 417. 20th Century China. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Chinese history in the twentieth century: the fall of the Qing Dynasty and founding of Republic of China in 1912, problems of imperialism and modernity, Chinese Communist Party and People's Republic of China since 1949. 3 lectures and research project.

HIST 418. Chinese Film and History. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Examination of 20th century Chinese history through the use of Chinese feature films. Films (with English subtitles) serve as main texts for understanding the tremendous changes in modern Chinese history, and the evolving relationships between film and Chinese society. 4 lectures.

HIST 419. Modern Southeast Asia. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Modern history of mainland and maritime Southeast Asia, focusing on the development of political institutions and changing political and cultural identities. Early empires, expansion of capitalism, colonial rule and wars through era of independence. 3 lectures and research project.

HIST 421. The History of Prostitution. 4 units

Term Typically Offered: SP

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Comparative history of prostitution from antiquity to present. Analysis of prostitution from social, cultural, political, gendered and economic perspectives. 4 lectures. Crosslisted as HIST/WGQS 421. Formerly WGS 421.

HIST 422. Japanese Postwar Film and History. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing. Recommended: HIST 316 or WLC 310 in GE Area D.

Relationships between film and postwar Japanese society; recurring themes and images that link the diverse body of postwar Japanese film. Films (with English subtitles) serve as main texts for understanding of the tremendous changes in recent Japanese history. 3 lectures, 1 activity.

HIST 423. The History of Vietnam. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

The history of Vietnam and the influences on its national identities, including migration, cultural adaptations, temporality and territoriality, foreign influences, and racial formations within and outside of the borders of today's Vietnam. 3 lectures and research project.

HIST 424. Organizing and Teaching History. 4 units

Term Typically Offered: F

Prerequisite: Admission to teacher education program or valid teaching credential.

Organization, selection, presentation, application, and interpretation of subject matter in history in secondary schools. 4 seminars.

HIST 425. History-Social Sciences Student Teaching Seminar. 2 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: HIST 424. Concurrent: EDUC 469 or EDUC 479.

Supervised practicum for part-time and full-time student teachers in the Social Science Credential Program. Teaching techniques and strategies useful for addressing a wide range of issues that arise in grades 6-12 social science classrooms. Credit/No Credit grading only. Total credit limited to 8 units. 2 seminars.

HIST 426. Imperial Russia. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Political, social, intellectual and economic roots of Russian Absolutism. Emergence of Russia as an imperial power, reform, reaction and revolution - 1689-1914. 3 lectures and research project.

HIST 427. Soviet Russia. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Transformation of Russian autocracy from tsarist to Bolshevik under the impact of World War I and the Revolution of 1917. The formative force of Marxism-Leninism; Civil War; the "experimental" 20s; forced collectivization and industrialization; the Purges; "engineering" a new Soviet Woman and Man for a new communist world; War: Second and Cold. 3 lectures and research project.

HIST 428. The Indian Ocean. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

History of the Indian Ocean from pre-Islamic times to the present. Exploration of unity and diversity of interconnected societies of the sea and shores of the Indian Ocean. Examination of geography, trade, travel, naval power and exploration in the political, religious, cultural, maritime and economic history of this vital region. 4 lectures.

HIST 429. Precolonial African History. 4 units

Term Typically Offered: F

Prerequisite: HIST 303 or graduate standing.

Survey of African history from earliest times. Ancient African civilizations, Moslem penetration, the rise of indigenous kingdoms and the continuous impact of Atlantic slave trade. 3 lectures and research project.

HIST 430. Modern African History. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Survey of African history in the 19th and 20th centuries including European colonialism, African resistance, the rise of African nationalism and problems since independence. 3 lectures and research project.

HIST 432. United States Environmental History. 4 units

Term Typically Offered: TBD

Sustainability Focused

Prerequisite: HIST 303 or graduate standing.

Consideration of major themes in human interactions with the environment from the colonial period to the present. Major topics include: changing subsistence systems; the environmental impact of industrialization; conservation and sustainability; and the rise of modern environmental movements. 3 lectures and a research project.

HIST 433. History of the American West, Southwest Borderlands, and California. 4 units

Term Typically Offered: W

Prerequisite: One upper-division course in GE Area D or HIST 303 (may be taken concurrently).

Historiographical and chronological survey since European contact. Emphasis on the frontier and borderlands concepts, Native America, the Hispanic Southwest, US expansion and conquest, industrial capitalism, inter-societal and transnational economies, immigration, public memory, and racial identity formation. 3 lectures and a research project.

HIST 434. American Women's History to 1870. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Female ideology and experience from the colonial period through the American Civil War. Use of a variety of sources, including women's own writing, in order to understand the history of women as it both reflects and shapes American culture and society. 3 lectures and research project. Crosslisted as HIST/WGQS 434. Formerly WGS 434.

HIST 435. American Women's History from 1870. 4 units

Term Typically Offered: TBD

USCP

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

The female past in the modern period of U.S. history. Considers how transformations in gender roles are reflective of other significant changes in American culture and society. Emphasis on class, race, and ethnic variations in women's experience. 3 lectures and research project. Crosslisted as HIST/WGQS 435. Fulfills USCP. Formerly WGS 435.

HIST 437. Nazi Germany. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Background of German Romantic Nationalism; national unification and defeat in World War I; the failure of Weimar Democracy and political radicalization; the Nazi political, economic, and social revolution 1933-1939. 3 lectures and research project.

HIST 440. Topics and Issues in the History of the United States. 4 units

Term Typically Offered: SP

Prerequisite: HIST 303 or graduate standing.

Selected topics and issues in United States history. Descriptive subtitles assigned to each course. The Class Schedule will list topic selected. May be repeated to 8 units. 3 lectures and a research project.

HIST 441. Topics and Issues in European History. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Selected topics and issues in European history. Descriptive subtitles assigned to each course. The Class Schedule will list topic selected. May be repeated to 8 units. 3 lectures and research project.

HIST 442. Topics and Issues in Latin American History. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Selected topics and issues in Latin American history. Descriptive subtitles will be assigned to each course. The Class Schedule will list topic selected. May be repeated to 8 units. 3 lectures and research project.

HIST 443. Topics and Issues in Asian History. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Selected topics and issues in Asian history. Descriptive subtitles will be assigned to each course. The Class Schedule will list topic selected. May be repeated to 8 units. 3 lectures and research project.

HIST 444. Topics and Issues in African History. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Selected topics and issues in African history. Descriptive subtitles will be assigned to each course. The Class Schedule will list topic selected. May be repeated to 8 units. 3 lectures and research project.

HIST 445. Topics and Issues in Comparative History. 4 units

Term Typically Offered: W, SP

Prerequisite: HIST 303 or graduate standing.

Selected topics and issues in comparative history. Descriptive subtitles will be assigned to each course. The Class Schedule will list topic selected. May be repeated to 8 units. 3 lectures and research project.

HIST 452. Renaissance and Reformation Europe. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Europe from 1348 to 1620 CE, with topics including the urban milieu, Renaissance philosophy and artistic expression, the new prince, the educational revolution, the Renaissance Church, Martin Luther, Jean Calvin, and the monumental economic, social, and political changes of the sixteenth century. 3 lectures and research project.

HIST 453. Religious Wars and Absolutism. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Europe from 1559 to 1715 CE, focusing on the Catholic-Protestant conflict, the rise of the Absolutist state (especially Louis XIV), the "Crisis of the Seventeenth Century," the Thirty Years War, the English Civil War and Cromwell, and the Newtonian Paradigm. 3 lectures and research project.

HIST 458. Gender and Sexuality in Modern Europe. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Social, economic, political, and cultural effects of changing gender systems in modern Europe, particularly but not exclusively with regard to sex and sexuality. 3 lectures and research project. Crosslisted as HIST/WGQS 458. Formerly WGS 458.

HIST 459. Imperialism and Postcolonial Studies. 4 units

Term Typically Offered: SP

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

The history of imperialism and postcolonial studies and the influences of social, economic, and political impact of the empire system on indigenous people, cultures, economy, and politics. 3 lectures and research project.

HIST 460. Senior Project I. 2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: HIST 303; HIST 304; senior standing; and History major.

Completion of paper or creative project under faculty supervision. Must be historical in nature, investigate a question of significance, include an historiographical analysis, and make an argument based on primary and secondary sources. Take HIST 461 during a subsequent quarter.

HIST 461. Senior Project II. 2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: HIST 303, HIST 304; HIST 460; senior standing; and History major.

Completion of paper or creative project begun in HIST 460 under faculty supervision.

HIST 467. History Internship. 4-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Junior standing, completion of HIST 303 with grade of B or better and consent of internship coordinator.

Supervised work experience using skills of the discipline of history in a public agency ranging from 12 to 36 hours per week. Interns work directly under the supervision of an employee of the agency and are subject to the professional responsibilities typical of the state. Total credit limited to 12 units. Credit/No Credit grading only.

HIST 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

HIST 475. Arabia and the Arab Gulf States. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or graduate standing.

History of Arabia from pre-Islamic times to the present. Political, cultural, social and economic history of Oman, the United Arab Emirates, Qatar, Bahrain, Kuwait, Saudi Arabia and Yemen. Emphasis on regional connectivity, imperialism and the origins of modern Gulf nation states, and historical roots to contemporary problems in the region. 4 lectures.

HIST 477. Topics and Issues in Public Engagements with History. 4 units

Term Typically Offered: F, W

Prerequisite: HIST 303 or graduate standing.

Intensive study of how contemporary historians engage the public. Focus on tools and methodologies. Special attention to forms of public engagement designed for diverse audiences. Organized around individual and group projects. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

HIST 485. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 12 units. Credit/No Credit grading only.

HIST 495. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 24 units. Credit/No Credit grading only.

HIST 500. Special Problems for Graduate Students. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing in History.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units.

HIST 504. Graduate Study in History. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing in History.

Weekly reading and discussion course on practical methods and theoretical approaches to the study and writing of history. 4 seminars.

HIST 505. Graduate Seminar in United States History. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in History.

Intensive study of selected topics in United States history. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

HIST 506. Graduate Seminar in European History. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in History.

Intensive study of selected topics in modern European history. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

HIST 507. Graduate Seminar in East Asian History. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing in History.

Intensive study of selected topics in East Asian history. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

HIST 508. Graduate Seminar in Latin American History. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in History.

Intensive study of selected topics in Latin American history. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

HIST 509. Graduate Seminar in African History. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in History.

Intensive study of selected topics in African history. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

HIST 510. Graduate Seminar in Comparative History. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing in History.

Intensive study of selective topics in comparative history. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

HIST 511. Graduate Seminar in Middle Eastern History. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing in History.

Intensive study of selected topics in Middle Eastern history. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 seminars.

HIST 512. Supervised Reading for Comprehensive Exams. 2 units

Term Typically Offered: F, W, SP

Prerequisite: HIST 504 and 12 units of graduate study.

Directed supervision of reading for MA comprehensive exams. Regular consultation between advisor and student. Total credit limited to 4 units.

HIST 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

HIST 599. Thesis. 3 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing in History.

Directed supervision of MA thesis. Regular consultation between advisor and student. Course to be taken three times over three separate quarters; total credit limited to 9 units.

Health (HLTH)

undefined

HLTH Courses

HLTH 101. Orientation to Public Health. 1 unit

Term Typically Offered: F, W

CR/NC

Prerequisite: Public Health majors only.

Orientation to the public health discipline. Advising, introduction to the faculty, department and campus resources to facilitate student success; extracurricular and research opportunities, careers and current topics in public health. Credit/No Credit grading only. Course may be offered in classroom-based or online format. 1 lecture.

HLTH 201. Introductory Undergraduate Research. 1-2 units

Term Typically Offered: F, W, SP

Introduction to individual research, studies, or surveys of selected problems. Intended for students in Kinesiology and in Public Health. Total major credit limited to 4 units. Total credit limited to 6 units. Crosslisted as HLTH/KINE 201.

HLTH 250. Healthy Living. 4 units

Term Typically Offered: F, W, SP

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

Personal health with emphasis on healthful behavioral practices including physical fitness, nutrition, psychosocial well-being, alcohol and other drugs, intentional and unintentional injury, reproductive health, infectious and non-infectious diseases. Not open to students with credit in HLTH/KINE 255. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

HLTH 255. Personal Health: A Multicultural Approach. 4 units

Term Typically Offered: F, W, SP

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

USCP

Personal health with special emphasis on multicultural practices. Not open to students with credit in HLTH/KINE 250. Course may be offered in a classroom-based or online format. 4 lectures. Fulfills GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs); and USCP.

HLTH 260. Women's Health Issues. 4 units

Term Typically Offered: F, W, SP

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

USCP

Introduction to major health issues that affect women disproportionately or differently from men. Topics include female sexual health and reproduction, exercise and eating behaviors, substance abuse, mental health and stress, and violence against women. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs); and USCP.

HLTH 265. Introduction to Community and Public Health. 3 units

Term Typically Offered: F, W, SP

Prerequisite: one of the following: HLTH/KINE 250, HLTH/KINE 255, or HLTH/KINE 260. Recommended: HLTH 101.

Introduction to community health and the core functions of public health. Social-ecological, behavioral, and policy influences on community and population health. Health promotion in community/public health settings. Course may be offered in classroom-based or online format. 3 lectures.

HLTH 280. Assessment Team for Health Promotion Activities. 1 unit

Term Typically Offered: TBD

CR/NC

Prerequisite: HLTH/KINE 250, HLTH/KINE 255, or HLTH/KINE 260.

Recommended: KINE 319 and STAT 218.

Introduction to multiple health and fitness assessment protocols through participation in community-based activities and/or as assistants on faculty-led research projects. Experiential and service learning. Total credit limited to 3 units. Credit/ No Credit grading only. 1 activity. Crosslisted as HLTH/KINE 280.

HLTH 281. Health Ambassadors. 1 unit

Term Typically Offered: TBD

CR/NC

Prerequisite: HLTH/KINE 250, HLTH/KINE 255, or HLTH/KINE 260.

Recommended: FSN 210 and HLTH/KINE 265.

Introduction to health education and promotion strategies through participation in community-based activities and/or as assistants on faculty-led projects. Experiential and service learning. Field trip required. Total credit limited to 3 units. Credit/No Credit grading only. 1 activity. Crosslisted as HLTH/KINE 281.

HLTH 297. Medical Terminology. 3 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area B2.

Development of medical vocabulary used in health care occupations, through the study of root words, prefixes, suffixes, and case studies. Pronunciation, spelling, and use of medical terms and abbreviations related to diagnosis, clinical procedures, surgery, and anatomical and physiological systems. Course offered online only. 3 lectures.

HLTH 298. Introduction to Epidemiology. 4 units

Term Typically Offered: F, W

Prerequisite: HLTH/KINE 265; and STAT 217 or STAT 218. Recommended: MCRO 221 or MCRO 224.

Introduction to epidemiologic principles and methods for studying chronic and communicable diseases in the United States, including surveillance methods; epidemiologic study designs; and statistics used to describe occurrence of health-related conditions and associations of risk factors with health outcomes. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

HLTH 305. Drugs in Society. 4 units

Term Typically Offered: F, W

Prerequisite: BIO 231; and one of the following: HLTH/KINE 250, HLTH/KINE 255, HLTH/KINE 260, or HLTH/KINE 443. Recommended: BIO 232.

Social, biological, and psychological factors of the major drugs associated with therapeutic and recreational use and abuse in society. Topics include drug use as a social problem, theories and treatment of addiction, how drugs work, and the detrimental health effects of drug use. Includes both illegal and legal drugs. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

HLTH 310. Injury Prevention. 3 units

Term Typically Offered: W, SP

Prerequisite: BIO 231; BIO 232; and HLTH/KINE 265. Recommended: HLTH 298.

Injury prevention from a public health perspective. Examination of unintentional and intentional injuries in different populations. Theory and evidence-based approaches to injury prevention. Course may be offered in classroom-based or online format. 3 lectures.

HLTH 318. Applied Epidemiology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: HLTH/KINE 298; and PSY 201 or PSY 202. Recommended: STAT 313.

Application of epidemiologic principles and methods to the study of distribution and determinants of disease outcomes, identifying sources of systematic and random error, causal inference, presentation and interpretation of epidemiologic data. Course may be offered in classroom-based, online, or hybrid format. Replaced HLTH 299. 3 lectures, 1 laboratory.

HLTH 320. Media and Technology in Health Promotion. 4 units

Term Typically Offered: W, SP

Prerequisite: Completion of GE Area A with grades of C- or better; KINE 180 or HLTH/KINE 265; and one of the following: HLTH/KINE 250, HLTH/KINE 255, or HLTH/KINE 260. Recommended: HLTH 299 or HLTH 318.

Applications of mass communication technologies in health promotion. Role of theoretical frameworks, ethics, challenges, development, implementation, and evaluation of technology-based health promotion programs. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

HLTH 334. Health Behavior Theory. 3 units

Term Typically Offered: F, W, SP

Prerequisite: HLTH/KINE 298. Recommended: HLTH 299; and PSY 201 or PSY 202.

Introduction to health behavior theories and models. Examination of effectiveness of theory-based interventions to facilitate behavior change to promote health and prevent disease. Course may be offered in classroom-based, online, or hybrid format. 3 lectures.

HLTH 337. Early Fieldwork Experience. 1-3 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Junior standing.

Practical work experience in related activities of kinesiology under qualified supervision. Total credit limited to 9 units. Credit/No Credit grading only. Minimum of 2 laboratory hours per week per unit. Crosslisted as HLTH/KINE 337. Formerly KINE 437.

HLTH 400. Special Problems for Advanced Undergraduates. 1-3 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing.

Individual investigation, research, studies, or surveys of selected problems. Total major credit limited to 4 units. Total credit limited to 6 units. Crosslisted as HLTH/KINE 400.

HLTH 402. Research Methods in Public Health Settings. 4 units

Term Typically Offered: F, W

Prerequisite: HLTH 299 or HLTH 318; HLTH 334; and STAT 313.

Quantitative and qualitative research approaches and methods in public health settings, with particular emphasis on social and behavioral sciences. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

HLTH 405. Stress, Health and Chronic Illness. 4 units

Term Typically Offered: F, SP

Prerequisite: BIO 231; BIO 232; HLTH 299 or KINE 304; and HLTH 334 or KINE 266.

Overview of stress physiology. Multifactorial causes and consequences of stress in chronic disease. Assessment of stress in health promotion settings. Evidence-based stress management practices and programs for disease prevention in public health settings. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 activity.

HLTH 410. Global Health. 4 units

Term Typically Offered: W, SP

Prerequisite: Junior standing; completion of GE Area D1; one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs); and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs); and ANT 360, or HLTH 298 and HLTH 334.

Application of the social determinants of health to global health problems. Particular attention to disparities, national and international policies, health systems, and resource availability and utilization. Overview of the history of global health including the impact of colonization in the field - past, present, and future. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

HLTH 434. Health Promotion Program Planning. 4 units

Term Typically Offered: F, W

Prerequisite: HLTH/KINE 265; HLTH/KINE 298; and KINE 266 or HLTH 334.

Application of methods to facilitate behavior change to promote health and prevent morbidity and mortality. Concepts affecting health behavior, motivation, and decision making. Development of program planning skills in health education and promotion. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

HLTH 435. Health Promotion Program Implementation and Evaluation. 4 units

Term Typically Offered: W, SP

Prerequisite: HLTH/KINE 320; and HLTH/KINE 434.

Implementation and evaluation of health promotion programs in school, community, medical, public health, worksite, and college/university settings. Planning the intervention design, implementation and evaluation protocols including process, impact and outcome assessments. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

HLTH 440. Kinesiology/Public Health Practicum. 1 unit

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Supervised experience involving organizational and instructional responsibilities in activity, lecture and/or laboratory classes. Total credit limited to 3 units. Crosslisted as HLTH/KINE 440.

HLTH 443. Health Education for Teachers. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area B2; completion of GE Area E (GE Area D4 for students on the 2017-19 and earlier catalogs); and junior standing.

Health status, special concerns and national health objectives for school aged children; coordinated school health programs and Health Framework for CA public schools. Health literacy, nutrition, safety, alcohol, tobacco and other drugs, reproductive health, and chronic disease prevention. 4 lectures.

HLTH 450. Worksite and University Health Promotion Programs. 4 units

Term Typically Offered: SP

Prerequisite: one of the following: HLTH/KINE 250; HLTH/KINE 255; or HLTH/KINE 260; and KINE 266 or HLTH 334. Recommended: HLTH/KINE 320.

Planning, implementing, and evaluating comprehensive worksite/university health promotion (WHP) and campus wellbeing programs. Benefits of WHP for employers and employees. Educational, organizational, economic, and environmental supports for behaviors conducive to health. Course may be offered in classroom-based or online format. 4 lectures.

HLTH 453. Obesity Prevention and Treatment. 4 units

Term Typically Offered: F, W

Prerequisite: FSN 210 or KINE 451; and one of the following: HLTH/KINE 298, KINE 304, or FSN 310. Recommended: HLTH 405; and one of the following: KINE 266, HLTH 334, or FSN 415.

Overview of research on the causes and consequences of obesity. Evidence-based prevention and treatment interventions. Emphasis on skills for promoting weight control in multidisciplinary health promotion and public health settings. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 activity.

HLTH 460. Experiential Senior Project. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Senior standing; completion of GE Area A with grades of C- or better; and HLTH 402 or KINE 319.

Applied and project-based culminating experience in planning, implementing, and evaluating a campus, community, or worksite health promotion program under faculty supervision. Minimum 30 hours.

HLTH 461. Senior Project Report. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Senior standing; completion of GE Area A with grades of C- or better; and HLTH 402 or KINE 319.

A comprehensive synthesis of professional literature that integrates content from major courses resulting in a report. Topic must be approved by the instructor. Minimum 30 hours time commitment. 1 seminar.

HLTH 462. Research Senior Project. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing; completion of GE Area A with grades of C- or better; and HLTH 402 or KINE 319.

Completion of an advanced research, or creative project. Results may be submitted for poster presentation or other public/ professional forum. Total credit limited to 4 units. 1 to 4 supervision.

HLTH 463. Public Health Internship. 1-3 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Senior standing; completion of graduation writing requirement; minimum GPA of 3.0; KINE 434; and KINE 435.

Practical experience at an approved agency that provides public health promotion programs. Students participate in program administration under the direct supervision of an approved on-site coordinator as a capstone experience. Total credit limited to 3 units. Credit/No Credit grading only. 1 to 3 supervision.

Honors Contract (HNRC)

undefined

HNRC Courses

HNRC 199. Honors Contract. 0 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Student must be in good standing in the Honors Program, and have permission of the Director.

Students in the Honors Program are required to take at least eight courses for honors credit before graduation. Taking an Honors course may not be possible due to scheduling conflicts or unavailability of courses. In these cases and with the permission of the Director of the Honors Program, the student may enter into a "Contract" to engage in honors-level work in a class on an individual basis. Credit/No Credit grading only. Students can register for a maximum of 2 Honors Contracts; repeatable in same term.

HNRC 200. Honors Leadership Experience. 0 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Student must be in good standing in the Honors Program, and have permission of the Director.

The Honors Program encourages its students to develop leadership skills through serving on the Honors Board, chairing Honors Committees, or by participating in other approved leadership activities. To receive Honors credit for these activities, students must also participate in a number of formal leadership-training seminars/workshops, and contribute their insights to the Honors and greater Cal Poly communities. Credit/No Credit grading only. Total credit limited to two courses.

HNRC 399. Honors Contract. 0 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Student must be in good standing in the Honors Program, and have permission of the Director.

Students in the Honors Program are required to take at least eight courses for honors credit before graduation. Taking an Honors course may not be possible due to scheduling conflicts or unavailability of courses. In these cases and with the permission of the Director of the Honors Program, the student may enter into a "Contract" to engage in honors-level work in a class on an individual basis. Credit/No Credit grading only. Students can register for a maximum of 2 Honors Contracts; repeatable in same term.

HNRC 400. Honors Professional, Social and Global Experience. 0 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Student must be in good standing in the Honors Program, and have permission of the Director.

The Honors Program encourages its students to enhance their academic coursework by broadening their professional, social and global perspectives through professional internships/co-ops, participation in community projects and study abroad experience. To receive Honors credit, students must also reflect on these experiences and contribute their insights through presentations (oral and/or written) to the Honors and greater Cal Poly communities. Credit/No Credit grading only. Total credit limited to two courses, repeatable in the same term.

Honors (HNRS)

undefined

HNRS Courses

HNRS 100. Introduction to the Honors Community. 2 units

Term Typically Offered: TBD

CR/NC

Topics on sustainability, diversity, ethics, and transition to life at Cal Poly. Introduction to Honors Program opportunities. Mentoring and building community. Collaboration with local service organizations. For University Honors Program students only. Credit/No Credit grading only. 2 lectures.

HNRS 101. Public Speaking. 4 units

Term Typically Offered: F, SP

2020-21 or later catalog: GE Area A1

2019-20 or earlier catalog: GE Area A2

Introduction to the principles of oral communication and the tradition of public speaking in political and social life. Practical experience in the development, presentation, and critical analysis of speeches to inform and to persuade. Not open to students with credit in COMS 102. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as COMS/HNRS 101. Fulfills GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

HNRS 102. Principles of Oral Communication. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area A1

2019-20 or earlier catalog: GE Area A2

Introduction to the fundamentals and principles which underlie effective oral communication. Practical experience in various types of speaking situations: informative speaking, persuasive speaking, and panel discussion. Not open to students with credit in COMS 101. 4 lectures. Crosslisted as COMS/HNRS 102. Fulfills GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

HNRS 112. Race, Culture, and Politics in the United States. 4 units

Term Typically Offered: TBD

2020-21 or later: GE Area D1

2019-20 or earlier catalog: GE Area D1

USCP

Interdisciplinary study of race and ethnicity as created by historical processes and American institutions (social, political, economic, legal and cultural institutions). Attention to interlocking systems of race, class, gender and sexuality. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ES/HNRS 112. Fulfills GE D1 and USCP.

HNRS 132. General Physics II. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area B1

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B3

2019-20 or earlier catalog: GE Area B4

Prerequisite: PHYS 141; and MATH 142 or MATH 182.

Oscillations, waves in elastic media, sound waves. Temperature, heat and the first law of thermodynamics. Kinetic theory of matter, second law of thermodynamics. Geometrical and physical optics. 3 lectures, 1 laboratory. Crosslisted as HNRS 132/PHYS 142. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs). Formerly PHYS 132.

HNRS 134. General Physics I. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area B1

2019-20 or earlier catalog: GE Area B3

Prerequisite: MATH 141 with grade C- or better. Corequisite: MATH 142 or MATH 182. Recommended: High School Physics.

Fundamental principles of mechanics. Vectors, particle kinematics. Equilibrium of a rigid body. Work and energy, linear momentum, rotational kinematics and dynamics. Primarily for engineering and science students. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as HNRS 134/PHYS 141. Fulfills GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs).

HNRS 141. Calculus I. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area B4

2019-20 or earlier catalog: GE Area B1

Prerequisite: Appropriate Math Placement Level; or MATH 117 and high school trigonometry; or MATH 118 and high school trigonometry; or MATH 119.

Limits, continuity, differentiation. Introduction to integration. 4 lectures. Crosslisted as HNRS/MATH 141. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

HNRS 142. Calculus II. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area B4

2019-20 or earlier catalog: GE Area B1

Prerequisite: MATH 141 with a grade of C- or better or consent of instructor.

Techniques of integration, applications to physics, transcendental functions. 4 lectures. Crosslisted as HNRS/MATH 142. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

HNRS 143. Calculus III. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area B4

2019-20 or earlier catalog: GE Area B1

Prerequisite: MATH 142 with a grade of C- or better or consent of instructor.

Infinite sequences and series, vector algebra, parametric curves. 4 lectures. Crosslisted as HNRS/MATH 143. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

HNRS 145. Writing Arguments. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area A3

2019-20 or earlier catalog: GE Area A3

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for student on the 2019-20 or an earlier catalog).

Examination of rhetorical principles and ethical rhetorical action. Application of these principles and practices to arguments across a range of genres and media. Evaluate credibility of evidence and sources. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ENGL/HNRS 145. Fulfills GE Area A3 with a grade of C- or better.

HNRS 147. Writing Arguments about STEM. 4 units

Term Typically Offered: SP

2020-21 or later catalog: GE Area A3

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for student on the 2019-20 or an earlier catalog).

Critical analysis of arguments about STEM topics. Examination and application of logical and rhetorical principles. Evaluation of sources and evidence. Composing arguments across a range of genres and media. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area A3 with a grade of C- or better. Crosslisted as ENGL/HNRS 147.

HNRS 161. Creating Sustainable Communities I. 2 units

Term Typically Offered: F

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Sustainability Focused

Environmental, historical, and social dimensions of sustainability. Elements of sustainable communities in a local and global context. Resilience and systems thinking. Introduction to research skills. Developing community within Honors. Includes a service learning component. Upon completion of HNRS 161 and HNRS 162, a student will receive 4 units of GE credit for Area D2 (GE Area D3 for students on the 2019-20 or earlier catalogs). Field trip required. 1 lecture, 1 activity.

HNRS 162. Creating Sustainable Communities II. 2 units

Term Typically Offered: W
 2020-21 or later catalog: GE Area D2
 2019-20 or earlier: GE Area D2 or D3
 Sustainability Focused
 Prerequisite: HNRS 161.

Continuation of HNRS 161. Environmental, historical, and social dimensions of sustainability. Institutional views of sustainability. Environmental justice. Appropriate technology. Developing community within Honors. Includes a service learning component. Upon completion of HNRS 161 and HNRS 162, a student will receive 4 units of GE credit for Area D2 (GE Area D3 for students on the 2019-20 or earlier catalogs). Field trip required. 1 lecture, 1 activity.

HNRS 163. Creating Sustainable Communities III. 2 units

Term Typically Offered: TBD
 Sustainability Focused
 Prerequisite: HNRS 162.

Continuation of HNRS 161 and 162. Implementation and assessment of a year-long community service project, initiative, or campaign. Project management and interpersonal communication. Developing community within the Honors Program. For University Honors Program students only. 1 lecture, 1 activity.

HNRS 164. Sustainability and Communities. 4 units

Term Typically Offered: W, SP
 2020-21 or later catalog: GE Area D2
 2019-20 or earlier: GE Area D2 or D3
 Environmental, historical, and social dimensions of sustainability. Elements of sustainable communities in a local and global context. Resilience and systems thinking. Developing community at Cal Poly. Includes a service learning component. Not open to students with credit in HNRS 161 and HNRS 162. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HNRS 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F, W, SP
 CR/NC
 Prerequisite: Consent of instructor and Honors Program.

Individual investigation, research, projects, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit/No Credit grading only.

HNRS 201. Survey of Economics. 4 units

Term Typically Offered: TBD
 2020-21 or later catalog: GE Area D2
 2019-20 or earlier: GE Area D2 or D3
 Basic principles of microeconomics and macroeconomics. Emphasis on applications to current local, national and global economic issues. Not open to student with credit in ECON 222. Course may be offered in classroom-based or hybrid format. 4 lectures. Crosslisted as ECON/HNRS 201. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HNRS 202. United States History Since 1865. 4 units

Term Typically Offered: TBD
 2020-21 or later: GE Area D1
 2019-20 or earlier catalog: GE Area D1
 USCP

Survey of the second half of U.S. history, including reconstruction, industrialization, the regulatory state, foreign affairs, and the remaking of citizenship rights and society. Particular attention to how race, class, and gender shaped changing definitions of freedom and equality. Not open to students with credit in HIST 206. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as HIST/HNRS 202. Fulfills GE Area D1 and USCP.

HNRS 203. United States History to 1865. 4 units

Term Typically Offered: TBD
 2020-21 or later: GE Area D1
 2019-20 or earlier catalog: GE Area D1
 USCP

Survey of the first half of U.S. history, including: contact and settlement, American Revolution, slavery, westward expansion, early California, Civil War, and California and U.S. Constitutions. Particular attention to how race, class, and gender shaped changing definitions of freedom and equality. Not open to students with credit in HIST 206. 4 lectures. Crosslisted as HIST 201/HNRS 203. Fulfills GE Area D1 and USCP.

HNRS 204. Gender and Sexuality in US Society and Politics. 4 units

Term Typically Offered: TBD
 2020-21 or later: GE Area D1
 2019-20 or earlier catalog: GE Area D1
 USCP

Survey and exploration, via intersectional frameworks, of the ways that gender and sexuality have impacted, and been impacted by, US society and politics, from the formation of the US as a settler colonial nation-state into the present day. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as HNRS 204/WGS 201. Fulfills GE Area D1 and USCP.

HNRS 210. Gender and Sexuality in Visual and Popular Culture. 4 units

Term Typically Offered: F, SP
 2020-21 or later catalog: GE Area C1
 2019-20 or earlier catalog: GE Area C3

Survey and exploration of key developments in visual and popular culture, considered through the lenses of intersectional approaches to gender and sexuality, and examined across multiple mediums and practices including: visual art, film, television, performance, mass media and material culture. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as HNRS/WGQS 210. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs). Formerly WGS 210.

HNRS 211. Engineering Statics. 3 units

Term Typically Offered: TBD
 Prerequisite: MATH 241 (or concurrently), PHYS 131 or PHYS 141.

Analysis of forces on engineering structures in equilibrium. Properties of forces, moments, couples, and resultants. Equilibrium conditions, friction, centroids, area moments of inertia. Introduction to mathematical modeling and problem solving. Vector mathematics where appropriate. Course may be offered in classroom-based, online, or hybrid format. 3 lectures. Crosslisted as HNRS/ME 211.

HNRS 213. Modern Political Economy. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

The relationship between states and economies in the modern period. Modernization, industrialization, and colonialism. Modern systems of political economy, especially mercantilism, capitalism, communism, and social democracy. Modern theories of political economy, especially liberalism, Marxism, and Keynesianism. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as HIST/HNRS 213. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HNRS 214. Engineering Dynamics. 3 units

Term Typically Offered: TBD

Prerequisite: MATH 241; ME 211 or ARCE 211.

Analysis of motions of particles and rigid bodies encountered in engineering. Velocity, acceleration, relative motion, work, energy, impulse, and momentum. Further development of mathematical modeling and problem solving. Vector mathematics where appropriate. Course offered in hybrid format with classroom-based and online learning. 3 lectures. Crosslisted as HNRS 214/ME 212.

HNRS 216. Comparative Social Movements. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

History of social movements worldwide from the late nineteenth century to the present. May include, but not limited to: socialism and other labor movements, feminism, white supremacy, pacifism, decolonization, Indigenous peoples, racial justice, LGBTQIA, environmentalism, fair trade, and independent living movement. 4 lectures. Crosslisted as HIST/HNRS 216. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HNRS 223. World History, 1800 - Present. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Comparative history of Western and non-Western societies in global perspective. Examines the history of cross-cultural exchange, interaction, and conflict in the making of the modern world, concentrating on economic, political, and cultural transformations that facilitated and emerged from imperialism. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as HIST/HNRS 223. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

HNRS 230. Philosophical Classics: Knowledge and Reality. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

Prerequisite: Completion of GE Area A with grades of C- or better.

Critical examination of primary philosophical works with focus on the nature of reality and the sources and limits of human knowledge. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as HNRS/PHIL 230. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

HNRS 231. Philosophical Classics: Ethics and Political Philosophy. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

Prerequisite: Completion of GE Area A with grades of C- or better.

Critical examination of primary philosophical works, with focus on the identification and evaluation of the central ethical, social and political themes and arguments presented in them. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as HNRS/PHIL 231. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

HNRS 232. British Literature: 1789 to the Present. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

Prerequisite: Completion of GE Area A with grades of C- or better.

Broadly surveys Romantic, Victorian, Modern, and Contemporary British literature in an historical-cultural context. Investigates works from several genres and a variety of national and cultural voices. May include such writers as Wordsworth, Wollstonecraft, Dickens, G. Eliot, Wilde, Woolf, Yeats, and Gordimer. 4 lectures. Crosslisted as ENGL 231/HNRS 232. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

HNRS 241. Calculus IV. 4 units

Term Typically Offered: TBD

Prerequisite: MATH 143.

Partial derivatives, multiple integrals, introduction to vector analysis. 4 lectures. Crosslisted as HNRS/MATH 241.

HNRS 242. American Literature: 1830 to the Present. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

Prerequisite: Completion of GE Area A with grades of C- or better.

A broad survey of later U.S. American literature from the rise of literary nationalism to the present. A wide range of writers and genres, including novels, short stories, poems, plays, essays, and autobiographies. Not open to students with credit in ENGL 240. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as ENGL/HNRS 242. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

HNRS 244. Linear Analysis I. 4 units

Term Typically Offered: TBD

Prerequisite: MATH 143.

Separable and linear ordinary differential equations with selected applications; numerical and analytical solutions. Linear algebra: vectors in n-space, matrices, linear transformations, eigenvalues, eigenvectors, diagonalization; applications to the study of systems of linear differential equations. 4 lectures. Crosslisted as HNRS/MATH 244.

HNRS 251. Introduction to Classical Literature. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

Prerequisite: Completion of GE Area A with grades of C- or better.

Examination of the ancient epics and classical literature of Mesopotamia, Greece, and Rome. May include such readings as The Epic of Gilgamesh, the Iliad, the Odyssey, Genesis, Sappho's Poetry, Antigone, the Symposium, the Aeneid, and Marcus Aurelius's Meditations. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ENGL/HNRS 251. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

HNRS 252. Global Origins of Race in the U.S.. 4 units

Term Typically Offered: F, W, SP

GE Area F: Ethnic Studies

Explores global origins of race in the U.S. including forced slavery, removal, displacement, and migration of Native Americans, Latinas/os, African Americans, and Asian Americans. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ES/HNRS 252. Fulfills GE Area F.

HNRS 261. Leadership: Self Evaluation. 1 unit

Term Typically Offered: F, W, SP

Recommended: Sophomore standing.

Interpersonal leadership and communication skills with a focus on self evaluation. Personality assessment, preparation of a personal leadership development plan, and goal setting. Values and moral development. For University Honors Program students only. 1 activity.

HNRS 262. Leadership: Group Dynamics. 1 unit

Term Typically Offered: W

Prerequisite: HNRS 261.

Teamwork and team building skills with a focus on group dynamics. Understanding the effects of diversity on team dynamics and performance. Cross-cultural communication and leadership. Development of trust, feedback, and conflict resolution. For University Honors Program students only. 1 lecture.

HNRS 263. Leadership: Coaching and Mentoring. 1 unit

Term Typically Offered: SP

Prerequisite: HNRS 262.

Strategies for effective coaching and mentoring. Servant leadership, recognition of motivational sources in others, and positive psychology in leadership. Development of a leadership philosophy. For University Honors Program students only. 1 lecture.

HNRS 265. Research and Information Skills for Honors Students. 2 units

Term Typically Offered: W, SP

Prerequisite: HNRS 162.

Identifying information resources and research support services available through Kennedy Library. Methods, best-practices, and ethical standards related to planning, carrying out, summarizing, and publishing scholarly research. Written, oral, and visual presentation of research findings. For University Honors Program students only. 1 lecture, 1 activity.

HNRS 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

HNRS 299. Honors Group Seminar. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Students in the Honors Program are required to take at least eight courses for honors credit before graduation. Taking an Honors course may not be possible due to scheduling conflicts or unavailability of courses. This course allows students to engage in honors-level work in a standard, non-honors course on a group basis. Credit/No Credit grading only. Total credit limited to 4 units; repeatable in same term. Must achieve a B or better in the related standard course. 1 seminar.

HNRS 302. The Learn By Doing Lab Teaching Practicum. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Early teaching experience in an informal science, technology, engineering, and mathematics (STEM) teaching and learning environment. Principles of inquiry-driven STEM education, lesson design, implementation and assessment. Intended for undergraduates exploring STEM teaching as a career. Total credit limited to 4 units. Credit/No Credit grading only. 1 seminar, 1 laboratory. Crosslisted as ENGR 322/SCM 302/HNRS 302.

HNRS 303. Economics of Poverty, Discrimination and Immigration. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and ECON 201 or ECON 222.

Economic analysis of the cause, extent and impact of poverty, discrimination and immigration and of the policies designed to address these socioeconomic issues. Emphasis on the experience of African-Americans, Latinos, and women in the United States. 4 lectures. Crosslisted as ECON/HNRS 303. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

HNRS 304. Values and Technology. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area C.

Humanistic investigation into the theoretical and practical applications of technology with specific reference to the social effects of technological change. Course may be offered in classroom-based or online format. For all majors. Non-technical. 4 lectures. Crosslisted as HNRS 304/ISLA 303. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

HNRS 308. The Trans-Atlantic Slave Trade. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

The African, Islam and Euro-American dimensions of the trans-Atlantic slave trade, with focus on its varying roots, organization and impact on cross-cultural and global levels. 4 lectures. Crosslisted as HIST/HNRS 308. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HNRS 310. Air and Space. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs); and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Technological developments of modern aircraft and spacecraft through physics of flight equations, mission analysis, propulsion, structures, materials, and control systems for civil and military aircraft/spacecraft. Synthesis of current and future aerospace technologies through emerging ethical considerations, and global impact. 4 lectures. Course may be offered in classroom-based or online format. Crosslisted as AERO/HNRS 310. Fulfills GE Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

HNRS 312. East Asian Culture and Civilization. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

The pre-modern and modern histories of China and Japan. Focus on the traditional era, the transition to modernity, cultural uniqueness within East Asian civilization, and western images of Asia. 4 lectures. Crosslisted as HIST 310/HNRS 312. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HNRS 317. The Lure of the Sea. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

The history of the sea, people who travel across it, live alongside or in the midst of it, or simply seek it out. Topics include imperialism, maritime commerce, port cities, littoral societies, piracy, tourism, popular culture. 4 lectures. Crosslisted as HIST/HNRS 317. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HNRS 320. Topics and Issues in Values, Media and Culture. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The interplay of values, media, and culture from an interdisciplinary perspective. Descriptive subtitles assigned to each course. The Class Schedule will list topic selected. 4 lectures. Total credit limited to 8 units with different subtopic; repeatable in same term. Crosslisted as HNRS/ISLA 320. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

HNRS 321. Undergraduate Research Methods and Practice. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and consent of instructor.

Research methods and tools for sciences and humanities, including formulating a research question, designing a study, using the scientific method to conduct and analyze surveys, and analyzing data. Emphasis on working in interdisciplinary research teams. Total credit limited to 8 units. 2 lectures, 2 activities. Crosslisted as HNRS/UNIV 321.

HNRS 323. Modern America. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area D1.

American history since 1900. Focus on domestic and foreign policy interactions, struggle of disenfranchised groups for social and political equality, and changes in culture and identity. 4 lectures. Crosslisted as HIST 322/HNRS 323. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HNRS 325. Ethics, Science and Technology. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Ethical decision-making as applied to issues such as the use of robots, the treatment of animals, sustainability, scientific fraud, feminist analysis of science and technology, as well as questions about whether technology is just a value-neutral tool or, rather, embodies certain values. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as HNRS 325/PHIL 323. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

HNRS 332. British Literature: 1660-1798. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth exploration of the dominant themes and preoccupations of the Age of Enlightenment. Historical and cultural contexts of canonical and non-canonical literature emphasized to illustrate 18th century Britons' views of themselves and their changing world. May include such writers as Dryden, Behn, Defoe, Swift, Pope, and Johnson. 4 lectures. Crosslisted as ENGL/HNRS 332. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

HNRS 333. British Literature: 1798-1832. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth exploration of the literature of the British Romantic period. Cultural, historical, and philosophic contexts will also be examined in both canonical and non-canonical works. May include such writers as Blake, Wordsworth, Keats, and Wollstonecraft. 4 lectures. Crosslisted as ENGL/HNRS 333. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

HNRS 334. Modern Europe, 1789-1914. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D. Recommended: HIST 111.

Europe's 'long nineteenth century' reveals continuity and dramatic changes in politics, social structures and identities, forms of cultural expression, and scientific and technological knowledge. Topics include the French and Industrial revolutions; liberalism; nationalism; socialism; modernism; imperialism; and World War I. 4 lectures. Crosslisted as HIST/HNRS 334. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HNRS 335. Modern Europe, 1914-Present. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D. Recommended: HIST 111.

Examination of twentieth-century European history. Topics include: First World War, World Economic Crisis, communism, fascism, mass culture, shifting gender roles, Second World War, Cold War, Velvet Revolution, and the European Union. 4 lectures. Crosslisted as HIST/HNRS 335. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HNRS 336. Social Ethics. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 USCP

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Examination of contemporary moral problems, solutions to these problems, and the arguments for these solutions, with emphasis on two or more of the following sample problem areas: abortion, suicide and euthanasia, capital punishment, family ethics, race relations, social justice, war, women's issues. 4 lectures. Crosslisted as PHIL 335/HNRS 336. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

HNRS 338. Critical Issues in American Politics. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area D1. Recommended: POLS 112 (GE Area D1).

Examination of significant social, legal, economic and political issues that face the country and how the basic institutions of government-national, state, local-are responding to them; assessment of policies to correct these problems. 4 lectures. Crosslisted as HNRS/POLS 338. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HNRS 340. Sexuality Studies. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Sexuality in a cultural and historical context. Changing definitions of human subjectivity. The cultural and social regimes that control and create sexuality (including the 'invention' of homo/heterosexuality and the social, legal and political systems that define sexual ab/normality). Contemporary issues of sexual orientation and topics of sexuality in relation to gender and race. Course may be offered in classroom-based, online, or hybrid format. 4 seminars. Crosslisted as WGQS/HNRS 340. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs). Formerly WGS 340.

HNRS 341. American Literature: 1865-1914. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Analysis of literary Realism and Naturalism in their cultural and historical contexts. May include such writers as Whitman, Dickinson, Twain, Chopin, James, Wharton, Dreiser, Norris, and Crane who are seen to accommodate the sense of danger, doubt, and disorder of the time. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

HNRS 342. American Literature: 1914-1956. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The writers of the modern period and those of the early post-modern age, including writers marked by stylistic innovation and a willingness to challenge traditionally accepted standards. May include such writers as Hemingway, Fitzgerald, Stein, Hughes. 4 lectures. Crosslisted as ENGL/HNRS 342. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

HNRS 343. American Literature: 1956-Present. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth study of American fiction, poetry, and drama written since 1956. How contemporary literature examines enduring American themes and breaks new ground with the inclusion of diverse voices. 4 lectures. Crosslisted as ENGL/HNRS 343. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

HNRS 345. Women Writers of the Twentieth and Twenty-First Centuries. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR
 USCP

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

In-depth exploration of works of 20th and 21st century women authors within their historical and cultural contexts. Analysis of canonical and non-canonical writing by women of differing classes, races, ethnicities, and sexual orientations. Literary techniques through which texts reflect or challenge such cultural constructs as gender, identity, sexuality, motherhood, etc. The emergence of a female literary tradition. May include such writers as Adichie, Aoki, Lorde, Mukherjee, Olds, Rich. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ENGL/HNRS 345. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); USCP; and GWR.

HNRS 347. African American Literature. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR
 USCP

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The writings of African Americans from the end of the eighteenth century to the present. Individual works and literary trends among African Americans of various periods and contexts: intellectual, political, and cultural. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as ENGL/HNRS 347. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); USCP; and GWR.

HNRS 350. The Scientific Revolution, c. 1500-1800. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or History major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: One or more courses in GE Area B.

History of the intellectual, social, and cultural changes in the early modern period known as the 'Scientific Revolution.' Main topics include the Copernican Revolution, mechanical philosophy, natural history, and the social and material practices of early modern science. 4 lectures. Crosslisted as HIST/HNRS 350. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HNRS 351. Speech and Debate Team. 2 units

Term Typically Offered: TBD
 Prerequisite: Consent of instructor. Recommended: Previous competitive debate experience. Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs); and completion of GE Area A3 with a grade of C- or better; and COMS 250.

Advanced participation in competitive intercollegiate speech activities. Intercollegiate tournament competition, judging speech competition and other communication-related public service on campus and in the community. Field trip may be required. Total credit limited to 8 units. Course offered in hybrid format with classroom-based and online learning. 2 laboratories. Crosslisted as COMS/HNRS 351.

HNRS 352. Modern Drama. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Reading and analysis of world drama of the last 150 years, thereby enhancing student awareness of modern culture, history, ethics, politics, and the human condition. Design work, multi-media forms, art, music, and cinema as components or informing elements of the works under consideration. 4 lectures. Crosslisted as ENGL/HNRS 352. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

HNRS 353. Gender, Race, Culture, Science & Technology. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area B
 2019-20 or earlier catalog: GE Area B5, B6, or B7
 USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Area B2; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: STAT 130, 217, 218, 251, 301, 312, or 321.

Examines the complex relationships between gender, race, culture, science, and technology via intersectional quantitative and qualitative inquiry, centering the perspectives/contributions of historically marginalized people in the U.S. Explores, evaluates, and develops proposals to create more diverse, equitable, ethical, humane science/technology. Course may be offered in classroom-base, online, or hybrid format. 3 lectures, 1 activity. Crosslisted as ES 350/HNRS 353/WGQS 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog); and USCP. Formerly WGS 350.

HNRS 361. Honors Track - Research, International, and Community Service Experience. 1 unit

Term Typically Offered: F, W, SP
 Recommended: HNRS 265.

Completion of an approved Honors experience track in research, international study, or community service. Personal reflection on the experience. Peer evaluation. Presentation of the experience to the Honors and greater Cal Poly communities. Course may be offered in classroom-based or online format. For University Honors Program students only. 1 lecture.

HNRS 380. Literary Themes. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area C
 2019-20 or earlier catalog: GE Area C4
 GWR

Prerequisite: Junior standing or English major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Literature selected according to a particular theme. Emphasis on critical interpretation, aesthetic appreciation, and historical and cultural contexts. The Class Schedule will list topic selected. Total credit limited to 12 units. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ENGL/HNRS 380. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and GWR.

HNRS 391. Appropriate Technology for the World's People: Development. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5
 Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

A broad overview of international development and appropriate design for sustainability. Besides traditional classroom work, students work in teams to address problems with technical solutions. Collaboration with mentors from the university, private sector, and nonprofits serves to provide diverse background and project mentorship. 4 lectures. Crosslisted as HNRS/PSC/UNIV 391. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

HNRS 392. Appropriate Technology for the World's People: Design. 4 units

Term Typically Offered: TBD
 2020-21 or later: Upper-Div GE Area B
 2019-20 or earlier catalog: GE Area B5, B6, or B7
 Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: UNIV 391 and completion of GE Area D2.

Addresses the needs of international impoverished communities with technological solutions, which are inexpensive, ecologically sustainable, and socially appropriate. Group study of target communities, and design and construction of an appropriate technology prototype. Not open to students with credit in PSC/UNIV/HNRS 492. 3 lectures, 1 laboratory. Crosslisted as HNRS/PSC/UNIV 392. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

HNRS 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP
 Prerequisite: Consent of Honors Program Director.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HNRS 411. New Media Arts I. 4 units

Term Typically Offered: TBD
 Prerequisite: Junior standing; and completion of GE Area A with grades of C- or better.

Advanced-level presentation of new media theory, design and practice. Topics covered include, but are not limited to, interactivity theory, user-centered system design, cognitive psychology, media analysis, and basic web design theory. Total credit limited to 8 units. 4 lectures. Crosslisted as ENGL/HNRS 411.

HNRS 412. New Media Arts II. 4 units

Term Typically Offered: TBD
 Prerequisite: ENGL 411.

Advanced level of work with the primary technologies and design/critique theories currently at use in the professional creation of new media works. Lectures and readings expand upon material presented in ENGL 411. 4 lectures. Crosslisted as ENGL/HNRS 412.

HNRS 450. Solar Photovoltaic System Engineering. 4 units

Term Typically Offered: TBD
 Prerequisite: one of the following: PHYS 104; PHYS 118; PHYS 121; or PHYS 141; and junior standing.

Engineering principles, design, and installation of solar photovoltaic power systems including grid-tie and off-grid systems. Photonic energy conversion, solar module engineering, solar power electronics, photovoltaic site planning, mechanical and structural considerations, permit processes, government incentives, and analysis of financial and investment issues. Field trips required. 3 lectures, 1 laboratory. Crosslisted as BRAE/EE/HNRS 450.

HNRS 461. Honors Capstone Seminar. 1 unit

Term Typically Offered: F, W, SP
 CR/NC
 Corequisite: Major-specific senior project.

Forum for graduating seniors to share their Honors experiences. Presentation and defense of a capstone project or experience before a diverse group of subject experts and laypersons. Seminars on communication and career guidance. For University Honors Program students only. Credit/No Credit grading only. Course may be offered in classroom-based, online, or hybrid format. 1 seminar.

HNRS 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
 Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

HNRS 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

HNRS 492. Appropriate Technology for the World's People: Design. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); or graduate standing. Recommended: UNIV 391 and two lower-division courses in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Addresses the needs of international impoverished communities with technological solutions, which are inexpensive, ecologically sustainable, and socially appropriate. Group study of target communities, and design and construction of an appropriate technology prototype. Seminar paper required. Not open to students with credit in PSC/UNIV/HNRS 392. 3 lectures, 1 laboratory. Crosslisted as PSC/UNIV 492.

HNRS 499. Honors Group Seminar. 1 unit

Term Typically Offered: TBD

CR/NC

Students in the Honors Program are required to take at least eight courses for honors credit before graduation. Taking an Honors course may not be possible due to scheduling conflicts or unavailability of courses. This course allows students to engage in honors-level work in a standard, non-honors course on a group basis. Credit/No Credit grading only. Total credit limited to 4 units, repeatable in same term. Must achieve a B or better in the related standard course. 1 seminar.

Industrial and Manufacturing Engineering (IME)

undefined

IME Courses**IME 101. Introduction to Industrial and Manufacturing Engineering. 1 unit**

Term Typically Offered: F

Introduction of major topics in industrial and manufacturing engineering such as data analysis, process improvement, operations research, product design, and supply chain management. Professional ethics, cheating and plagiarism. Resources for academic success. Career opportunities review. 1 laboratory.

IME 141. Manufacturing Processes: Net Shape. 1 unit

Term Typically Offered: F,W,SP,SU

Metal casting as a net shape process in manufacturing. Properties of molding materials and methods of casting. Introduction to rapid prototyping. Pattern and casting design principles. 1 laboratory.

IME 142. Manufacturing Processes: Materials Joining. 2 units

Term Typically Offered: F,W,SP,SU

Theory and application of metal cutting and welding processes. Includes shielded metal arc, flux cored arc, submerged arc, gas metal arc, gas tungsten arc, brazing, resistance, and oxy-acetylene processes. Bonding theory, joint design, codes and testing. Introduction to adhesive bonding. Open to all majors. 1 lecture, 1 laboratory.

IME 143. Manufacturing Processes: Material Removal. 2 units

Term Typically Offered: F, SP

Uses, capabilities, and theoretical and operational characteristics of lathe and milling machine tools, including conventional, automatic and numerical control. Cutting tool characteristics, machining parameters, quality control, and production methods. Design considerations for manufacturing. Introduction to robotics and automation. Open to all majors. 1 lecture, 1 laboratory.

IME 144. Introduction to Design and Manufacturing. 4 units

Term Typically Offered: F, W, SP

Supplemental review of visualization, sketching, and drafting fundamentals. Computer-aided solid modeling of parts and assemblies. Introduction to conventional machining processes on lathes and mills, computer numerical control, quality control, production methods, and design for manufacturing. Open to all majors. 2 lectures, 2 laboratories.

IME 145. Subtractive Manufacturing Processes for Mechanical Designs I. 1 unit

Term Typically Offered: W

Concurrent: ME 129.

Material removal manufacturing processes as related to mechanical design. Manual and computer-controlled (CNC) machining processes and equipment. Interpretation of engineering drawings, operation setup, process parameters, inspection of parts. Manufacturing of standard machine design features. Design for manufacturing and assembly (DFMA). Not open to students with credit in IME 143. 1 laboratory.

IME 146. Subtractive Manufacturing Processes for Mechanical Designs II. 1 unit

Term Typically Offered: SP

Prerequisite: IME 145. Concurrent: ME 130.

Material removal manufacturing processes for mechanical design. Fits and assignment of part tolerances. Machining and inspection of geometric dimensioning and tolerancing (GD&T). Teamwork for batch part production. Design for manufacturing and assembly (DFMA) concepts. Not open to students with credit in IME 143. 1 laboratory.

IME 156. Basic Electronics Manufacturing. 2 units

Term Typically Offered: F,W,SP,SU

Practical electronics manufacturing knowledge expanded through concepts such as CAD/CAM design, Design for Manufacture (DFM), documentation requirements, prototyping and production planning. Hands-on techniques learned for project planning, soldering, automation, hand tool usage and production methods. 1 lecture, 1 laboratory.

IME 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IME 212. Introduction to Enterprise Analytics. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC 232.

Using Big Data for decision making in Industrial Engineering. Data-driven solution design. Data acquisition and database queries. Cleaning, understanding, preprocessing, describing, and visualizing data. Analysis for insight. Storytelling and ethical considerations. 2 lectures, 2 laboratories.

IME 223. Process Improvement Fundamentals. 4 units

Term Typically Offered: F, W, SP
Prerequisite: MATH 141. Recommended: IME 101.

Principles of work simplification and motion analysis. Recording of work flow and methods. Process improvement through work measurement and standards, time study, synthetic data, predetermined time systems and work sampling. Allowances and performance rating, productivity measures. Introduction to lean manufacturing principles. Client based project. 3 lectures, 1 laboratory.

IME 239. Industrial Costs and Controls. 3 units

Term Typically Offered: F, W, SP
Prerequisite: IME 223.

Estimation of manufacturing costs for production planning, cost analysis, and cost control. Planning, budgeting, and control processes. Costs, accounting data and analysis of variances for managerial control, inventory valuation, and decision making. Techniques of pricing, cost estimating and cost reduction, and activity-based costing. 3 lectures.

IME 240. Additional Engineering Laboratory. 1-2 units

Term Typically Offered: TBD
Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories.

IME 244. Intermediate Design and Manufacturing. 2 units

Term Typically Offered: W
Prerequisite: IME 144. Corequisite: MATE 210 and MATE 215.
Recommended: IME 141 and IME 142.

Advanced computer-aided part design with geometric dimensioning and tolerancing, assemblies, and prototyping techniques for metal, polymer, and composite components. Communication of design information to manufacturing. Hands-on experience with non-traditional manufacturing processes. Not open to students with credit in IME 140. 1 lecture, 1 laboratory.

IME 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

IME 301. Operations Research I. 4 units

Term Typically Offered: F, W, SP
Prerequisite: MATH 244.

Systems modeling methodology, mathematical model formulations, linear programming, graphical and simplex methods. Sensitivity analysis. Integer and binary programming. Transportation, transshipment, assignment, and other network optimization models. Computer applications. 3 lectures, 1 activity.

IME 303. Project Organization and Management. 4 units

Term Typically Offered: F, W, SP
Prerequisite: Junior standing; IME 314 or IME 315.

Design and implementation of a major industrial/business systems project. Project planning considerations. Motivational and influence techniques used in project management. Scheduling techniques with risk assessment. Resource leveling and management under constraints. Reducing project duration. Monitoring progress with earned value analysis. Project audit and closure. Planning and implementation of a project. Application of project management software. 3 lectures, 1 laboratory.

IME 305. Operations Research II. 4 units

Term Typically Offered: F, W, SP
Prerequisite: IME 301; and STAT 312 or STAT 321.

Stochastic decision analysis. Utility models. Multi-criteria decision making models: Goal Programming and Analytic Hierarchy Process. Decision Biases. Markov processes and introduction to queuing models. Inventory models and analysis. Computer aided modeling and case studies. 3 lectures, 1 activity.

IME 312. Data Management and System Design. 4 units

Term Typically Offered: F, W, SP
Prerequisite: CSC 232.

Design and management of industrial databases and reporting systems. Relationships of financial accounting databases and production systems. Efficient data entry and reports, queries, macro function, and Internet based database applications. 3 lectures, 1 laboratory.

IME 314. Engineering Economics. 3 units

Term Typically Offered: F,W,SP,SPU
Prerequisite: MATH 241.

Economic analysis of engineering decisions. Determining rates of return on investments. Effects of inflation, depreciation and income taxes. Sensitivity, uncertainty, and risk analysis. Application of basic principles and tools of analysis using case studies. 3 lectures.

IME 315. Financial Decision Making for Engineers. 3 units

Term Typically Offered: F,W,SP,SPU
Prerequisite: MATH 142.

Develop business case for engineering projects. Investment evaluation using after-tax Net Present Value and Internal Rate of Return. Sensitivity analysis. Financial statements. Fully allocate costs. Use of spreadsheets. Application to personal finance. Critical examination of financial systems for decision making. Course may be offered in classroom-based or online format. 3 lectures.

IME 319. Human Factors Engineering. 3 units

Term Typically Offered: F, W, SP
Prerequisite: PSY 201 or PSY 202, and junior standing.

Analysis of factors influencing the efficiency of human work. Data on the physical and mental capacities of persons, the physical environment, work organization, and the problem of aging. Design of machines, operations, human computer interface and work environment to match human capacities and limitations, including the handicapped. Multidisciplinary team project. 3 lectures.

IME 320. Human Factors and Technology. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: STAT 217, STAT 218, or STAT 312.

Analysis of cognitive, sensory and physical limitations and capabilities of operators and users of technology, in working and living environments. Analysis of pertinent databases for a proactive approach to designing user-centered products, systems and work environment. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

IME 326. Engineering Test Design and Analysis. 4 units

Term Typically Offered: F, W, SP

Prerequisite: STAT 321 with a grade of C- or better.

Data gathering and statistical testing applied to industrial engineering and manufacturing fields. Experimental methods for product and process evaluation and comparisons; interpretation of engineering data. Engineering experimental design, linear and nonlinear regression, ANOVA, and multifactor ANOVA. Utilization of existing computer software. 4 lectures.

IME 327. Test Design and Analysis in Manufacturing Engineering. 4 units

Term Typically Offered: F, SP

Prerequisite: STAT 321 with a grade of C- or better or consent of instructor; or ME 236.

Sampling and descriptive statistics. Central limit theorem. Hypothesis testing for means and variances. Analysis of variance (ANOVA) and factorial design. Applications in engineering design, reliability manufacturing, and inspection. Design projects. 3 lectures, 1 laboratory.

IME 330. Fundamentals of Manufacturing Engineering. 4 units

Term Typically Offered: F, W

Prerequisite: IME 141 or ITP 341; IME 142; CE 204 or CE 208; MATE 210; MATE 215; IME 244 or ME 251 and IME 143 or IME 146.

Engineering analysis of manufacturing processes for casting, molding, forming, joining, and machining. Design for manufacturability and estimation of production costs. Process design strategies. Setup and operation of processing equipment; inspection methods. Field trip to manufacturing center. 3 lectures, 1 laboratory.

IME 331. Intermediate Metal Casting. 4 units

Term Typically Offered: W

Prerequisite: MATE 210; and IME 143, IME 144, or IME 146.

Recommended: IME 141.

Foundry process advantages. Mold and core design. Tooling and patterns. Materials properties and selection. Design for casting principles. Modeling gating systems, solidification and defect analysis. 3 lectures, 1 laboratory.

IME 335. Computer-Aided Manufacturing I. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATH 244; IME 244 or ME 251 and IME 143 or IME 146; and CSC 101, CSC 231, CSC 232 or CSC 234.

Use of the computer to communicate design information to manufacturing. Computer Numerical Control (CNC) programming. Use of CAD/CAM software. Overview of manufacturing systems in an automated environment, including cellular manufacturing and computer-aided process planning. 3 lectures, 1 laboratory.

IME 336. Computer-Aided Manufacturing II. 4 units

Term Typically Offered: W

Prerequisite: IME 335, ME 212, MATH 244, or consent of instructor.

Advanced Computer Numerical Control (CNC) programming and machine tool control. Machining center operation. Parametric representation of curves and surfaces. Computation of tool paths. Product and process design for CNC machining. CNC machine tool dynamics. Introduction to flexible manufacturing systems and robotics. Design and fabrication projects. 3 lectures, 1 laboratory.

IME 342. Manufacturing Systems Integration. 4 units

Term Typically Offered: W

Prerequisite: IME 223, MATH 241 and STAT 321.

Analysis and design tools for production planning and control of manufacturing systems, including mathematical modeling of operations and computer tools for simulation. Decision-making models for manufacturing systems. Overview of material requirements planning, inventory models and analysis, and facilities design. 3 lectures, 1 laboratory.

IME 356. Manufacturing Automation. 4 units

Term Typically Offered: F, W

Prerequisite: EE 321.

Computers in the factory automation environment. Basic control theory including feedback. Programming and use of programmable logic controllers (PLC), human-machine interface (HMI), and industrial control systems. Interfacing of electro-mechanical systems; analog and digital inputs, output; programmable controllers. Computer process control. 3 lectures, 1 laboratory.

IME 372. Applications of Enterprise Analytics. 4 units

Term Typically Offered: F, W, SP

Prerequisite: IME 212, IME 312, IME 326, MATH 244.

Applications of Big Data Analytics to solve enterprise problems with the emphasis on manufacturing organizations. Data clustering and classification algorithms. Applications of multiple, stepwise, and logistic regression methods. Over-fitting and regularization. Machine learning, neural networks, and Bayesian analysis. Healthcare analytics. 3 lectures, 1 laboratory.

IME 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limit to 4 units.

IME 401. Sales Engineering. 2 units

Term Typically Offered: F, SP

Prerequisite: Senior standing in engineering.

Concepts and principles of engineering in sales. Role of the professional engineer in the analysis, design, development, production, and final application of a product or system required by the buyer. 2 seminars.

IME 403. Software Product Management. 4 units

Term Typically Offered: W

Prerequisite: Senior standing; CSC/CPE 101, CSC 231, or CSC 232.

Product Manager role for software products. Software technologies and domain knowledge. Managing performance metrics, product features, and engineering requirements. Analysis of user data. Marketing, business planning, and product launch. Course may be offered in classroom-based or online format. 4 lectures.

IME 408. Systems Engineering. 3 units

Term Typically Offered: TBD

Prerequisite: CSC 232.

Systems, subsystems, static, dynamic, closed and open systems. Systems design requirements. Performance measures. Process control modeling and analysis, transform methods, linear systems analysis, digital, adaptive and steady state optimal control. Optimal search strategies. Manufacturing, maintenance, replacement and engineering applications. 3 lectures.

IME 409. Economic Decision Systems. 3 units

Term Typically Offered: TBD

Prerequisite: IME 239 and IME 314, or IME 315; and IME 305.

Economic evaluation of information for complex decisions. Analysis of risks and uncertainties. Bayes theory and models. Decision theory, sequential decisions, and value of information applied to financial evaluation and control. Major project justification procedures. 3 lectures.

IME 410. Production Planning and Control Systems. 4 units

Term Typically Offered: F, W, SP

Prerequisite: IME 342 or IME 305.

Building blocks of manufacturing resource planning (MRP II). Demand forecasting, production planning, master scheduling development. BOM and inventory files. MRP computations and operational challenges. Capacity analysis and production control in push and pull systems. Enterprise Resource Planning (ERP). Principles of JIT and lean manufacturing. Not open to students with credit in IME 580. 3 lectures, 1 laboratory.

IME 415. Service Enterprises Engineering and Management. 4 units

Term Typically Offered: SP, SU

Prerequisite: IME 305 or IME 342.

Analysis, design, and control of service enterprises. Topics include workforce planning, customer queueing, service facility location, yield management, and call center management. Case studies from the entertainment, retailing, and financial sectors, among others. Course may be offered in classroom-based or online format. 4 lectures.

IME 416. Automation of Industrial Systems. 3 units

Term Typically Offered: SP

Prerequisite: IME 356, ME 305 or equivalent.

Automation in manufacturing and warehousing. Economic selection of automation systems. Projects in automation. 2 lectures, 1 laboratory.

IME 417. Supply Chain and Logistics Management. 4 units

Term Typically Offered: F, W, SP

Prerequisite: IME 342 or IME 410.

Overview of key logistics and supply chain management concepts. Models and solution methods for the design, control, operation, and management of supply chains. Techniques that are used to analyze supply chains. Team projects in partnership with industry sponsors. Course may be offered in classroom-based or online format. 4 lectures.

IME 418. Product-Process Design. 4 units

Term Typically Offered: F

Prerequisite: Senior standing in engineering or graduate standing.

Recommended: IME 450.

Innovative new product design and creative development process. Design for manufacturability. Study of constraints for prototyping, designing, testing, processing, quality, and customer satisfaction. Life-cycle analysis. Examination of relevant environmental and ethical issues. Design projects using real world problems. 3 lectures, 1 laboratory.

IME 420. Simulation. 4 units

Term Typically Offered: F, W, SP

Prerequisite: IME 305; IME 326 or IME 327; or graduate standing.

Queueing systems. Design and analysis of production and service systems using the simulation technique. System modeling. Random number and function generators, programming, and characteristics of simulation languages. Design projects using real world problems. 3 lectures, 1 laboratory.

IME 421. Engineering Management. 3 units

Term Typically Offered: TBD

Prerequisite: PSY 201 or PSY 202; junior standing. Recommended: IME 314 or IME 315.

Theory and principles for manufacturing, service, and non-profit organizations. Competitive advantage. Strategic planning and operations management for organizations and teams in a rapidly changing, diverse environment. Engineering management concepts, including effective ethical, sustainable, and inclusive leadership practices. Team-based projects and cases. 3 seminars.

IME 424. Industrial Engineering in Healthcare. 4 units

Term Typically Offered: SP

Prerequisite: IME 223.

Industrial engineering applications in healthcare industry. Background on healthcare reform. Simulation, operations research, supply chain, facility engineering, process improvement case studies. Emerging topics in industrial engineers in healthcare, change management, patient flow, Lean Six Sigma, nursing, patient safety, and decision-making. 4 lectures.

IME 428. Engineering Metrology. 4 units

Term Typically Offered: TBD

Prerequisite: IME 143, IME 144, or IME 146; and IME 326, IME 327, IME 503, or STAT 312.

Measurement of attributes and variables; standards, accuracy and precision; mechanical, electronic and optical/laser measurement systems. Contact and non-contact measurement; straightness, flatness and squareness; GDT (Geometric Dimensioning and Tolerancing); CMM (Coordinate Measurement Machines); surface roughness; metrology for electronic products. 3 lectures, 1 laboratory.

IME 429. Ergonomics Laboratory. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: IME 319; and IME 326 or IME 327.

Investigation of various physiological, sensory, and cognitive capabilities and limitations of people in work and living environments through laboratory data collection, design of experiments and statistical analysis. 1 laboratory.

IME 430. Quality Engineering. 4 units

Term Typically Offered: F,W,SP,SPSU

Prerequisite: IME 326, IME 327, IME 503, STAT 302, or STAT 312.

Quality history and philosophies. Cost of quality. Quality control tools. Statistical control charts for variables and attributes. Process capability. Measurement system analysis. Acceptance sampling. Reliability and life testing methods. Quality improvement tools: Quality Function Deployment, Failure Modes and Effects Analysis, Six Sigma, quality standards and systems. Course may be offered in classroom-based or online format. 4 lectures.

IME 432. Additive Manufacturing. 4 units

Term Typically Offered: W, SP

Prerequisite: IME 144 or ME 251; and MATE 210. Recommended: IME 330.

Engineering principles, materials, equipment, design for manufacturing, process flow, post processing, and applications of additive manufacturing processes, including: photopolymerization, powder bed fusion, extrusion, direct energy deposition, printing, binder jetting, and sheet lamination. Process selection, environment considerations, safety, and cost analysis for manufacturing. 3 lectures, 1 laboratory.

IME 435. Reliability for Design and Testing. 3 units

Term Typically Offered: TBD

Prerequisite: IME 326, IME 327, IME 503 or STAT 312.

Reliability concepts and mathematical models, mechanical device reliability, electrical device reliability, systems reliability and maintainability, reliability data, assurance program elements. Not open to students with credit in IME 542. Course may be offered in classroom-based or online format. 3 lectures.

IME 441. Engineering Supervision I. 1 unit

Term Typically Offered: F,W,SP,SPSU

Prerequisite: Consent of instructor.

Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in engineering laboratories. 1 laboratory each.

IME 442. Engineering Supervision II. 1 unit

Term Typically Offered: F,W,SP,SPSU

Prerequisite: Consent of instructor.

Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in engineering laboratories. 1 laboratory each.

IME 443. Facilities Planning and Design. 4 units

Term Typically Offered: F, W, SP

Prerequisite: IME 144; IME 223; IME 314 or IME 315; and IME 305 or IME 342. Recommended: IME 319 and IME 420.

Design concepts and input requirements in planning and design of new or renovation of existing manufacturing systems. Product, process, and flow and activity analysis techniques. Flow lines and buffering techniques. Computer-aided layout design and evaluation. Design of handling systems. Math models of location problems. Multidisciplinary team project. 3 lectures, 1 laboratory.

IME 450. Manufacturing Process and Tool Engineering. 4 units

Term Typically Offered: SP

Prerequisite: MATH 244, IME 330. Recommended: IME 335.

Engineering design of fixtures and tools for manufacturing processes. Interpretation of engineering design specifications. Analysis of cost, quality, productivity, and safety in tool design. Mechanical analysis of tool design. Detailed process design for net shape production and component design for manufacture. Process and tool design projects. 3 lectures, 1 laboratory.

IME 451. Radio Frequency Identification and Sensing System Design. 4 units

Term Typically Offered: TBD

Prerequisite: EE 201 or IME 156 or ITP 150.

Radio frequency identification (RFID) and its role in asset and inventory management, facility access, payment transaction systems, and other applications. RFID and the Industrial Internet of Things (IIOT). Physics and types of RFID and other sensing devices. Economic analysis. Multidisciplinary project teams design RFID systems for real-world applications. 2 lectures, 2 laboratories.

IME 456. The Industrial Internet of Things. 4 units

Term Typically Offered: SP

Prerequisite: IME 156, EE 143, or EE 145; and IME 212, CSC 365, or DATA 301.

Project-based introduction to internet-enabled device technologies for industrial applications. Sensor setup; data collection, storage, and analysis for real-time control and decision-making; internet communications standards and protocols; ethics and security issues. Applications such as asset tracking, machine maintenance, smart buildings. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

IME 457. Advanced Electronic Manufacturing. 4 units

Term Typically Offered: TBD

Prerequisite: IME 156 or EE 143 or EE 201.

Design and fabrication of commercial electronic products; PCB layout design, bill of material analysis and component purchasing, production planning and scheduling, programming automated surface-mount assembly line, marketing of products. Multidisciplinary project teams exposed to real-world challenges of electronics manufacturers. 2 lectures, 2 laboratories.

IME 458. Microelectronics and Electronics Packaging. 4 units

Term Typically Offered: TBD

Prerequisite: EE 112 or EE 113 or EE 201. Recommended: MATE 210.

Materials, processes, and reliability of microelectronics and electronics packaging, surface mount assembly and printed circuit board fabrication. Organic substrates and ceramic substrates. Mechanical design, thermal, and electrical considerations in electronic packaging. Design for manufacturability. Overview of optoelectronics packaging and other emerging technologies in microelectronics and electronic packaging. Project on design and manufacture of an electronic device. 3 lectures, 1 laboratory. Crosslisted as CPE 488/IME 458/MATE 458.

IME 460. Introduction to Value Chain Analysis. 3 units

Term Typically Offered: SP

Prerequisite: IME 223 or ITP 303; and senior standing.

Introduction to value chain concepts and their application to the analysis and improvement of business operations. Application of lean principles to optimize the value chain. 3 lectures.

IME 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

IME 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

IME 481. Senior Design Project I. 2 units

Term Typically Offered: F, W

Prerequisite: IME 326 or IME 327; IME 314 or IME 315. Corequisite: IME 301 or IME 330; IME 342 or IME 420. Recommended: IME 303; IME 410 or IME 418; and IME 430; completion of all IME 300-level coursework.

Culminating design project typical of problems in professional practice. Individual or group projects involving system design, modeling, analysis and testing. Problem definition, planning, scheduling, literature review, conceptual and alternative designs. Develop business case for communication and formal reports documenting project methodology. Professional ethics. Field trip may be required. 1 lecture, 1 laboratory.

IME 482. Senior Design Project II. 2 units

Term Typically Offered: W, SP

Prerequisite: IME 481. Recommended: IME 417; IME 429, IME 443 or IME 450.

Continuation of IME 481. Involves research methodology: project design, analysis, implementation, and/or testing. Project results documented in thesis-like formal reports suitable for reference library and formal oral presentations. Professional ethics. Field trip may be required. 1 lecture, 1 laboratory.

IME 483. Senior Design Project III. 2 units

Term Typically Offered: F, SP

Prerequisite: IME 482.

Continuation and completion of project from IME 482. Focus on testing and experimentation of implemented design project. Evaluation of project sustainability and impacts of societal, organizational, economic, and environmental nature. Project results and recommendations summarized and presented in formal reports suitable for reference library and formal oral presentations. Field trip may be required. 1 lecture, 1 laboratory.

IME 495. Cooperative Education Experience. 4-12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

IME 500. Individual Study. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair and supervising faculty member.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to students who have demonstrated ability to do independent work.

IME 503. Applied Statistical Methods in Engineering. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing.

Application of important statistical distributions in engineering and management. Coverage of sampling distributions and their roles in design of experiments. Applications of hypothesis testing, ANOVA, analysis of covariance, multiple and nonlinear regressions in industry and service systems. Introduction to nonparametric analysis. 3 lectures, 1 laboratory.

IME 507. Graduate Seminar. 2 units

Term Typically Offered: F

Prerequisite: Graduate standing.

Seminars in industrial engineering, integrated technology management, and engineering management by researchers and practitioners from academia and industry. Preparation for conducting research. Presentation of student research projects. Overview of graduate education requirements. Ethics issues in research. 1 seminar, 1 laboratory.

IME 510. Systems Engineering I. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or consent of instructor.

Project management. Scheduling and budgeting. Queuing theory. Process control and life-cycle cost analysis. Contracts and negotiation. 4 lectures.

IME 511. Systems Engineering II. 4 units

Term Typically Offered: TBD

Prerequisite: IME 510, graduate standing or consent of instructor.

Risk management. Design strategies to meet system/mission requirements. Design for supportability, manufacturability, reliability, etc. Quality function development and quality control concepts. 4 lectures.

IME 520. Advanced Information Systems for Operations. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor. Recommended: IME 410.

Advanced information systems (IS) applications in manufacturing and service operations. Introduction of common IS applications, such as manufacturing execution systems; reporting systems; capacity planning systems; scheduling systems; and customer inquiry systems. Industry-specific analysis of IS requirements and availability. 4 seminars.

IME 527. Design of Experiments. 4 units

Term Typically Offered: W

Prerequisite: IME 326 or IME 327 or IME 503 or STAT 312.

Experimental design principles. Comparative experiments for population parameters. ANOVA and randomized block design. Factorial designs, the 2^k factorial designs, and factorial designs with blocks. Fractional factorial designs. Response surface methodology. Fitting regression models. Design projects using real world problems. Substantial use of statistical software. 3 lectures, 1 laboratory.

IME 535. Change Management for Engineering Leaders. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing.

Engineering change processes, configuration management, implementation in project management, cultural change, change models, and personal change. Processes used in reacting and managing changes. Learning through discussion and applications which might include conflict, emotion and differing opinions. 4 lectures.

IME 541. Advanced Operations Research. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing and consent of instructor.

Operations Research approach to model building. Linear programming and sensitivity analysis. Network flow models. Integer programming, large scale linear programming. Goal programming and multi-attribute decision making. Dynamic programming. Nonlinear programming and search methods. Applications in model building and computer solutions in planning, resource allocation, scheduling, and other industrial and service operations. 3 lectures, 1 laboratory.

IME 542. Applied Reliability Engineering. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing. Recommended: IME 326 or IME 327 or IME 503 or STAT 312.

Reliability terminology and bathtub curve. Failure distributions: Exponential, Lognormal, and Weibull. Probability plotting. Reliability of systems. Maintainability and availability. Reliability in design; Load-strength analysis; Failure modes and effects analysis; Fault tree analysis. Reliability testing; Reliability management. Not open to students with credit in IME 435. 3 lectures, 1 laboratory.

IME 543. Applied Human Factors. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing or consent of instructor. Recommended: IME 326 or IME 327 or IME 503.

Human factors/ergonomics analysis and evaluation of automation, mobile communication technology, and interface design for Internet websites. Usability analysis of current hardware/software products with an emphasis on a user-centric design approach. Team-based projects. 3 seminars, 1 laboratory.

IME 544. Advanced Topics in Engineering Economy. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing. Recommended: Undergraduate course in engineering economy.

Review of interest calculations and comparison of economic alternatives. Replacement analysis. Capital planning and budgeting. Mathematical programming and capital budgeting. Utility theory. Decision making under risk and uncertainty. Application of simulation in risk modeling. Benefit-cost analysis. Multi-attribute decision making. Analytic hierarchy process. 3 lectures, 1 activity.

IME 545. Advanced Topics in Simulation. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing. Recommended: IME 420.

Validation of simulation models. Statistical techniques for variance reduction. Experimental design and optimization. Comparison of attributes of simulation languages. Review of current manufacturing and service industry applications. Case studies. 3 lectures, 1 laboratory.

IME 546. Large-Scale Optimization. 4 units

Term Typically Offered: SP

Prerequisite: IME 301 or graduate standing. Recommended: DATA 301 or IME 212.

Large-scale network, assignment and scheduling problems. Data reduction and aggregation techniques. Distributed optimization. Constructive solution techniques. Model relaxations. Improvement heuristics. Multi-start and randomized algorithms. 3 lectures, 1 laboratory.

IME 549. Network Analysis and Optimization. 4 units

Term Typically Offered: W

Prerequisite: IME 212 or DATA 301; and IME 301 or IME 305; and graduate standing or consent of instructor.

Basic network concepts, topologies, and applications. Representation and visualization. Social networks, relationship types, and data collection. Analysis metrics including cohesion, centrality, subgroups, and equivalence. Survivable networks. Network manipulation and design. Cost-optimized network computation including trees and cycles. 3 lectures, 1 laboratory.

IME 556. Technological Project Management. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor.

Projects in industrial organizations and enterprises. Emerging technologies and project management. Relationship to strategic plans and managing change in organizations. Formulating, selecting, structuring, and planning projects. Project organization and control. Overcoming barriers. Application of project management software. 3 seminars, 1 laboratory.

IME 565. Predictive Data Analytics for Engineers. 4 units

Term Typically Offered: F

Prerequisite: IME 372 or DATA 301 and graduate standing; or consent of instructor. Recommended: IME 326, MATH 206, or MATH 244; and STAT 302 or STAT 312.

Applications of predictive data analytics to enhance the performance of engineering systems, processes, and products. Data processing, analysis, and visualization. Supervised and unsupervised learning. Ensemble learning, random forests, support vector machines, neural networks, and clustering. Model biases and data ethics. 3 lectures, 1 laboratory.

IME 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Directed group study of selected topics for advanced students. Open to graduate students and selected seniors. Topic lists will be provided with class schedule outlines. 1 to 4 seminars.

IME 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

IME 577. Engineering Entrepreneurship. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or consent of instructor.

The special requirements of entrepreneurship in a high-tech environment. Guest lectures, focused seminar topics, a business plan project, and case studies provide the tools to evaluate and pursue technology-based business opportunities. 4 lectures.

IME 580. Manufacturing Systems. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing.

Modern approaches in production and inventory planning and control to support large-scale manufacturing systems, material requirements planning (MRP I), manufacturing resource planning (MRP II), and just-in-time (JIT) manufacturing systems. Enterprise resource planning (ERP) and integration with financials. Information requirements, operational issues, and policy matters. Not open if credit in IME 410. Course may be offered in classroom-based or online format. 4 seminars.

IME 596. Graduate Project/Internship. 1-5 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing and consent of instructor.

Integrative learning experience through internship and project. Focus on a significant industrial or research problem in an engineering field. Project involves student(s), faculty, and sponsoring representative(s) in a collaborative learning environment, and culminates in a comprehensive written report. Total credit limited to 5 units.

IME 599. Thesis. 1-9 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing and consent of instructor.

Systematic study of a significant problem under faculty supervision. Both a written thesis and an oral defense are required. Total credit limited to 9 units.

Industrial Technology and Packaging (ITP)

undefined

ITP Courses**ITP 100. Student Orientation, College Success and Career Readiness. 1 unit**

Term Typically Offered: F

Orientation to ITP major and concentrations. Development of a personalized graduation plan. Skills for academic success: goal setting, time management, study skills, registration strategies, overall adjustment to college life, including connection to a social peer network and Career Readiness. Field trip required. 1 activity.

ITP 125. Introduction to Supply Chain and Packaging Systems. 3 units

Term Typically Offered: F

Comprehensive overview of topics and opportunities in Industrial Technology and Packaging. Discusses fundamentals of product and package design, operations, supply chain management, innovation, and sustainability as related to curriculum. Includes practical application of tools to address real world challenges. 3 lectures.

ITP 150. Industrial Power Systems. 4 units

Term Typically Offered: SP

Corequisite: PHYS 123.

A survey of common industrial power systems. Labs include fundamentals of electrical/electronic circuits, fluid power, internal combustion engines and renewable energy sources. 3 lectures, 1 laboratory.

ITP 203. Personal Leadership - 7 Habits. 4 units

Term Typically Offered: W

Learn and practice the what, why, and how of personal leadership. Uses the 7 Habits of Highly Effective People framework to provide students with skills they will use repeatedly in their careers and life. Course offered online only. 4 lectures.

ITP 211. Industrial Safety and Quality Program Leadership. 4 units

Term Typically Offered: W

Prerequisite: ITP 150.

Effective program development and leadership to implement safety and quality process improvement. Application of industrial leadership, knowledge, skills and methods to develop and implement total safety and quality management programs. Class project includes the oral presentation. 3 lectures, 1 activity.

ITP 233. Product Modeling and Communication. 4 units

Term Typically Offered: F, W, SP

Fundamental theory and practice of digital modeling with emphasis on hands-on use of two dimensional and three dimensional modeling software commonly used in industry. Includes part/assembly modeling, geometric dimensioning/tolerancing and fundamental skills in communicating product design data in accordance with industry standards. 2 lectures, 2 activities.

ITP 234. Packaging Design Fundamentals. 4 units

Term Typically Offered: F, SP

A comprehensive overview of fundamental structural and graphic concepts for package design. Focus on design thinking, two-dimensional and three-dimensional form creation, design elements, visual perception, photo rendering, and rapid prototyping. 3 lectures, 1 laboratory.

ITP 260. Manufacturing Processes and Materials. 4 units

Term Typically Offered: W, SP

Prerequisite: CHEM 111 or CHEM 124 or CHEM 127.

Introduction to a wide variety of manufacturing processes and materials with emphasis on metallic products. Analysis of relationships among manufacturing processes, materials and product design. Provides experiential learning on safe and efficient operations of manufacturing equipment. 3 lectures, 1 laboratory.

ITP 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ITP 275. Industrial Facility Systems and Equipment. 4 units

Term Typically Offered: TBD

Prerequisite: ITP 150. Corequisite: ITP 211.

Develop an understanding of contemporary issues in modern industrial facilities. Emphasis on support systems and equipment such as heating and cooling; material handling; electrical, hydraulic, pneumatic power systems; and energy management. Includes facilities sustainability and lean practices. 3 lectures, 1 activity.

ITP 302. Developing and Presenting New Enterprise Strategies. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs); and BUS 346.

Taking new industrial enterprise concept to launch. Planning and management of product-based start-up including integration of: product development; manufacturability and costs; outsourcing; channel selection; supply chain; inventory and scheduling. Application to project case study. Emphasis on developing effective technical presentations. 2 lectures, 2 activities.

ITP 303. Lean Six Sigma Green Belt. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: STAT 217, STAT 218, STAT 251, or any 300 or 400 level statistics course.

Develop skills to function as lean six sigma leader. Discussion and problem sessions cover lean six sigma green belt body of knowledge: define, measure, analyze, improve, control. Team skills necessary to complete projects. Course may be offered in classroom-based or online format. 4 lectures.

ITP 326. Product Design and Development. 4 units

Term Typically Offered: F, SP

Prerequisite: ITP 233 or BUS 310.

Overview of user-centered design methods involving sketching and quick prototyping techniques for new product development. Topics include: design thinking, identification of user needs, concept generation/selection/testing, industrial design, visual perception, ergonomics, sustainable design, product architecture, and intellectual property. 3 lectures, 1 laboratory.

ITP 330. Packaging Fundamentals. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing or Industrial Technology and Packaging Major; completion of GE Area A with grades of C- or better; completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs); and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Overview of packaging functions, materials and development. Discuss value addition to product-package systems via various packaging materials, processes, design and protective packaging for global distribution. Illustrates the impact of packaging on environment. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ITP 341. Packaging Polymers and Processing. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Related

Prerequisite: Junior standing or Industrial Technology and Packaging Major; completion of GE Area A with grades of C- or better; CHEM course in GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs); and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Physical and chemical properties of plastic materials and processing techniques. Evaluation of current materials and technologies to reduce waste and to improve reuse and recycling. Applied laboratory using common industry processes emphasizes relationships among processing, structure, properties, and consumer response. Course may be offered in classroom-based, or hybrid format. 3 lectures, 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ITP 371. Supply Chain Management in Manufacturing and Services. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: A grade of C- or better, or consent of instructor, in: MATH 141 or MATH 221, and STAT 217 or STAT 218 or STAT 251 or any 300 or 400 level statistics course.

Introduction to supply chain management and performance metrics. Supply or value chains dealing with hard goods and services from design to daily management. Project management techniques and technology for making and implementing decisions. Course may be offered in classroom-based or online format. 4 lectures.

ITP 390. Industrial Automation. 4 units

Term Typically Offered: W, SP

Prerequisite: ITP 260.

Programming and setup of computer-controlled manufacturing/assembly machinery. Includes introduction to smart manufacturing and industrial internet of things. Familiarization with CNC machines, robots, 3D printing, programmable logic controllers and online data monitoring. 3 lectures, 1 laboratory.

ITP 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

ITP 403. Lean and Quality Systems Management. 4 units

Term Typically Offered: F, W

Prerequisite: ITP 303; Business majors must have formally declared their concentration to enroll.

Process improvement and quality assurance viewed from systems perspective including cost, time, and process. Lean thinking and tools studied as problem solving approach achieving continuous improvement through waste elimination and variability reduction. Projects improve processes in manufacturing, supply chain or service. 4 lectures.

ITP 404. Lean Six Sigma Green Belt Certification Project. 4 units

Term Typically Offered: SP

Prerequisite: ITP 303.

Tools and concepts required to complete a Lean Six Sigma Green Belt Certification project (LSSGB). Supervised independent completion of an LSSGB project for a client selected by the student. Written and verbal presentation of process and results.

ITP 406. Professional Technical Selling. 4 units

Term Typically Offered: F, SP

Prerequisite: BUS 346.

Technical competencies in complex business-to-business selling through project selling teams, providing extended product/service solutions to customer buying committees. Individual mock sales presentations (with written proposals) and team case study presentations. 4 lectures.

ITP 408. Fiber-Based Packaging. 4 units

Term Typically Offered: W, SP

Prerequisite: ITP 330.

Design of packaging systems using paper, paperboard, corrugated fiberboard, and other fiber-based materials. Physical and chemical properties, manufacturing, converting operations, commercial applications, and sustainability. Survey of tests and procedures for fiber-based packaging materials and packaging products following ASTM, TAPPI, and ISO standards. 3 lectures, 1 laboratory.

ITP 409. Packaging Machinery and Processes. 4 units

Term Typically Offered: F, SP

Prerequisite: ITP 330.

Integrated study of packaging machinery and processes from a practical and operational viewpoint. Understanding basic processes and interrelationship between packaging machinery and type of product, production layout and efficiency, material handling and distribution equipment, quality control and ancillary systems. 3 lectures, 1 activity.

ITP 410. Operations Planning and Control. 4 units

Term Typically Offered: F, W

Prerequisite: BUS 391; and ITP 303 or ITP 371.

Linking supply chain operations to deliver value to the end customer. Contrasting of advanced manufacturing concepts, such as pull systems, sales and operations planning, mixed model manufacturing, level production, and theory of constraints to traditional materials requirements planning systems. 3 lectures, 1 activity.

ITP 411. Packaging Sustainability. 4 units

Term Typically Offered: F, SP

Sustainability Focused

Prerequisite: ITP 330.

A comprehensive overview of cradle-to-cradle sustainability concerns that apply to the packaging life cycle, tools for measuring & reporting sustainability and communicating sustainability initiatives. 3 lectures, 1 laboratory.

ITP 412. Instrumental Analysis of Packaging Polymers. 4 units

Term Typically Offered: W

Prerequisite: ITP 341.

Overview of various analytical methods and tools used for the evaluation of polymers and other packaging materials including thermal characterization, spectroscopy, chromatography. Qualitative and quantitative analysis of the matter. Identification of polymeric materials and morphology. Mass transfer measurement. 3 lectures, 1 laboratory.

ITP 413. Packaging Quality Assessment. 4 units

Term Typically Offered: SP

Prerequisite: ITP 341 and ITP 408.

Overview of the role that packaging quality plays in consumer packaged goods. Techniques used for testing and evaluating the quality of consumer product packaging, including material quality assessment, product-package interaction and human-package interaction. 3 lectures, 1 laboratory.

ITP 414. Packaging Laws & Regulations. 4 units

Term Typically Offered: W

Prerequisite: ITP 408 and ITP 411.

Comprehensive overview of the U.S. laws and regulations applicable to packaging of different types of consumer products, and related government organizations. Awareness of legal and regulatory requirements related to packaging solutions. Course may be offered in classroom-based or online format. 4 lectures.

ITP 415. Supply Chain and Logistics. 4 units

Term Typically Offered: SP

Sustainability Related

Prerequisite: One of the following: ITP 303, ITP 326, ITP 330, or ITP 341; and ITP 371.

Key concepts, tools, and approaches for making effective supply chain and logistics decisions in support of business goals. Practical management issues and applications are the focus rather than theoretical, mathematical optimization. Business cases and simulations are used to illustrate and explore best practices. 4 lectures.

ITP 419. Cooperative Education/Internship. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Approval of area chair, junior standing, and a CPSLO cumulative GPA of at least 2.5 without being on academic probation.

Work experience in business, industry, government and other areas of student career interest. Periodic written progress reports, final report, and evaluation by work supervisor required. Total credit limited to 4 units.

ITP 428. Commercialization of New Technologies. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BUS 342, BUS 346, or ITP 326.

Concepts, frameworks, and experiences necessary to understand the business potential of technology innovations and determine if one or more sustainable market opportunities can be identified to exploit them. Hands-on exercises and real new inventions to illustrate concepts. 4 lectures.

ITP 430. Healthcare Packaging. 4 units

Term Typically Offered: W

Prerequisite: ITP 330.

Study of packaging systems for pharmaceuticals, nutraceuticals, and medical devices. Characteristics and properties of materials, forms, and sterilization methods. Design principles for products for healthcare. Laboratory exercises on packaging operations, materials, and evaluation methods. International and federal regulations and standards. Field trip may be required. 3 lectures, 1 laboratory.

ITP 461. Senior Project I. 2 units

Term Typically Offered: F, W

Prerequisite: Consent of instructor.

Selection and completion of a project under faculty supervision. Projects typical of problems graduates must solve in their field of employment. Project results presented in a formal report, and must be completed in two quarters. Minimum 120 hours total time.

ITP 462. Senior Project II. 2 units

Term Typically Offered: W, SP

Prerequisite: Consent of instructor.

Selection and completion of a project under faculty supervision. Projects typical of problems graduates must solve in their field of employment. Project results presented in a formal report, and must be completed in two quarters. Minimum 120 hours total time.

ITP 464. Applied Industrial Technology Senior Project Seminar. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing.

Selection and analysis of industrial and technological problems and opportunities in directed individual or group-based projects. Problems typical to those which graduates could encounter in their fields of employment. Formal report required. Minimum 120 hours of total time. 4 seminars.

ITP 467. Applied Business and Production Management. 4 units

Term Typically Offered: F, SP

Prerequisite: ITP 211, ITP 233, ITP 260, ITP 326, and BUS 346.

An integrative manufacturing business and production systems experience, including design, prototyping, processing, quality control, resource management, cost-control, marketing, sales, packaging, and technical documentation. Team projects reflect the real-world, dynamic environment of product development and production. 2 lectures, 2 laboratories.

ITP 468. Blockchain in Business. 4 units

Term Typically Offered: SP

Prerequisite: BUS 392 or CSC 101 or CSC 232 or ECON 395.

Blockchain technology in business, with application examples in management (including HR, marketing and accounting), operation systems (manufacturing, supply chain and other service systems), finance (including stock trading, real estate transactions and P2P payment systems) and entrepreneurship. 4 lectures. Crosslisted as BUS/ITP 468.

ITP 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study and seminars in selected topics in industrial technology. Open to undergraduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 lectures.

ITP 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ITP 475. Distribution Packaging Dynamics. 4 units

Term Typically Offered: F

Prerequisite: ITP 330.

Survey of tests and procedures for packaging materials and packaging products following ASTM and ISTA standards. The testing procedures include tests for shock, vibration, drop and impact as prescribed for shipment by truck, rail, sea, and air. Hands-on product/packaging testing for quality control. 3 lectures, 1 laboratory.

ITP 485. Packaging Development. 4 units

Term Typically Offered: SP

Prerequisite: ITP 341, ITP 408, and ITP 475.

Integrative approach to developing new packaging systems by balancing the needs of the different value chain stakeholders. Interplay of package design for end-users, marketing, manufacturing, distribution, and disposal. Class project focuses on cross-disciplinary collaboration, design thinking, discovery, and disruptive innovation. 3 lectures, 1 laboratory.

ITP 500. Individual Study. 1-6 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing and formal petition with approval from the Associate Dean.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Maximum of 6 units may be applied to degree requirements.

ITP 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Directed group study of selected topics for advanced students. Open to undergraduate students. The Class Schedule will list topic selected. Total credit limited to 16 units. 1 to 4 seminars.

ITP 571. Selected Advanced Topics Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Directed group laboratory study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 16 units. 1-4 laboratories.

ITP 599. Industrial and Technical Studies Thesis. 3 units

Term Typically Offered: TBD

Prerequisite: OCOB graduate standing or approval from the Associate Dean.

Completion of a thesis involving individual research that is significant to the field of industrial and technical systems. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Course satisfies culminating experience requirement through the completion of the comprehensive thesis. Total credit limited to 9 units.

Interdisciplinary Studies in Liberal Arts (ISLA)

undefined

ISLA Courses

ISLA 123. Introduction to Science, Technology & Society. 4 units

Term Typically Offered: F, W, SP

Introductory exploration of science, technology, and society relationships from interdisciplinary perspectives in the arts, communications, humanities, and social sciences. Topic areas include ethics and public policy; gender, race and culture; media arts and society; science and risk communication. Course may be offered in classroom-based or online format. 4 lectures.

ISLA 201. Introduction to Interdisciplinary Studies. 4 units

Term Typically Offered: F, W

Prerequisite: COMS 218, ES 112, HIST 206, HIST 216, ISLA 123, JOUR 219, RELS 201, WGQS 201, or WGQS 210.

Focus on methods, concepts and skills in the Interdisciplinary Studies major, and on career and graduate school opportunities. Refinement of individualized plan of study to reflect professional, educational, and personal goals. 4 lectures.

ISLA 240. Introduction to Media Arts and Technologies. 4 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs). Recommended: TH 210.

The intimate connection between the desire for artistic expression and current technologies that can assist that expression. Examination of technologies for theater, sound, cinema, gaming, and embodied media. Guest speakers with expertise. 4 lectures.

ISLA 255. Introduction to Interdisciplinary Theory and Methods. 4 units

Term Typically Offered: F, W

Prerequisite: ISLA 201.

Introduces students to interdisciplinary research and how interdisciplinarity integrates with disciplinary methods and theories. Course content develops integrated foundational knowledge and perspective for conducting original interdisciplinary research in higher level courses. Preparation for ISLA 355, senior project, and senior portfolio. 4 lectures.

ISLA 303. Values and Technology. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area C.

Humanistic investigation into the theoretical and practical applications of technology with specific reference to the social effects of technological change. Course may be offered in classroom-based or online format. For all majors. Non-technical. 4 lectures. Crosslisted as HNRS 304/ISLA 303. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ISLA 305. Topics in Public Engagements with STEM. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Areas B1 and B2 with a grade of C- or better; and completion of one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs) with a grade of C- or better. Recommended: STAT 130, STAT 217, STAT 218 or STAT 313.

Exploration of contemporary issues in science, technology, engineering, and mathematics (STEM), with an emphasis on public engagements with STEM research and teaching cultures. The Class Schedule will list topic selected. Total credit limited to 8 units. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ISLA 316. London: From Roman Colony to World Capital. 4 units

Term Typically Offered: SU

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; enrollment in London Study program; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Corequisite: ISLA 319.

Selective examination of the historical and cultural legacy of London within the development of Western civilization as well as its influence on the submission and eventual emergence of the non-Western world in the twentieth century. An analytical and interpretive study of how London shaped the social, economic, political and legal institutions of Western society. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

ISLA 319. London Activities. 2 units

Term Typically Offered: SU

CR/NC

Prerequisite: Enrollment in London Study program.

Analytical and interpretive survey of the principal center of the English speaking world. The development of London from Roman administrative capital to modern cultural, financial and political colossus. Credit/No Credit grading only. 2 activities.

ISLA 320. Topics and Issues in Values, Media and Culture. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

The interplay of values, media, and culture from an interdisciplinary perspective. Descriptive subtitles assigned to each course. The Class Schedule will list topic selected. 4 lectures. Total credit limited to 8 units with different subtopic; repeatable in same term. Crosslisted as HNRS/ISLA 320. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

ISLA 330. Cal Poly Land: Nature, Technology, and Society. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course from GE Area B1 (GE Area B4 for students on the 2019-20 or earlier catalogs); one course from GE Area B2; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Scientific investigation of the natural features of the Cal Poly landscape and their transformations by land management technology. Environmental, economic, social, and political effects of agriculture, resource extraction, construction technology. Educational, land-use, long term planning issues. 4 lectures. Crosslisted as AG/ISLA/SCM/UNIV 330. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ISLA 335. Feminist Studies of Popular Culture and Whiteness. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Feminist approaches to the analysis of representations of whiteness in contemporary media, and considerations of the U.S. cultural values these images illuminate. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ISLA/WGQS 335. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs). Formerly WGS 335.

ISLA 340. Media Arts and Technologies: Storytelling. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ISLA 240 or the completion of an ART or TH course in GE Area C3.

Creation of expressive technology-based pre-production works for standard television and film presentation to interactive technological environments. Pre-production script work, storyboarding, flow chart design, collaborative story creation, audience testing, and basic animatic construction. Visiting professionals work with students directly in collaborative workshops. 3 lectures, 1 activity.

ISLA 341. Media Arts and Technologies: Cinematic Process. 4 units

Term Typically Offered: W, SP

Prerequisite: ISLA 340.

Cinematic production including adapting a narrative for different presentation formats, storyboarding, lighting, sound recording, cinematography and editing. Production of short works designed as foundational pieces that can be built upon individually or in teams in independent study. Visiting professionals run collaborative production workshops. 2 lectures, 2 activities.

ISLA 350. The Global Environment. 4 units

Term Typically Offered: W, SP, SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/historical/political perspectives. Use of remote sensing maps. Sustainable solutions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as AG/EDES/ENGR/GEOG/ISLA/SCM/UNIV 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ISLA 355. Interdisciplinary Research Methods. 4 units

Term Typically Offered: F

Prerequisite: ISLA 201. Recommended: STAT 130, STAT 217, STAT 218, or STAT 251.

Exploration of interdisciplinary research strategies, theory, and process, including contextualization, perspective taking, and integration. Development of knowledge and skills needed to conduct original interdisciplinary research. Preparation for senior project or senior portfolio. Course may be offered in classroom-based or online format. 4 lectures.

ISLA 393. Action-oriented Ethnography. 4 units

Term Typically Offered: F

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs); and one of the following: ANT 201, ANT 202, ANT 250, ISLA 123, any Ethnic Studies (ES) course, any Women's and Gender Studies (WGS) course.

Development of knowledge and skills needed to conduct original action-oriented ethnographic research. Grounded in the reflexive 'turn' in anthropology and critical race, science, technology and society, queer and feminist studies, students will engage questions of authority, representation, critical consciousness and justice. 4 lectures. Crosslisted as ANT/ISLA 393.

ISLA 395. Science Communication. 4 units

Term Typically Offered: TBD

Sustainability Related

Prerequisite: Completion of GE Area A with grades of C- or better and completion of one GE Area B course.

Examination of science communication in a variety of contexts. Issues covered may include: scientific journal articles, boundary-work, information deficit models, public understanding/awareness of science, accommodated science, mediated science, popular science. 4 lectures. Crosslisted as COMS/ISLA 395.

ISLA 400. Independent Study Project. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior or senior standing and consent of instructor.

Independent study project focusing more than one discipline on a problem of study related to the liberal arts. May involve travel and/or independent research. Bibliography and study plan submitted in advance. Total credit limited to 8 units.

ISLA 411. Technology and Community Engagement. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; and sophomore standing.

Onsite work with community and design team to develop and evaluate the use of innovative technologies as tools for community development and empowerment. Through guided discussion with instructor, guests, and community members, work through intercultural collaboration and design issues, conduct qualitative and quantitative research, and present works-in-progress. Field trip may be required. Total credit limited to 8 units. 4 lectures. Crosslisted as ISLA/LAES 411.

ISLA 440. Advanced Interdisciplinary Studies Seminar. 4 units

Term Typically Offered: W

Prerequisite: ISLA 201. Recommended: ISLA 355.

Advanced examination of selected interdisciplinary topic. Topics will be examined from perspective of multiple disciplines. The Class Schedule will list topic selected. Total credit limited to 8 units. Course may be offered in classroom-based or online format. 4 lectures.

ISLA 450. Summer Internship in London. 12 units

Term Typically Offered: SU

CR/NC

Prerequisite: Junior standing and consent of the Director of London Study.

Extensive work experience in London. Administration, orientation, and supervision of independent work by the service provider. Intensive two-week orientation, eight-week full-time work assignment. Evaluation by instructor, internship supervisor, and employer. Credit/No Credit grading only. 4 lectures, 8 units of independent study.

ISLA 456. Advanced Project-Based Learning in Science, Technology & Society. 4 units

Term Typically Offered: W, SP

Prerequisite: ISLA 123; completion of GE area A with grades of C- or better; completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs) or completion of GE Area B2; junior standing; and minor in one of the following: Ethics, Public Policy, Science and Technology; Gender, Race, Culture, Science, and Technology; Media Arts, Society and Technology; or Science and Risk Communication.

Develop, maintain and lead teams in a project investigating complex multi-disciplinary issues in science, technology and society. Integrate knowledge across the minors. 2 lectures, 2 activities.

ISLA 461. Senior Project. 4 units

Term Typically Offered: W, SP

Prerequisite: Senior standing; and ISLA 355.

Selection and completion of an interdisciplinary research or creative project that draws upon at least two disciplines. 4 seminars.

ISLA 465. Internship. 2-12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: ISLA 201 and consent of instructor.

Supervised training, research, and work in public and private organizations. Evaluations by supervisor and written reports by student required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only.

ISLA 470. Selected Advanced Topics. 2-4 units

Term Typically Offered: TBD

Prerequisite: Junior standing; and completion of GE Area A with grades of C- or better.

Focused interdisciplinary study of an issue impacting or impacted by the liberal arts, combining the insight and expertise of more than one of the liberal arts disciplines, especially as they interface with the sciences and technology and/or international studies in a study abroad setting. The Class Schedule will list topic selected. Total credit limited to 8 units; repeatable in same term. 2 to 4 lectures.

Italian (ITAL)

undefined

ITAL Courses

ITAL 101. Elementary Italian I. 4 units

Term Typically Offered: F

Beginning Italian. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context. Not open to students with credit in ITAL 141. 4 lectures.

ITAL 102. Elementary Italian II. 4 units

Term Typically Offered: W

Prerequisite: ITAL 101, ITAL 141, or consent of instructor.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context. Not open to students with credit in ITAL 142. 4 lectures.

ITAL 103. Elementary Italian III. 4 units

Term Typically Offered: SP

Prerequisite: ITAL 102, ITAL 142, or consent of instructor.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context. Not open to students with credit in ITAL 143. 4 lectures.

ITAL 141. Elementary Italian I Study Abroad. 4 units

Term Typically Offered: SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: Acceptance into the Cal Poly Global Program.

Beginning Italian. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in ITAL 101. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

ITAL 142. Elementary Italian II Study Abroad. 4 units

Term Typically Offered: SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: ITAL 101, ITAL 141, or appropriate score on placement exam; and acceptance into the Cal Poly Global Program.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in ITAL 102. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

ITAL 143. Elementary Italian III Study Abroad. 4 units

Term Typically Offered: SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: ITAL 102, ITAL 142, or appropriate score on placement exam; and acceptance into the Cal Poly Global Program.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to student with credit in ITAL 103. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

ITAL 201. Intermediate Italian I. 4 units

Term Typically Offered: F
2019-20 or earlier catalog: GE Area C5
Prerequisite: ITAL 103, ITAL 143, or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Italian within an intercultural context. Not open to students with credit in ITAL 241. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

ITAL 202. Intermediate Italian II. 4 units

Term Typically Offered: W
Prerequisite: ITAL 201, ITAL 241, or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Italian within an intercultural context. 4 lectures.

ITAL 241. Intermediate Italian I Study Abroad. 4 units

Term Typically Offered: SU
2020-21 or later catalog: GE Area C2
2019-20 or earlier: GE Area C1 or C2
2019-20 or earlier: GE Area C1 or C2
2019-20 or earlier catalog: GE Area C5
Prerequisite: ITAL 103, ITAL 143, or appropriate score on placement exam; and acceptance into the Cal Poly Global Program.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Italian. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in ITAL 201. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

Japanese (JPNS)

undefined

JPNS Courses

JPNS 101. Elementary Japanese I. 4 units

Term Typically Offered: F
Beginning Japanese. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, basic conversation, and introduction to Japanese culture. 4 lectures.

JPNS 102. Elementary Japanese II. 4 units

Term Typically Offered: W
Prerequisite: JPNS 101 or consent of instructor.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, basic conversation, and introduction to Japanese culture. To be taken in numerical sequence. 4 lectures.

JPNS 103. Elementary Japanese III. 4 units

Term Typically Offered: SP
Prerequisite: JPNS 102 or consent of instructor.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, basic conversation, and introduction to Japanese culture. To be taken in numerical sequence. 4 lectures.

JPNS 201. Intermediate Japanese I. 4 units

Term Typically Offered: F
2019-20 or earlier catalog: GE Area C5
Prerequisite: JPNS 103 or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Japanese within an intercultural context. To be taken in numerical sequence. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

JPNS 202. Intermediate Japanese II. 4 units

Term Typically Offered: W
Prerequisite: JPNS 201.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Japanese within an intercultural context. To be taken in numerical sequence. 4 lectures.

Journalism (JOUR)

undefined

JOUR Courses

JOUR 102. Introduction to Journalism. 1 unit

Term Typically Offered: F
Introduction to current practices in American news media with a focus on emerging technologies and traditional print and broadcast operations. Exploration of changing career opportunities in news and public relations. Overview of student media organizations and requirements for academic success in journalism. 1 lecture.

JOUR 201. News Media and Democracy. 4 units

Term Typically Offered: SP
Survey of historical influences in the development of today's journalism. Contributions of women and minorities to American mass media. Rise of technology in the communication industry. 4 lectures.

JOUR 203. News Reporting and Writing. 4 units

Term Typically Offered: F, W, SP
Introduction to the fundamental techniques of reporting and writing news articles from print and online perspectives. Extensive laboratory and field practices in gathering and evaluating information. Writing basic news stories under close supervision. 3 lectures, 1 laboratory.

JOUR 219. Multicultural Society and the Mass Media. 4 units

Term Typically Offered: F, W, SP
USCP
The role of the mass media in a democratic multicultural society. Portrayal and stereotyping of ethnic minorities by different mass media forms throughout U.S. history. The growing impact of minorities in the United States. Achievement and goals of current American ethnic media, with special attention to Latinos/as and African-Americans. 4 lectures. Fulfills USCP.

JOUR 220. Introduction to Radio Broadcasting. 2 units

Term Typically Offered: W
Prerequisite: Acceptance as a KCPR staff member and consent of instructor.

Development of skills and knowledge to produce live and recorded radio shows for the campus radio station KCPR-FM. Basic station operations, FCC compliance standards, and basic station management. Required for KCPR staff. 2 lectures.

JOUR 228. Media, Self and Society. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Overview of the interaction among mass media, social institutions and individuals. Theoretical perspectives from mass communication and psychology. The power and influence of media messages and practices. How individuals and groups develop an understanding of their place within a highly mediated world. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

JOUR 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

JOUR 285. Introduction to Multimedia Journalism. 4 units

Term Typically Offered: F, W, SP

Prerequisite: JOUR 203.

Introduction to the social, editorial and technical issues surrounding the web as a form of communication. Fundamentals of gathering, writing and publishing content for the web that includes using photographs, sound, pictures and video to tell a story. 3 lectures, 1 laboratory.

JOUR 302. Mass Media Law. 4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: JOUR 203.

Legal basis for freedom of expression. Court decisions resolving conflicts between First Amendment and right to fair trial, privacy, reputation.

Source confidentiality, freedom of information, contempt, copyright.

Federal and state laws and regulations affecting mass media reporters, editors, publishers, news directors. Course may be offered in classroom based or online format. 4 lectures.

JOUR 303. Web Audio and Video. 4 units

Term Typically Offered: W, SP

Prerequisite: JOUR 203.

Concepts and technologies associated with bringing video, still images and audio online. Process of web-based audio and video creation, production and publication, from inception to publishing. 3 lectures, 1 laboratory.

JOUR 304. Public Affairs Reporting. 4 units

Term Typically Offered: F

Prerequisite: JOUR 203.

Experience leading to advanced skills in reporting and writing stories about contemporary issues, government and courts. Field and laboratory assignments in beat reporting, public meeting coverage, writing style, investigative techniques, and online journalism research. 3 lectures, 1 laboratory.

JOUR 312. Public Relations. 4 units

Term Typically Offered: F, W

Prerequisite: Sophomore standing.

Overview of the history, growth and ongoing development of public relations as an information management function in a multicultural environment. Public relations practices used in commercial and non-profit sectors, and firsthand application of public relations skills. 4 lectures.

JOUR 320. Cal Poly Radio Laboratory. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: JOUR 220 and consent of instructor.

Field experience in radio station operations at KCPR-FM, the campus radio station. Emphasizes support functions such as recording announcements, planning and carrying out promotions, underwriting, events and other station management duties. Required of students also hosting live or prerecorded on-air programs. Total credit limited to 8 units. Open only to students on staff at KCPR-FM. 1 laboratory.

JOUR 331. Contemporary Advertising. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A3 with a grade of C- or better.

Principles of advertising, copy, layout, and production across media platforms, including online, mobile, social, print and broadcast. Economic, political, and social function of advertising in a free market society. Advertising ethics. Social responsibility of advertising in a multicultural environment. Emerging advertising technologies. Course may be offered in classroom-based or online format. 4 lectures.

JOUR 333. Broadcast News. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area A3 with a grade of C- or better.

Beginning broadcast news writing and reporting for radio and television. Emphasis on developing news judgment and producing radio newscasts. Introduction to television studio equipment and procedures. Lab experience includes writing and reporting live on-air for KCPR. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

JOUR 334. Editing. 4 units

Term Typically Offered: F, W, SP

Prerequisite: JOUR 203.

Editing for print and online publication. Using the Associated Press style. Writing headlines, captions, summaries and other display text. Repurposing various media content for the web and other formats. Legal and ethical issues for the editor. 3 lectures, 1 laboratory.

JOUR 338. Podcasting. 4 units

Term Typically Offered: SP

Prerequisite: JOUR 285 or JOUR 303.

Acquire and apply the skills to write, produce, edit, distribute, market and monetize a podcast. Lab experience includes writing and producing a podcast pilot and episodes. 3 lectures, 1 laboratory.

JOUR 342. Public Relations Writing and Editing. 4 units

Term Typically Offered: F, W, SP

Prerequisite: JOUR 312.

Theory, strategic planning and practice in writing persuasive public relations copy for diverse internal and external audiences. Emphasis on gathering information, preparing news releases, newsletters and other communications vehicles. Analysis of various media case studies. 4 lectures.

JOUR 345. Social Media for Strategic Communication. 4 units

Term Typically Offered: F, SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Exploration of emerging technologies and media that influence strategic communication, including public relations and advertising practices. Knowledge, insight and analytical skills necessary to create, evaluate, and execute social media campaigns. 4 lectures.

JOUR 346. Broadcast Announcing and Production. 4 units

Term Typically Offered: F, W, SP

Prerequisite: JOUR 203. Recommended: JOUR 285.

Develop on-air skills in the performance of voice-overs, stand-ups, hosting and the production of televised public service announcements. Emphasis on the effective use of audio and non-linear video editing techniques as well as broadcast writing. 3 lectures, 1 laboratory.

JOUR 347. Public Relations Research. 4 units

Term Typically Offered: W, SP

Introduction to the role of research in the field of public relations. Overview of measurement tools and methodologies for gathering and analyzing data. Practical applications. 4 lectures. Prerequisite JOUR 312.

JOUR 348. Electronic News Gathering. 4 units

Term Typically Offered: TBD

Prerequisite: JOUR 203 and JOUR 333.

Instruction on electronic news gathering (ENG) that includes advanced news writing, field reporting and editing for broadcast. Emphasis on developing research techniques, interviewing skills, responsible and effective non-linear video editing, compelling use of natural sound and professional on-air delivery. 3 lectures, 1 laboratory.

JOUR 350. Data Journalism. 4 units

Term Typically Offered: W, SP

Prerequisite: JOUR 285; and one of the following: STAT 130, STAT 217, STAT 218, or STAT 251.

Introduction to the techniques of finding stories in data sets and presenting them visually via interactive online displays. Emphasis on adapting emerging tools for digital storytelling. 3 lectures, 1 laboratory.

JOUR 352. Advanced News Reporting Practicum. 4 units

Term Typically Offered: F, W, SP

Prerequisite: JOUR 334.

Reporting lab for the print and digital editions of Mustang News. Total credit limited to 8 units. 3 lectures, 1 laboratory.

JOUR 353. Advanced Broadcast Journalism Practicum. 4 units

Term Typically Offered: F, W, SP

Prerequisite: JOUR 303 or JOUR 333.

Students produce a live 30-minute CPTV newscast per week, or a one-hour KCPR segment that incorporates news, information, talk and entertainment. Emphasis on news producing, reporting and announcing skills. Total credit limited to 8 units. 3 lectures, 1 laboratory.

JOUR 378. Advanced Sportscasting. 4 units

Term Typically Offered: SP

Prerequisite: JOUR 285 and JOUR 303 or JOUR 346.

Develop advanced skills in sports reporting and writing for broadcast, web and social media. Play-by-play. Job search in sports journalism. Field trip may be required. Course offered in hybrid format with classroom-based and online learning. 3 lectures, 1 laboratory.

JOUR 385. Media Innovation and Entrepreneurship. 4 units

Term Typically Offered: W, SP

Prerequisite: Sophomore standing. Recommended: BUS 310 or COMS/JOUR 218.

Innovation and entrepreneurship in journalism. Human-centered design. Business plan development. Designing content to reach and engage an audience. Identifying opportunities to create sustainable journalistic enterprises for real-world application in Cal Poly's student-run media organizations. 4 lectures.

JOUR 387. Sports Communication. 4 units

Term Typically Offered: W, SP

Prerequisite: Completion of GE Area A with grades of C- or better.

Examination of the interrelationship between sports and community including participant, sports organization, sports media, and sports fan. Explores how these interrelationships reinforce social values, challenge social norms, and social identities relevant to sports and cultural values. 4 lectures. Crosslisted as COMS/JOUR 387.

JOUR 390. Visual Communication for the Mass Media. 4 units

Term Typically Offered: F,W,SP, SU

Prerequisite: JOUR 203.

Theory and application of visual communication in today's media. Visual communication's power to inform, educate and persuade. Production of visual media across digital, broadcast and print platforms. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

JOUR 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F,W,SP, SU

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

JOUR 401. Global Communication. 4 units

Term Typically Offered: SP

Prerequisite: JOUR 203 and junior standing.

Global communications facilities and operations; world transmission of information; survey of world wire services and international print and electronic media. Analysis of press operations under varying government ideologies, including third world countries. 4 seminars.

JOUR 402. Journalism Ethics. 4 units

Term Typically Offered: F, W, SP
Prerequisite: JOUR 203.

Current issues revolving around the social responsibility of the mass media. Role of the public, government, and media in considerations of media accountability. Professional behavior in media organizations. 4 seminars.

JOUR 403. Multimedia Production for Public Relations and Advertising. 4 units

Term Typically Offered: F
Prerequisite: JOUR 303 or JOUR 346.

Development of fundamentals pertaining to the technical and aesthetic proficiencies used in video communication for public service, public relations, marketing and advertising. All aspects of pitching, planning, production, editing and post-production in addition to historical and regulatory aspects of communication policy and mandates. 3 lectures, 1 laboratory.

JOUR 407. Feature Writing. 4 units

Term Typically Offered: W
Prerequisite: JOUR 203.

Practice in researching, interviewing and the writing and marketing of both long and short form nonfiction articles for various media outlets. Analysis of similar work in current distribution. 4 lectures.

JOUR 410. Advanced Digital Journalism. 4 units

Term Typically Offered: TBD
Prerequisite: JOUR 285.

Apply the theories and applications of digital journalism to the development and publication of innovative digital content. 3 lectures, 1 laboratory.

JOUR 412. Public Relations and Crisis Management. 4 units

Term Typically Offered: SP
Prerequisite: Junior standing.

Apply contemporary public relations theory to turn crisis into opportunity. Analyze Homeland Security and FEMA best practices using public relations framework and strategy. Practical exercises in planning, implementing, and evaluating public relations messages in a variety of media platforms. 4 lectures.

JOUR 413. Public Relations Campaigns. 4 units

Term Typically Offered: W
Prerequisite: JOUR 312 and JOUR 342.

Development of skills needed to plan and conduct internal and external public relations campaigns for corporate and non-profit organizations. Includes goal setting, management of resources, budgeting, creation of campaign communications, and outcomes analysis. 4 lectures.

JOUR 415. Senior Project: Public Relations Practicum. 4 units

Term Typically Offered: F, W, SP
Prerequisite: Senior standing and JOUR 413.

Capstone experience that applies public relations principles and strategies in the context of the student-run agency, Central Coast PRspectives. Emphasis on proposing, creating, managing, and implementing public relations campaigns. 3 lectures, 1 laboratory.

JOUR 418. Copyright, Trademark, Patent and Commercial Speech in Digital Media. 4 units

Term Typically Offered: F
Prerequisite: Junior standing; and completion of GE Area A with a grade of C- or better.

Examination of intellectual property rights covered by copyright, trademark and, to a limited degree, patent law as well as commercial speech rights in a digital media age. Emphasis on intellectual property rights as they affect content creators and other publishers in a digital world. 4 lectures.

JOUR 444. Media Internship. 3 units

Term Typically Offered: F,W,SP,SU
CR/NC
Prerequisite: JOUR 352, JOUR 353, or JOUR 413; and internship coordinator approval.

Application of techniques on daily basis with media under supervision of department faculty. Credit/No Credit grading only.

JOUR 455. Media Management Laboratory. 1 unit

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Field experience in management of Cal Poly student media. Emphasizes planning, leadership, media integration, goal-setting and measurement. Required of students in elected leadership positions in KCPR-FM, Mustang News, Central Coast PRspectives and MNTV. Total credit limited to 8 units. Intended for students in leadership positions of student media. 1 laboratory.

JOUR 460. Senior Project. 4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor; Journalism majors only.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

JOUR 462. Senior Project: Media Practicum. 4 units

Term Typically Offered: F, W, SP
Prerequisite: Senior standing.

Capstone experience that applies principles and tools of print, broadcast and digital journalism to tell engaging stories across multiple platforms. Emphasis on integrating text, video, audio, graphics, search engine optimization and social networking to produce content for digital publication. 3 lectures, 1 laboratory.

JOUR 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor; junior standing.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

JOUR 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

Kinesiology (KINE)

undefined

KINE Courses

KINE 100. Physical Activity for Students with Disabilities. 1 unit

Term Typically Offered: TBD

CR/NC

Prerequisite: Consent of instructor.

Basic instruction in the development of skill, knowledge of rules, background and analysis of techniques, and desirable attitudes toward physical fitness and participation in physical activities. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 108. Basketball. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 109. Bowling. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 110. Cycling. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes while engaging in cycling in outdoor settings. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 112. Intermediate Bowling. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: KINE 109.

Basic instruction and the development of skill, knowledge of rules, background and analysis of techniques, and desirable attitudes toward physical fitness and participation in physical activities. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses nor more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 121. Golf. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 122. Golf, Int.-Adv.. 1 unit

Term Typically Offered: F, SP

CR/NC

Prerequisite: KINE 121.

Basic instruction and the development of skill, knowledge of rules, background and analysis of techniques, and desirable attitudes toward physical fitness and participation in physical activities. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses nor more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 125. Jogging. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 129. Yoga/Pilates. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Practice of yoga/pilates to improve fitness, flexibility, core strength and endurance. Safe and effective training techniques are emphasized. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 131. Group Fitness Cardio/Strength. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Group fitness activities designed to improve all components of fitness. Concepts of aerobic endurance, muscular strength and agility are discussed to assist in the formulation of individual goals. Safe and effective training techniques are emphasized. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 132. Racquetball. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 134. Pickleball. 1 unit

Term Typically Offered: F, SP
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Fundamental pickleball skills, knowledge, and strategy such that beginning to intermediate levels of play are attained. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 137. Self-Defense. 1 unit

Term Typically Offered: TBD
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 138. Karate. 1 unit

Term Typically Offered: TBD
CR/NC

Basic instruction and the development of skill, knowledge of rules, background and analysis of techniques, and desirable attitudes toward physical fitness and participation in physical activities. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses nor more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 3 units. Credit/No Credit grading only. 1 laboratory.

KINE 139. Soccer. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 140. Ultimate Disc. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Introduction to Ultimate Disc including fundamental skills, rules of the game and active participation. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 141. Flag Football. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Fundamental flag football skills, knowledge, and strategy such that beginning to intermediate levels of play are attained. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 143. Swimming for Non-Swimmers. 1 unit

Term Typically Offered: TBD
CR/NC

Introduction to aquatic environments for adults for the pursuit of swimming and other aquatic exercise. Developing positive attitudes, good swimming habits and safe practices in and around the water. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 144. Beginning Swimming. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Development of swimming strokes for adults to improve confidence and endurance as novice swimmers. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 145. Intermediate Swimming. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Continuation of stroke refinement for adult swimmers who have basic beginning level swimming skills. Practice of swimming strokes and swimming drills for the enhancement of confidence and improvement of swimming effectiveness and endurance. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 147. Advanced Swimming and Conditioning. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Lap swimming for advanced swimmers. Organized structured swim workouts with emphasis on increasing fitness. Participants should have ability to swim three of the four competitive strokes: freestyle, backstroke, breaststroke, butterfly. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 148. Tennis. 1 unit

Term Typically Offered: F, SP
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 151. Volleyball. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 152. Beach Volleyball. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes while engaging in Beach Volleyball. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 154. Weight Training. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes in a weight room setting. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 176. Fitness Walking. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Basic instruction in skill development, knowledge, and desirable attitudes toward physical activity. Enrollment is open to all students. Total limited to 12 units of credit earned in basic instructional KINE courses (KINE 100-176) for non-majors. The following restrictions apply to KINE 100-176: 1) no more than two different activity courses or more than one section of an individual activity course may be taken for credit in any one quarter, 2) a student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course, and 3) any level of an activity course can be repeated only once for credit. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity.

KINE 180. Orientation to Kinesiology. 2 units

Term Typically Offered: F, W
CR/NC

Prerequisite: Kinesiology majors only.

Disciplinary and professional perspectives in Kinesiology and the Kinesiology program at Cal Poly. Credit/No Credit grading only. 2 lectures.

KINE 181. Responding to Emergencies: Comprehensive First Aid, CPR, AED. 2 units

Term Typically Offered: F, W, SP
CR/NC

An American Red Cross certification course designed to help participants recognize and respond appropriately to cardiac, breathing, and first aid emergencies. Skills and knowledge necessary in the treatment of life-threatening emergencies, other injuries, and sudden illnesses. Red Cross First Aid/CPR/AED certifications issued upon successful completion of certification requirements. Credit/No Credit grading only. 1 lecture, 1 activity.

KINE 201. Introductory Undergraduate Research. 1-2 units

Term Typically Offered: F, W, SP

Introduction to individual research, studies, or surveys of selected problems. Intended for students in Kinesiology and in Public Health. Total major credit limited to 4 units. Total credit limited to 6 units. Crosslisted as HLTH/KINE 201.

KINE 240. Introductory Principles of Exercise Science and Sport. 4 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area B2; completion of GE Area B4 with a grade of C- or better in one course (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs). Recommended: MATH 119; and PHYS 121 or PHYS 141.

Introduction to scientific bases of exercise and sport including concepts associated with health-related components of fitness. 3 lectures, 1 laboratory.

KINE 266. Sport and Exercise Psychology. 4 units

Term Typically Offered: F, SP

Prerequisite: Completion of GE Area A with grades of C- or better. Recommended: PSY 201 or PSY 202.

An introduction to the field of sport and exercise psychology. Psychological theories and research related to topics such as motivation to participate in sport and exercise, exercise and psychological well-being, teamwork and leadership, aggression, anxiety, psychological response to athletic injuries and exercise addiction. Course may be offered in classroom-based or online format. 4 lectures.

KINE 278. Introduction to Perspectives in Physical Activity. 4 units

Term Typically Offered: W

Prerequisite: Completion of GE Area A with grades of C- or better; and GE Area C2. Recommended: PHIL 230 or PHIL 231.

Current and historical trends in human movement from philosophical perspectives including Western and Eastern intellectual traditions; exploration of the effects of culture on the view of the human body and the understanding of the role of physical activity and sport in people's lives. 4 lectures.

KINE 280. Assessment Team for Health Promotion Activities. 1 unit

Term Typically Offered: TBD

CR/NC

Prerequisite: HLTH/KINE 250, HLTH/KINE 255, or HLTH/KINE 260.

Recommended: KINE 319 and STAT 218.

Introduction to multiple health and fitness assessment protocols through participation in community-based activities and/or as assistants on faculty-led research projects. Experiential and service learning. Total credit limited to 3 units. Credit/ No Credit grading only. 1 activity. Crosslisted as HLTH/KINE 280.

KINE 281. Health Ambassadors. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: HLTH/KINE 250, HLTH/KINE 255, or HLTH/KINE 260.

Recommended: FSN 210 and HLTH/KINE 265.

Introduction to health education and promotion strategies through participation in community-based activities and/or as assistants on faculty-led projects. Experiential and service learning. Field trip required. Total credit limited to 3 units. Credit/No Credit grading only. 1 activity. Crosslisted as HLTH/KINE 281.

KINE 290. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

KINE 301. Functional Anatomy. 3 units

Term Typically Offered: F, W, SP

Prerequisite: PHYS 121; and BIO 231 or BIO 409.

Functional organization of the human musculoskeletal system and articulations. Emphasis on the roles of muscles during activities of daily living, human performance settings, and the structure of freely movable joints. 3 lectures.

KINE 303. Physiology of Exercise. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BIO 231; and BIO 232 or BIO 361. Recommended: CHEM 128.

Application of human physiology to exercise situations. 3 lectures, 1 laboratory.

KINE 304. Pathophysiology and Exercise. 3 units

Term Typically Offered: F, W, SP

Prerequisite: KINE 303.

Selected human diseases, their etiology, pathophysiology, symptoms, diagnosis, effects on health and physical performance, and as affected by preventive or therapeutic exercise. 3 lectures.

KINE 307. Adapted Physical Activity. 4 units

Term Typically Offered: W, SP

Prerequisite: Sophomore standing; completion of GE Area B2; and completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs).

Major categories of disabling conditions with implications for the development of physical activity programs for specific disabilities. 3 lectures, 1 laboratory. Formerly KINE 407.

KINE 308. Motor Development. 3 units

Term Typically Offered: F, SP

Prerequisite: GE D4.

Motor development of individuals from birth to maturity. Emphasis on interrelationship between motor and cognitive characteristics and affective needs and interests. Course may be offered in classroom-based or online format. 3 lectures.

KINE 310. Concepts and Applications in Elementary Physical Education. 3 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing.

Movement as it relates to physical motor skill development, fitness, wellness, social development, cross-cultural understanding, and self-image. 2 lectures, 1 activity.

KINE 312. Motor Learning and Control. 4 units

Term Typically Offered: F, W

Prerequisite: STAT 217 or STAT 218.

Variables which control sensory-motor integration. Analysis of factors which affect the acquisition of motor skills as related to the learning process and the learning environment. 3 lectures, 1 activity. Formerly KINE 402.

KINE 319. Introduction to Research Methods in Kinesiology. 4 units

Term Typically Offered: F, W

Prerequisite: STAT 217 or STAT 218.

Principles of reading and conducting research including contemporary research perspectives in kinesiology. Basic and applied research. Quantitative, qualitative, and mixed methods. 3 lectures, 1 laboratory.

KINE 323. Sport and Gender. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); completion of GE Area D1; and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs) or in GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Intersections between sport and gender in American society. Identification and discussion of the historical, sociological and psychological issues that affect the sport experiences of males and females, especially as they relate to class, race/ethnicity, sexuality, and political movements. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

KINE 324. Sports, Media and American Popular Culture. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Issues of class, race/ethnicity, gender, various forms of deviance, and other aspects of social life. Exploration of sociological manifestations and implications of how the aforementioned social issues are embedded in mediated forms of sports. 3 lectures, 1 activity. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

KINE 330. Group Fitness Instruction. 2 units

Term Typically Offered: TBD

Prerequisite: KINE 301.

Overview of basic components of group fitness classes in school, corporate and commercial fitness settings. Development of instructional competencies in the primary components of a group fitness class. Instructional techniques, professionalism, leadership styles conducive to promoting exercise adherence. Application of basic theory related to human anatomy, biomechanics, exercise physiology, training principles and use of relevant ACSM guidelines. 2 activities.

KINE 337. Early Fieldwork Experience. 1-3 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Junior standing.

Practical work experience in related activities of kinesiology under qualified supervision. Total credit limited to 9 units. Credit/No Credit grading only. Minimum of 2 laboratory hours per week per unit. Crosslisted as HLTH/KINE 337. Formerly KINE 437.

KINE 349. Exercise Testing and Prescription for Healthy Populations. 4 units

Term Typically Offered: F, W, SP

Prerequisite: KINE 303. Recommended: KINE 301.

Selected areas of health/fitness screening and evaluation. Application of components relevant to the development and administration of exercise programs for healthy persons regardless of sex, age, or functional capacity. 3 lectures, 1 laboratory. Formerly KINE 452.

KINE 366. Applied Sport Psychology. 3 units

Term Typically Offered: SP

Prerequisite: one of the following: PSY 201, PSY 202, or KINE 266.

Psychological considerations of the coach-athlete relationship and mental preparation of teams and individuals for competition and practice. Application of sport psychology principles to develop a psychological skills training program appropriate to enhance performance and well-being in sport or exercise contexts. Course offered in hybrid format with classroom-based and online learning. 3 lectures.

KINE 400. Special Problems for Advanced Undergraduates. 1-3 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing.

Individual investigation, research, studies, or surveys of selected problems. Total major credit limited to 4 units. Total credit limited to 6 units. Crosslisted as HLTH/KINE 400.

KINE 401. Managing Exercise, Health, and Sport Programs. 3 units

Term Typically Offered: F, SP

Prerequisite: One course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs); and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Planning, organizing and controlling programs in public, commercial, private and clinical exercise, health and sport program settings. Emphasis on legal, ethical and budgetary considerations. 3 lectures.

KINE 403. Biomechanics. 4 units

Term Typically Offered: F, W, SP

Prerequisite: KINE 301.

Fundamental biomechanical concepts and their application to human systems including examination of activities of daily living and performance settings. Examination of the effects of chronic and acute loading on the body. 3 lectures, 1 laboratory.

KINE 406. Neuroanatomy. 4 units

Term Typically Offered: SP

Prerequisite: BIO 231 and BIO 232; or ZOO 331 and ZOO 332, or BIO 361.

Structure and function of the human nervous system. Afferent and efferent pathways involved in perception and action. Behavioral aspects of motor control and related neurological dysfunction and pathologies. Designed for allied health professions students. 4 lectures.

KINE 408. Exercise and Health Gerontology. 3 units

Term Typically Offered: W, SP

Prerequisite: One of the following: KINE 250, KINE 255, or KINE 260; and KINE 304.

Special fitness, exercise, and health needs of elder adults. Theories of aging and age-related changes. Health and physical activity programs for elder adults. 3 lectures.

KINE 409. Interdisciplinary Study in Biomechanics. 4 units

Term Typically Offered: SP

Prerequisite: BMED 410 and CE 207 or CE 208; or KINE 403; or ME 326.

Examination of human motion biomechanics. Experimental and analytical methods in motion analysis based on rigid body dynamics. Protocols for protection of human subjects in research. Hypothesis-driven research in interdisciplinary teams, including written proposal development and written/oral communication of results to a scientific audience. 1 lecture, 3 activities. Crosslisted as BMED/KINE/ME 409.

KINE 412. Physical Activity and Public Health. 3 units

Term Typically Offered: SP

Prerequisite: CRP 214, HLTH 298, or KINE 319. Recommended: KINE 303.

Evaluation of scientific evidence supporting current physical activity guidelines for physical and mental well-being. Application of evidence-based strategies to promote physical activity at the individual, community, and policy levels. 3 lectures.

KINE 438. Adapted Physical Activity Fieldwork. 1-3 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: KINE 307.

Practical experience in adapted physical activity programming. Students plan and conduct physical activity programs for people who are disabled. Total credit limited to 6 units. Credit/No Credit grading only.

KINE 440. Kinesiology/Public Health Practicum. 1 unit

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Supervised experience involving organizational and instructional responsibilities in activity, lecture and/or laboratory classes. Total credit limited to 3 units. Crosslisted as HLTH/KINE 440.

KINE 445. Electrocardiography. 4 units

Term Typically Offered: F, W

Prerequisite: KINE 303.

Basic principles of electrocardiography, including practical skills of the ECG technician. Recognition of normal ECG patterns and abnormal changes related to rhythm disturbances, conduction defects, myocardial ischemia/infarction, and exercise. 3 lectures, 1 laboratory.

KINE 446. Echocardiography. 4 units

Term Typically Offered: SP

Prerequisite: KINE 445.

Basic principles of echocardiography, including practical skills of the echocardiographer. Recognition of normal echocardiographic patterns and abnormalities, including those caused by pathology and exercise conditioning. 2 lectures, 2 laboratories.

KINE 449. Exercise Prescription for Diseased and Special Populations. 3 units

Term Typically Offered: W, SP

Prerequisite: KINE 304; KINE 349; and KINE 445. Recommended: KINE 459.

Use of medical history, physical examination, laboratory and exercise testing data for establishment of appropriate exercise programs for clinical and special populations. Course offered in hybrid format with classroom-based and online learning. 2 lectures, 1 laboratory.

KINE 451. Nutrition for Fitness and Sport. 4 units

Term Typically Offered: F, W, SP

Prerequisite: one of the following: KINE 250, KINE 255 or KINE 260; KINE 303; and KINE 319. Recommended: FSN 210 and CHEM 313.

Application of nutritional and metabolic facts to selected aspects of physical training, diet manipulation and modification in sport, nutritional supplementation and special dietary considerations for the young and old, male and female athletes. Course may be offered in classroom-based or online format. 4 lectures.

KINE 454. Exercise Metabolism. 4 units

Term Typically Offered: F, W

Prerequisite: KINE 303; KINE 319; and CHEM 216 or CHEM 312.

Recommended: CHEM 313.

Advanced understanding of metabolic and endocrine responses to exercise. How exercise impacts storage, delivery, and fuel use required for energy conversion. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

KINE 459. Personal and Group Fitness Instruction. 3 units

Term Typically Offered: F, W, SP

Prerequisite: KINE 301; KINE 303; KINE 312.

Instructional competencies in the primary components of a group fitness class and individually tailored personal fitness programs. Instructional techniques, professionalism, leadership styles conducive to promoting exercise adherence. Application of basic theory related to human anatomy, motor learning, exercise physiology, training principles and relevant ACSM guidelines. 1 lecture, 2 activities.

KINE 460. Experiential Senior Project. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: HLTH 402 or KINE 319; completion of GE Area A with grades of C- or better; and senior standing.

A comprehensive applied capstone experience that integrates content from Kinesiology courses under faculty supervision. Projects must be approved by the supervising faculty member. Minimum 30 hours. Credit/No Credit grading only.

KINE 461. Senior Project Report. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: HLTH 402 or KINE 319; and completion of GE Area A with grades of C- or better.

A comprehensive synthesis of professional literature that integrates content from kinesiology courses resulting in a report. Topic must be approved by the instructor. Course may be offered in classroom-based or online format. 1 seminar.

KINE 462. Research Honors Senior Project. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: HLTH 402 or KINE 319; completion of GE Area A with grades of C- or better; and consent of instructor.

Completion of an advanced research, or creative project. Intended for students taking a significant or leadership role in a professional area. Results may be submitted for poster presentation or other public/professional forum. Total credit limited to 4 units.

KINE 463. Exercise Science and Health Promotion Fieldwork. 1-3 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Junior or senior standing and minimum GPA of 2.0.

Practical experience at an approved agency that provides exercise/fitness/health promotion programs. Students participate in program administration under the direct supervision of an approved on-site coordinator. Credit/No Credit grading only. Total credit limited to 3 units.

KINE 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

KINE 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

KINE 485. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 12 units. Credit/No Credit grading only.

KINE 495. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 24 units. Credit/No Credit grading only.

KINE 500. Independent Study. 1-3 units

Term Typically Offered: F, W, SP

Prerequisite: KINE 517, graduate standing, and consent of instructor.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Only 6 units may be applied to degree requirements.

KINE 501. Evaluation of Literature and Current Trends in Kinesiology. 3 units

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Analysis and evaluation of published studies and current trends in kinesiology. 3 seminars.

KINE 503. Current Health Issues. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Current issues and trends in health, disease prevention, and the healthcare system. Socioeconomic, biologic, environmental, institutional and policy factors that influence health status, disparities in health, and positive health outcomes. 4 seminars.

KINE 504. Advanced Pathophysiology and Exercise. 3 units

Term Typically Offered: TBD

Prerequisite: graduate standing. Recommended: KINE 303 or equivalent.

Selected human diseases, their etiology, pathophysiology, symptoms, diagnosis, effects on health and physical performance, and as affected by preventive or therapeutic exercise. 3 lectures.

KINE 505. Introduction to Issues, Ethics and Policies in Teaching Kinesiology. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing.

Knowledge, skills, preparation and support for teaching Kinesiology activity and laboratory classes in the department. Prepares students to be supervisors and teachers in their current or future employment. Credit/No Credit grading only. 1 seminar, 1 activity.

KINE 510. Advanced Health Behavior Change Programs. 3 units

Term Typically Offered: TBD

Prerequisite: KINE 503 or KINE 504 and graduate standing.

Examination of contemporary research, theory and practice related to facilitating healthy behavior change. Analysis of health problems from biological, ecological, and psycho-social perspectives with emphasis on understanding the acquisition and maintenance of healthy behavior. 3 seminars.

KINE 511. Administration in Exercise and Health Settings. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Principles and techniques of administration in health, physical activity, and academic settings including budget, personnel supervision, risk management, leadership techniques, and facility management. 4 seminars.

KINE 517. Research Methods in Kinesiology. 4 units

Term Typically Offered: TBD

Prerequisite: KINE 501. Recommended: STAT 512 or STAT 513.

Quantitative, qualitative and mixed methods approaches to research in kinesiology. Selection of adequate problems for investigation; various sampling techniques and analyses; use of library facilities; manuscript requirements for the thesis. 4 seminars.

KINE 518. Research Prospectus and Proposal Writing. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: KINE 517.

Strategies for identifying academically valid research topics. Planning considerations for qualitative and quantitative research including grant writing, human subjects review, personnel, equipment, and timelines. Design and composition of effective research proposals. Credit/No Credit grading only. 2 seminars.

KINE 522. Advanced Biomechanics. 4 units

Term Typically Offered: TBD

Prerequisite: KINE 403.

Advanced biomechanical concepts applied to human movement, examination of research, and biomechanical analyses of movement activities. Performance, occupational, and clinical settings. Laboratory techniques including motion analysis, force platform, and electromyography. 3 seminars, 1 laboratory.

KINE 525. Advanced Motor Learning and Control. 3 units

Term Typically Offered: TBD
Prerequisite: KINE 402 or equivalent.

Analysis of control theories, research principles and motor learning variables involved in the acquisition of skilled movement with an emphasis on the behavioral level of learning. 3 seminars.

KINE 526. Advanced Sport and Exercise Psychology. 3 units

Term Typically Offered: TBD
Prerequisite: Graduate standing.

Theoretical and professional issues in the psychological foundations of sport and exercise. 3 seminars.

KINE 530. Advanced Physiology of Exercise. 4 units

Term Typically Offered: TBD
Prerequisite: KINE 303 and graduate standing.

Physiological determinants of physical work capacity and sports performance. 3 seminars, 1 laboratory.

KINE 536. Advanced Electrocardiography. 4 units

Term Typically Offered: TBD
Prerequisite: KINE 445.

Theory and application of electrocardiography and other techniques for cardiovascular assessment and treatment of cardiac disease and other abnormalities. 3 seminars, 1 laboratory.

KINE 537. Internship. 3-12 units

Term Typically Offered: TBD
CR/NC
Prerequisite: Graduate standing; consent of instructor.

Supervised work experience in an approved wellness/fitness clinical facility, school, or other faculty approved setting. Total credit limited to 12 units. Maximum of 6 units may be applied toward Master of Science in Kinesiology. Credit/No Credit grading only.

KINE 539. Effective Practice in Teaching and Coaching. 3 units

Term Typically Offered: TBD
Prerequisite: Graduate standing.

Observation and analysis of teaching physical education and coaching sports with special emphasis in pedagogical systems. 2 seminars, 1 laboratory.

KINE 570. Selected Advanced Topics. 4 units

Term Typically Offered: TBD
Prerequisite: Graduate standing.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

KINE 581. Graduate Seminar in Kinesiology. 1-3 units

Term Typically Offered: TBD
Prerequisite: Graduate standing.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 6 units. 1 to 3 seminars.

KINE 585. Cooperative Education Experience. 6 units

Term Typically Offered: TBD
CR/NC
Prerequisite: Graduate standing.

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only.

KINE 599. Thesis or Project. 1-6 units

Term Typically Offered: TBD
Prerequisite: KINE 517, KINE 518 and consent of instructor.

Completion of a thesis or project pertinent to the field of kinesiology. Independent research under the guidance of the faculty.

Landscape Architecture (LA)

undefined

LA Courses

LA 101. Introduction to Landscape Architecture. 4 units

Term Typically Offered: F
Introduction to the profession of landscape architecture and orientation to the department curriculum and learning processes. 4 lectures.

LA 170. Principles of Design Communication. 4 units

Term Typically Offered: F, SP
Overview of design communications for landscape architects incorporating the principles, techniques, skills and tools used in design generation, exploration, review and implementation. 4 laboratories.

LA 171. Principles of Digital Communication. 4 units

Term Typically Offered: W
Introduction of digital media applications, software and techniques for landscape architects. Principles, techniques, skills and tools for using digital media in design projects. 4 lectures.

LA 202. Design Fundamentals I. 4 units

Term Typically Offered: F, SP
Corequisite: LA 170.

Introduction to the principles, methods and elements of two- and three-dimensional design in order to communicate intended concepts and meanings. Exploration of the basic design elements including composition, design process and the creation of spatial settings. 4 laboratories.

LA 203. Design Fundamentals II. 4 units

Term Typically Offered: F, W
Prerequisite: LA 202. Corequisite: LA 241 or LA 243.

Continuation of ideas introduced in LA 202 with the introduction of environmental and visual perception, including three-dimensional site design and landscape architectural design principles. Spatial design and sequencing of space with concern for human behavioral, environmental and natural site factors and generation of program, concept and design development. 4 laboratories.

LA 204. Design Fundamentals III. 4 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: LA 203, LA 241. Concurrent: LA 242.

Continuation of ideas introduced in LA 202 and LA 203 with the introduction of the principles of design theory, landscape ecology and technical applications. Problems of increasing complexity incorporate critical and creative problem solving, the relationship of aesthetics, response to human needs and design for sustainable environments. 4 laboratories.

LA 211. History of Landscape Architecture: Ancient Civilizations through Colonial America. 4 units

Term Typically Offered: W, SU

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Philosophies and ethics of important personalities and events of landscape architecture explored from recorded time through colonial America. Design theories support projects and individuals of their practice combined with influential events in industry, the arts and sciences, politics, and society. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

LA 212. History of Modern and Contemporary Landscape Architecture. 4 units

Term Typically Offered: F, SP, SU

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Philosophies and ethics of important personalities explored through the twentieth and twenty-first centuries of landscape architecture. Design theories supporting these individuals' projects and the nature of their practice combined with the influential events in industry, the arts and sciences, politics, and society. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

LA 218. Introduction to Geographic Information Systems (GIS). 3 units

Term Typically Offered: TBD

Learn the fundamental concepts and functions of Geographic Information Systems (GIS) using ArcGIS platform. Create, manage, analyze, and display geographically referenced data. Explore how GIS is applied to analyze environmental, social, and natural resource issues. 1 lecture, 2 laboratories. Crosslisted as LA/NR 218.

LA 220. Landscape Ecology: Concepts, Issues, and Interrelationships. 4 units

Term Typically Offered: W

2020-21 or later catalog: GE Area B2

Sustainability Focused

Recommended: BIO 114, BOT 121, and LA 101.

Concepts, theories and techniques related to landscape analysis, ecology, planning and design with an emphasis on landscape assessment, sustainability, land health, environmental protection and restoration, and natural resource management. 4 lectures. Fulfills GE Area B2.

LA 221. California Plants and Plant Communities. 4 units

Term Typically Offered: SP

Prerequisite: BIO 114 or BOT 121.

Introduction to the horticultural characteristics and landscape design potential of California native plants, California plant communities and associated vernacular plants. Includes experience in field identification, basic planting design, installation techniques and maintenance requirements. Required field trips. 2 lectures, 2 laboratories.

LA 241. Site Engineering Techniques and Applications. 4 units

Term Typically Offered: W

Prerequisite: LA 243. Corequisite: LA 203 and MATH 118.

Introduction and application of the techniques, methods, principles and criteria for site engineering and landform design. Includes an introduction to soil science, survey methods, and experiences in the principles, procedures and application of site grading and drainage for landscape architecture. 4 laboratories.

LA 242. Implementation Strategies. 4 units

Term Typically Offered: SP

Prerequisite: LA 203, LA 241. Concurrent: LA 204.

Introduction and application of the methods, principles and criteria for landscape implementation. Encompasses fundamental design and technical decisions common to landscape architectural design and construction projects including the development of concept, design development and working drawings, and construction management process. 3 lectures, 1 activity.

LA 243. Materials and Techniques of Landscape Construction. 4 units

Term Typically Offered: F

Sustainability Focused

Corequisite: LA 202.

Introduction to the properties, uses and inherent qualities of the fundamental materials of landscape architectural concerns and associated construction techniques and processes. Materials and techniques explored as a source of design ideas, form and expression in landscape architecture. 3 lectures, 1 activity.

LA 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

LA 317. The World of Spatial Data and Geographic Information Technology. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Foundation for understanding the world through geographic information as well as the tools available to utilize spatial data. Experience with Geographic Information Systems (GIS) and related technology. Not open to students with credit in GEOG 218 or LA/NR 218. 3 lectures, 1 activity. Crosslisted as LA/NR 317. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

LA 320. Design Theory for Landscape Architects. 4 units

Term Typically Offered: F

Prerequisite: LA 211, LA 212, or consent of instructor.

Complements the material and knowledge presented in the history of landscape architecture, architecture and art courses. Design theory and associated concepts as they are related to landscape architecture. Literature research and analysis of completed design projects. The artists/designers, materials and overall expressions of work are related to the social and economic issues of the time as well as their associations with the other arts and sciences. 4 lectures.

LA 330. Cultural Landscapes: People, Places and Ethical Decisions. 4 units

Term Typically Offered: SP

Sustainability Related

Prerequisite: LA 212.

Investigation of the complexities and interrelatedness of culture, environment and ethical decisions. Interpretation of personal and cultural values and ethics in terms of decisions made and behaviors and actions expressed in the built landscape. 4 lectures.

LA 349. Advanced Planting Design. 4 units

Term Typically Offered: SP

Prerequisite: PLSC 233; PLSC 234; and PLSC 381 or LA 221.

Advanced examination of the theories and applied principles of planting design. Emphasis on connections between art and science in the design of parks, gardens and other landscapes. Case studies and field trips. 2 lectures, 2 activities.

LA 350. Advanced Landscape Construction. 4 units

Term Typically Offered: SP

Prerequisite: LA 242.

Examination and application of advanced landscape construction techniques. Emphasis on design, development, construction, and testing of contemporary landscape technologies and practices. Field trip may be required. 2 lectures, 2 laboratories.

LA 370. Professional Practice. 4 units

Term Typically Offered: W

Prerequisite: LA 204.

Issues related to the practice of landscape architecture incorporating processes, procedures and outcomes of professional practice. Topics include professional ethics, business and legal aspects of the profession, relationships to the client and society, personal goal setting, resume and portfolio preparation. 4 lectures.

LA 371. Internship. 3 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Third year standing in Landscape Architecture.

Involvement in a work setting related to landscape architecture. Thirty hours work experience per unit of credit. Credit/No Credit grading only.

LA 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

LA 401. Research Project. 2 units

Term Typically Offered: F, SP

Prerequisite: Completion of four design focus studios (16 units from LA 402 - LA 405).

Research methods in landscape architecture and proposal writing techniques. Students prepare proposal and strategy for fifth year study in area of concentration. 2 seminars.

LA 402. Design Theory and Exploration Focus Studio. 4 units

Term Typically Offered: F, W, SU

Prerequisite: Junior standing; LA 204; LA 211; and LA 212; or consent of instructor. Concurrent: Integrated Learning Course (ILC) of student's option.

Exploration and application of design theory, exploratory design process and form exploration to design and planning projects. Emphasis on incorporation of inquiry techniques based on the synthesis of interdisciplinary frameworks of art and design theory with historical and cultural issues. Total credit limited to 12 units. 4 laboratories.

LA 403. Natural Environments Design Focus Studio. 4 units

Term Typically Offered: W, SP

Sustainability Focused

Prerequisite: Junior standing; LA 204; LA 211; LA 212; LA 220; LA 402; and LA 405; or consent of instructor. Concurrent: Integrated Learning Course (ILC) of student's option.

Assessment, exploration and integration of landscape ecology, sustainability and environmental planning to design and planning projects. Emphasis on interpretation and application of environmental and ecological issues at a range of design scales. Total credit limited to 12 units. 4 laboratories.

LA 404. Cultural Environments Design Focus Studio. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing; LA 204; LA 211; LA 212; LA 402; and LA 405. Concurrent: Integrated Learning Course (ILC) of student's option.

Assessment, exploration and interpretation of cultural values, issues and landscapes to design and planning projects. Emphasis on observation and inquiry of diverse cultural settings, differences in cultural values and personal ethics in the design process. Total credit limited to 12 units. 4 laboratories.

LA 405. Project Design and Implementation Focus Studio. 4 units

Term Typically Offered: F, W

Prerequisite: Junior standing; LA 204; LA 243; LA 242; and LA 241; or consent of instructor. Concurrent: Integrated Learning Course (ILC) of student's option.

Development, exploration and integration of project design and implementation strategies to design and planning projects. Emphasis on creative and exploratory problem solving, spatial design, project resolution, and graphic communication. Total credit limited to 12 units. 4 laboratories.

LA 406. Interdisciplinary Design Studio. 4 units

Term Typically Offered: W, SP

Prerequisite: Junior standing; LA 402; LA 403; LA 404; and LA 405; or consent of instructor. Concurrent: Integrated Learning Course (ILC) of student's option.

Design studio with focus on interdisciplinary modes of practice and collaborative approaches to design. Interdisciplinary design process may be explored through project program and collaboration with students in allied majors. Field trip required. Total credit limited to 12 units. 4 laboratories.

LA 431. CAD and Digital Media Communications (ILC). 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing; LA 170 and LA 204; or consent of instructor.

Integrated Learning Course (ILC) to assist integration and application of computer-aided drafting (CAD) skills in coursework, project planning and design studio courses. Focus on CAD skills and integration of digital media. Total credit limited to 12 units. 4 activities.

LA 432. Landscape Ecology Applications (ILC). 4 units

Term Typically Offered: F, W, SP

Sustainability Focused

Prerequisite: Junior standing. Co-requisite: LA 220. Concurrent: Design Focus Studio of student's option.

Integrated Learning Course (ILC) to assist integration and application of landscape ecology principles in project planning and design studio courses. Focus on understanding and developing a framework for ecological planning and design to anticipate consequences of planning and design decisions. Total credit limited to 12 units. 4 activities.

LA 433. Cultural Environments (ILC). 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior Standing and LA 211. Concurrent: Design Focus Studio of student's option.

Integrated Learning Course (ILC) to assist integration and application of culture, environment and personal ethics in coursework, project planning and design studio courses. Focus on skills, distinctions and integration of analyzing the cultural landscape, understanding diverse cultural values and assessing personal ethics. Total credit limited to 12 units. 4 activities.

LA 434. Project Design and Implementation (ILC). 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing; LA 241; LA 242; and LA 243; or consent of instructor. Concurrent: Design Focus Studio of student's option.

Integrated Learning Course (ILC) to assist integration and application of project design principles and implementation strategies in project planning and design studio courses. Focus on skills, techniques and decisions of the design, documentation and construction processes. Total credit limited to 12 units. 4 activities.

LA 435. Professional Practice (ILC). 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing. Concurrent: Design Focus Studio of student's option.

Integrated Learning Course (ILC) to assist integration and application of professional practice principles and techniques in planning and design studio and internship courses. Focus on achieving a high level of professional quality, ethical concern, and legal responsibility in project work. Total credit limited to 12 units. 4 activities.

LA 436. Traditional and Digital Media Communications (ILC). 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing; LA 170; LA 202; LA 203; and LA 204; or consent of instructor. Concurrent: Design Focus Studio of student's option.

Integrated Learning Course (ILC) to assist integration and application of graphic communication and presentation skills in coursework, project planning and design studio courses. Focus on skills, distinctions and integration of traditional and digital media explorations. Total credit limited to 12 units. 4 activities.

LA 437. 3D Digital Design Communications (ILC). 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing; LA 170 and LA 204; or consent of instructor. Concurrent: Design Focus Studio of student's option.

Integrated Learning Course (ILC) to assist integration and application of 3D digital graphic communication and presentation skills in coursework, project planning and design studio courses. Focus on skills and integration of three-dimensional digital media explorations. Total credit limited to 12 units. 4 activities.

LA 438. GIS Application to Design Projects (ILC). 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing. Corequisite: LA 220. Concurrent: Design Focus Studio of student's option.

Integrated Learning Course (ILC) to assist integration and application of geographic information systems (GIS) and spatial information into focus design studio courses. Total credit limited to 12 units. 4 activities.

LA 439. Planting Design (ILC). 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing; and AEPS 381 or LA 221. Concurrent: Design Focus Studio of student's option.

Integrated Learning Course (ILC) to assist the integration and application of plant selection, use and appropriateness in planning and design studio courses. Focus is on the skills, theories and principles of planting design. Total credit limited to 12 units. 4 activities.

LA 461. Senior Design Project Focus Studio. 4 units

Term Typically Offered: F, W, SP

Prerequisite: LA 401; and completion of Design Focus Sequence (20 units from LA 402-LA 406).

Comprehensive landscape architectural design and research project showing professional level competency in the integration of design theory, landscape architectural principles and project resolution. Emphasis on creative resolutions, organization and communication skills and technical abilities in program generation, design process, design and research. Total credit limited to 8 units. 4 laboratories.

LA 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

LA 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

LA 482. Evaluating Social and Behavioral Factors for Open Space Design. 4 units

Term Typically Offered: TBD

Prerequisite: Fourth-year or graduate standing.

User oriented approach to open space design. Interview and survey techniques, behavioral trace mapping and systematic observation, post occupancy evaluation and similar methods are used to generate user input and feedback in the design process. Understanding the behavioral implications of designed environments. 2 lectures, 2 activities.

LA 483. Special Studies in Landscape Architecture. 1-12 units

Term Typically Offered: TBD

Prerequisite: Fourth or fifth-year standing or graduate standing.

Special issues and problems through research, field trips, seminars and other forms of investigation and involvement. Course requirements are determined prior to each individual project through a contractual agreement between students and department. Departmental Off Campus Study Program guidelines apply. Total credit limited to 36 units. 1-12 activities.

LA 485. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Fourth or fifth-year standing or graduate standing, or consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 18 units. Credit/No Credit grading only.

LA 495. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Fourth or fifth-year standing or graduate standing, and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 24 units. Credit/No Credit grading only.

LA 520. Design with Cultural Landscapes. 4 units

Term Typically Offered: W

Sustainability Related

Prerequisite: LA 330 and LA 404; or graduate standing.

Examination of the designed landscape as a representation of culture. Analysis of historic and contemporary sites. Investigation of the value and interpretation of both rural and urban landscapes, broadening an understanding of cultural landscapes. Field trip required. 2 lectures, 2 laboratories.

LA 521. Ecological Urban Design. 4 units

Term Typically Offered: W

Sustainability Focused

Prerequisite: LA 403, LA 432, or graduate standing.

Examination of cities as ecosystems, urban ecology theories, concepts, and techniques at the site scale. History and theory of ecological urban design, ecosystem services, and how they are implemented for resilience. Field trip required. 2 lectures, 2 laboratories.

LA 531. Information Graphics for Landscape and Urban Studies. 4 units

Term Typically Offered: W, SP

Prerequisite: CRP 512; or LA 436 and LA 437; or graduate standing.

Conversion of raw sets of data into compelling narrative presentations that are communicated visually and effectively to specific design and planning audiences. Development of strategies for interpreting, packaging and shaping data for data storytelling, data visualization and effective communication. 2 lectures, 2 laboratories.

LA 538. Advanced GIS Application to Projects. 4 units

Term Typically Offered: W

Prerequisite: CRP 457, CRP 512, LA 438, or graduate standing.

Integration and application of GIS skills to planning and design projects. Emphasis on the analytical thinking process, visualization of various GIS data, and site analysis development for projects. 2 lectures, 2 laboratories.

LA 585. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only.

LA 595. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

Liberal Arts and Engineering Studies (LAES)

undefined

LAES Courses

LAES 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

LAES 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

LAES 301. Project-Based Learning in Liberal Arts and Engineering Studies. 4 units

Term Typically Offered: F, SP

Prerequisite: MATH 241; PHYS 132; PHYS 133; and GE Area A with grades of C- or better.

Examination of how to define LAES as a new field of study; analysis of the creative process and team building in theory and in application. Researching, writing, revising and presenting a technical proposal suitable for submission to a national design competition seeking innovative solutions to complex technological/social problems. 2 seminars, 2 activities.

LAES 302. Advanced Project-Based Learning in Liberal Arts and Engineering Studies. 4 units

Term Typically Offered: F, SP

Prerequisite: LAES 301.

Teamwork and leadership in project-based learning. Students lead, build, and maintain project teams; guide the creative process; and use and evaluate the principles of project management in theory and practice. Development of a technical proposal suitable for submission to a national design competition seeking innovative solutions to complex technological/social problems. 2 seminars, 2 activities.

LAES 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

LAES 411. Technology and Community Engagement. 4 units

Term Typically Offered: W, SP

Prerequisite: Completion of GE Area A with grades of C- or better; and sophomore standing.

Onsite work with community and design team to develop and evaluate the use of innovative technologies as tools for community development and empowerment. Through guided discussion with instructor, guests, and community members, work through intercultural collaboration and design issues, conduct qualitative and quantitative research, and present works-in-progress. Field trip may be required. Total credit limited to 8 units. 4 lectures. Crosslisted as ISLA/LAES 411.

LAES 430. Internship. 2-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Approval of area chair, junior standing, and a CPSLO cumulative GPA of at least 2.5 without being on academic probation.

Work experience in business, industry, government and other areas of student career interest. Periodic written progress reports, final report, and evaluation by work supervisor required. Credit/No Credit grading. Total credit limited to 12 units.

LAES 461. Senior Project in Liberal Arts and Engineering Studies. 4 units

Term Typically Offered: F, W, SP

Prerequisite: LAES 302; senior standing; and permission of instructor.

Under faculty supervision, the selection and completion of a senior project, demonstrating an interdisciplinary focus in LAES. With one-on-one format with the instructor, individual or small group work through many iterations of the senior project, with occasional showing of works in small student groups.

LAES 462. Capstone Senior Seminar in Liberal Arts and Engineering Studies. 4 units

Term Typically Offered: F, W, SP

Prerequisite: LAES 461.

The final refinement and completion of LAES senior projects and other projects. In a development workshop format, presentation of final versions of works-in-progress to combined faculty and professional review committees throughout the quarter.

LAES 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

LAES 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

LAES 485. Cooperative Education Experience. 6 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 18 units. Credit/No Credit grading only.

LAES 495. Cooperative Education Experience. 12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Major credit limited to 6 units; total credit limited to 24 units.

Liberal Studies (LS)

undefined

LS Courses

LS 201. Orientation to Liberal Studies. 1 unit

Term Typically Offered: F

Career and academic planning, co-curricular, extra-curricular opportunities, and pathway into a K-8 teaching profession. Academic policies and procedures, goal settings, elements of career in education, and other topics relevant to student and professional success. Intended for new students in the Liberal Studies major. Not open to students with credit in LS 101. 1 activity.

LS 211. Visual Arts in the Elementary Classroom. 4 units

Term Typically Offered: F, W, SP

Theory, aesthetics, appreciation and applications of visual arts, through multiple two dimensional art strategies, as related to educational processes for the elementary classroom. Focus on elements, principles of design while fostering artistic perception. One Saturday field trip required. 3 lectures, 1 laboratory.

LS 214. Constitutional Issues in the History of U.S. and California Education. 4 units

Term Typically Offered: F, W, SP

Examination of U.S. and California constitutions, significant legislation, and court cases affecting public education from the colonial period to the present. Overview of contributions by individuals of historical, national, and international educational significance. Examination of landmark decisions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

LS 230. Field Experience in the Elementary Classroom I. 2 units

Term Typically Offered: F, W, SP

Current practices and issues in elementary education, including teacher compensation, cultural impact on schools, time and classroom management, English learners, and the affective aspect of teaching. In addition to class time, 24 hours of K-6 structured observation is required. 2 activities.

LS 250. Field Experience in the Elementary Classroom II. 2 units

Term Typically Offered: F, W, SP

Overview of current practices and issues in elementary education, including components of effective teaching, motivating students, diagnostic/prescriptive teaching, curriculum, and accountability. In addition to class time, 24 hours of structured observation and participation in K-6 public schools is required. 2 activities.

LS 255. Children's Literature in a Diverse Society. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

Prerequisite: Completion of GE Area A with grades of C- or better.

Culturally diverse children's literature with a focus on analysis and evaluation of literary elements and structures, critical perspectives, trends, and issues. A wide range of authors, genres and formats including folktales, fantasy, poetry, informational, historical and realistic fiction books. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as ENGL/LS 255. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

LS 290. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

LS 301. Liberal Studies Career Preparation. 1 unit

Term Typically Offered: F, SP

Prerequisite: Junior standing and LS 201.

Overview of ethical, legal, and historical issues in education; major foundational philosophies in American public education. Career pathways in education, targeted advising, portfolio building and professional goals and opportunities. Not open to students with credit in LS 101. 1 activity.

LS 305. Project Based Learning in STEM Education. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Extended collaborative study of a question or problem in STEM using a Project Based Learning (PBL) environment; includes consideration of the educational framework and principles of PBL. Topics will have an engineering design component that will require application of mathematics, technology, and science. The Class Schedule will list topic selected. Total credit limited to 4 units. Credit/No Credit grading only. 2 activities.

LS 310. Storytelling: Modern Applications of Traditional Narrative. 4 units

Term Typically Offered: W, SP

Prerequisite: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

Techniques for selection, preparation and presentation of traditional folktales and myths for an audience. Discussion of theatrical and storytelling techniques. Applications of storytelling in teaching and organizations; theory and history of folk literature and mythology. 4 lectures.

LS 350. Identity and Equity in American Schools. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D with a grade of C- or better or consent of instructor. Recommended: ES 112, HIST 206, HIST 207, SOCS 111, or WGS 201.

Interdisciplinary examination of school, family, and community relationships, at the school and classroom level. Role of teachers' and students' intersectional identities in school achievement, disciplinary, and life-course outcomes. The school-to-prison-to-deportation pipeline. Educational equity and related issues. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

LS 370. Performing Arts in the Elementary Classroom. 4 units

Term Typically Offered: F, W, SP

Prerequisite: LS 211 and GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs). Recommended: LS 310.

Current theory and practice of standards based performing arts with an emphasis on the use of music, theater, media arts and dance, as discrete disciplines with historical and cultural context in the classroom. Attendance at outside performances required. 4 lectures.

LS 380. Education Apprenticeship. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Junior standing and consent of instructor.

Structured application of subject matter content in schools and informal educational settings. Topics include: Arts, English, Science, Mathematics, History/Social Studies, Physical Education and Health, Interdisciplinary K-8 Education, and Animal-Assisted Education in Schools. The Class Schedule will list topic selected. Participation in public schools requires mandated fingerprint clearance. Total credit limited to 4 units. Credit/No Credit grading only. 2 activities.

LS 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor, junior standing.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

LS 411. Advanced History/Social Sciences Integration for the K-8 Classroom. 4 units

Term Typically Offered: TBD

Prerequisite: One course in GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); HIST 208; LS major; and senior standing.

Analysis and practice of history and social sciences knowledge and skills to facilitate K-8 learning through identifying major themes and questions. The use of inquiry, assessment, curriculum integration, and technology to connect discipline specific content to contemporary social issues. 3 seminars, 1 activity.

LS 412. Advanced Arts Integration for the K-8 Classroom. 4 units

Term Typically Offered: W, SP

Prerequisite: LS 211 and senior standing.

Analysis and practice of Arts knowledge and skills to facilitate K-8 learning through identifying major themes and questions. The use of inquiry, assessment, curriculum integration, and technology to connect discipline specific content to contemporary social issues. Field trips required. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

LS 413. Advanced Science/Engineering Integration for the K-8 Classroom. 4 units

Term Typically Offered: F

Prerequisite: PSC 103; BIO 211; LS 250; MATH 328; and junior standing.

Recommended: MATH 329.

Analysis and practice of science and engineering knowledge and skills to facilitate K-8 learning through identifying major themes and questions. Use of inquiry, assessment, curriculum integration, and technology to connect discipline specific content to contemporary social issues. 3 lectures, 1 activity.

LS 461. Senior Project Seminar. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing, completion of GWR or consent of instructor.

Examination of issues in education of state, national and international concern. Students prepare presentations and conduct individual research and analysis of selected problems. Substantial research paper required. 4 seminars.

LS 462. Senior Project Research. 2-4 units

Term Typically Offered: TBD

Prerequisite: Senior standing; completion of GWR; LS 410 or LS 411 or LS 412.

Application of content and theory to the educational experience of one specific subject matter area in the Liberal Studies program. Total credit limited to 4 units.

LS 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

Marine Science (MSCI)

undefined

MSCI Courses

MSCI 100. Orientation to Marine Sciences. 1 unit

Term Typically Offered: F

CR/NC

Prerequisite: Marine Sciences major.

Introduction to Marine Sciences faculty, the Biology Department and campus resources, research opportunities, possible careers, studying science, and current topics in marine sciences. Credit/No credit grading only. 1 lecture.

MSCI 111. Survey of Marine Biology. 4 units

Term Typically Offered: W

2020-21 or later catalog: GE Area B2

2019-20 or earlier catalog: GE Area B2

Sustainability Focused

Marine organisms and their adaptations to the ocean. Focus on select marine ecosystems including coastal ecosystems. Interaction between humans and the sea. Topics include effects of ocean acidification and pollution, climate change, and loss of marine biodiversity. Not open for major credit in Biological Sciences, Marine Sciences, or Microbiology. 4 lectures. Fulfills GE Area B2.

MSCI 300. Marine Ecology. 4 units

Term Typically Offered: F, W

Prerequisite: BIO 160, BIO 162, and BIO 263. Recommended: STAT 218.

Introduction to the functional biology of marine plants and animals and the ecological processes that underlie their distribution and abundance in open oceans, coastal regions, and estuaries. Field trips required. 2 lectures, 2 laboratories. Formerly MSCI 328.

MSCI 301. Biological Oceanography. 3 units

Term Typically Offered: F

Prerequisite: BIO 160; BIO 161; BIO 263; CHEM 129; MSCI 300; PSC 201; and STAT 218.

Interdisciplinary study of marine organisms, how they interact with each other and their physical, chemical and geological environment. Emphasis on how these interactions impact abundance, diversity and temporal and spatial distributions. 3 lectures.

MSCI 324. Marine Mammals, Birds and Reptiles. 4 units

Term Typically Offered: W

Prerequisite: BIO 162; BIO 263; and STAT 218.

Introduction to the biology, ecology and evolution of mammals, reptiles and birds of the marine environment, with an emphasis on Central California species, diversity patterns, evolutionary relationships, adaptations to the ocean, and conservation issues. Field trips required. 2 lectures, 2 laboratories.

MSCI 330. Technologies for Ocean Discovery. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: Introductory statistics course.

Survey of ocean sensor systems and emerging technologies that provide new understanding of the ocean. Current issues in marine science. Social context, societal implications of discoveries in ocean sciences. Field trip required. Not open for major credit in Biological Sciences, Marine Sciences or Microbiology. Not open to students with credit in MSCI 403. 3 lectures, 1 activity. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

MSCI 401. Marine Science Outreach. 1-2 units

Term Typically Offered: F, W, SP
CR/NC

Prerequisite: MSCI 300 or MSCI 301 or PSC 201; Junior standing and consent of instructor.

Volunteer or internship experience in a marine science business, industry, government agency or informal science center. Positions require communicating science to the public. Formal report and evaluation by work supervisor required. Major credit limited to 4 units. Total credit limited to 8 units. Credit/No credit grading only.

MSCI 403. Ocean Sampling Techniques. 4 units

Term Typically Offered: F
Prerequisite: CHEM 302; MSCI 301; PSC 201; and STAT 218.

Introduction to techniques in oceanography and marine sciences. Hands-on technical training in sampling, measuring, tagging and tracking of bathymetry and geography; waves, tides and currents; salinity, temperature and pressure; dissolved oxygen and pH; irradiance and light scattering; phytoplankton and zooplankton; and benthic fauna and marine macrofauna. 2 lectures, 2 laboratories. Formerly MSCI 303.

MSCI 410. Scientific Diving. 3 units

Term Typically Offered: SU
Prerequisite: BIO 263, open water diving certificate, and instructor consent. Recommended: MSCI 300 or MSCI 301.

Advanced training in scientific methods associated with practical training in scuba diving. Satisfies American Academy of Underwater Sciences standards. Combination of theory, techniques and scuba diving. Experience collecting data and handling scientific equipment underwater. AAUS certification will require additional assessments outside of class. Field trips and additional fee required. 1 lecture, 2 labs.

MSCI 428. Marine Conservation and Policy. 4 units

Term Typically Offered: W
Sustainability Focused
Prerequisite: BIO 160 and BIO 263; and BIO 327 or BIO 363 or BIO 401 or BOT 326 or MSCI 300; or Graduate standing in Biological Sciences. Recommended: PSC 201.

Examination of how science and policy are used to evaluate and implement marine conservation and resource management. Topics include endangered species, fisheries, climate change, marine protected areas, research and conservation topics and developing policy for management decision-making. Field trip required. 3 lectures, 1 laboratory.

MSCI 437. Marine Botany. 4 units

Term Typically Offered: W
Prerequisite: Junior standing and BIO 162.

Comprehensive examination of the ecology, life histories, functional morphology, physiology, and taxonomy of marine algae and marine plants. Laboratory emphasizes species endemic to the central coast of California. Course offered in hybrid format with classroom-based and online learning. 3 lectures, 1 laboratory.

MSCI 438. Aquaculture. 4 units

Term Typically Offered: F
Prerequisite: BIO 160, BIO 162, and BIO 263.

Propagation and rearing of fishes, invertebrates and algae from marine, freshwater, and estuarine habitats. Current methodologies and general life histories. Global perspective including aquacultural development in developed and developing countries. 3 lectures, 1 laboratory.

MSCI 439. Fisheries Science and Resource Management. 4 units

Term Typically Offered: SP
Sustainability Focused
Prerequisite: BIO 162 and MSCI 300. Recommended: BIO 322.

Scientific investigation of marine and freshwater fisheries. Methodologies and quantitative strategies for study of finfish and invertebrates. Role of oceanographic or limnological processes on stock maintenance. Impact of human exploitation on maintenance of sustainable yields, including user-group conflict issues, and regional/global controversies. Lab/field protocols, basic fisheries statistical procedures, molecular methods, computer simulations. Field trip required. 3 lectures, 1 laboratory.

MSCI 440. Communicating Ocean Sciences to Informal Audiences. 3 units

Term Typically Offered: F
Prerequisite: Junior standing; BIO 322, BIO 336, MSCI 300, or PSC 201; completion of GE Area A with grades of C- or better; and GE Area B2 or BIO 211.

Simultaneous focus on developing a knowledge of ocean sciences and the advanced educational approaches for communicating that knowledge. Teaching skills developed through coursework, outreach events and design of collaborative projects at museums and aquariums. Primary objective is to learn how to present ocean-themed hands-on, inquiry-based science exhibits, in order to improve the scientific literacy of audiences of all ages. Field trip required. 1 lecture, 2 activities.

Materials Engineering (MATE)

undefined

MATE Courses

MATE 110. Introduction to Materials Engineering Design I. 1 unit

Term Typically Offered: F
Sustainability Related
Prerequisite: MATE majors only.

Laboratory work in teams to design, build and test a product. Material from math, science and engineering courses tied together. 1 laboratory.

MATE 120. Introduction to Materials Engineering Design II. 1 unit

Term Typically Offered: W
Sustainability Related
Prerequisite: MATE 110.

Second design laboratory, working in teams to design, build and test a complex system that benefits humanity. Focus on complete design process including project management, documentation in design, manufacturing techniques, and analysis of testing data. Issues of engineering ethics, technology and society, the environment and sustainability also studied. 1 laboratory.

MATE 130. Introduction to Materials Engineering Design III. 1 unit

Term Typically Offered: TBD
Sustainability Related
Prerequisite: MATE 120.

Third design laboratory in a sequence. Includes working in teams on project that benefits humanity. Issues of engineering ethics, technology and society, the environment and sustainability. 1 laboratory.

MATE 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: F,W,SP,SU
Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

MATE 210. Materials Engineering. 3 units

Term Typically Offered: F,W,SP,SU
Prerequisite: CHEM 111 or CHEM 124 or CHEM 127. Recommended:
Concurrent enrollment in MATE 215.

Structure of matter. Physical and mechanical properties of materials including metals, polymers, ceramics, composites, and electronic materials. Equilibrium diagrams. Heat treatments, materials selection and corrosion phenomena. Course may be offered in classroom-based or online format. 3 lectures.

MATE 215. Materials Laboratory I. 1 unit

Term Typically Offered: F,W,SP,SU
Prerequisite or concurrent: MATE 210.

Focus on processing-structure-properties relationships of materials, including crystal structures, electronic properties of materials, materials selection, phase diagrams, corrosion, mechanical properties of polymers, cold work and annealing of alloys and heat treatments of steels. 1 laboratory.

MATE 222. Materials Selection Life Cycle. 4 units

Term Typically Offered: TBD
Sustainability Focused
Prerequisite: MATE 210.

Materials selection for sustainable product design. Use of material selection software and techniques to solve design problems with multiple objectives and constraints. Focus on Triple Bottom Line design including functionality, economic viability, and sustainability. Principles and tools for weighted property optimization, production cost modeling, and life cycle analysis introduced through project-based learning mode. 4 lectures.

MATE 225. Materials Laboratory II. 1 unit

Term Typically Offered: F
Prerequisite: MATE 215. Concurrent: MATE 232.

Process-structure relationships of materials. Introduction to materials characterization techniques including differential scanning calorimetry, x-ray diffraction, and metallography. Emphasis on materials engineering professional practices and written communication. 1 laboratory.

MATE 232. Materials, Ethics, and Society. 4 units

Term Typically Offered: F
Sustainability Focused
Prerequisite: MATE 210.

Materials Engineering principles through the context of historical and current events. Ethics and systems thinking are integrated in the study of the impacts of materials and technology on society during the Stone Age, Bronze Age, and Iron Ages, as well as today's world. Topics include crystallography, phase diagrams, microstructures, processing techniques, and nanotechnology. 4 lectures.

MATE 235. Materials Laboratory III. 1 unit

Term Typically Offered: W
Prerequisite: MATE 225.

Mechanical property testing by tensile tests and hardness tests. Emphasis of data interpretation and analysis with structure-property relationships of materials. Continued materials engineering professional practices. 1 laboratory.

MATE 245. Materials Engineering Analysis. 1 unit

Term Typically Offered: SP
Prerequisite: MATE 210 and MATE 235.

Introduction to quantitative and qualitative materials analysis methods and tools. Experimental design, data distributions, hypothesis testing, and regression fits. Sensor design and calibration. Qualitative and quantitative image analysis. Emphasis placed on real-world examples of materials engineering data. Not open to students with credit in MATE 130. 1 laboratory.

MATE 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

MATE 280. Introduction to Materials Thermodynamics. 4 units

Term Typically Offered: W
Prerequisite: CHEM 125, PHYS 133, MATH 143, MATE 210 and MATE 215.

Thermodynamics concepts related to materials systems and processes: systems and surroundings, laws of thermodynamics, process flowsheets, mass and energy balances, ideal gasses, chemical reactions, steady state and transient processes. Not open to students with credit in MATE 380. 4 lectures.

MATE 300. Materials Selection for the Life Cycle. 4 units

Term Typically Offered: SP
GWR
Sustainability Related
Prerequisite: Junior standing and MATE 210.

Materials selection for sustainable product design. Use of material selection software and techniques to solve design optimization problems. Focus on Triple Bottom Line design including functionality, economic viability, and sustainability. Not open to students with credit in MATE 222. 4 lectures. Fulfills GWR.

MATE 310. Noncrystalline Material Systems. 4 units

Term Typically Offered: W
Prerequisite: MATE 210; MATE 340.

Design and synthesis of noncrystalline material systems. Synthesis, processing techniques, properties and fabrication methods of organic and inorganic polymeric materials. 3 lectures, 1 laboratory.

MATE 325. Transport Phenomena I. 1 unit

Term Typically Offered: F
Prerequisite: PHYS 132 and MATH 141.

Directed group laboratory study of energy transport. Focus on conduction and convection. 1 laboratory.

MATE 326. Transport Phenomena II. 1 unit

Term Typically Offered: W
Prerequisite: MATH 141 and ME 211.

Directed group laboratory study of fluid static and dynamic properties and behavior. Focus on non-compressible conditions. 1 laboratory.

MATE 327. Transport Phenomena III. 1 unit

Term Typically Offered: SP
Prerequisite: CHEM 124 and PHYS 133.

Introduction to radiative heat transfer and the material properties that control it. 1 laboratory.

MATE 340. Electronic Materials Systems. 4 units

Term Typically Offered: F
Prerequisite: MATE 210 and PHYS 133.

Design of electronic materials systems utilizing the basic concepts in electron theory of solids, electrical properties and conduction in materials, magnetic phenomena and optical properties in materials. 3 lectures, 1 laboratory.

MATE 350. Structural Materials Systems. 4 units

Term Typically Offered: W
Prerequisite: MATE 210. Corequisite: CE 204.

Design of structural materials systems. Topics include stress, strain, elasticity, anelasticity, plasticity, fracture and fatigue. 3 lectures, 1 laboratory.

MATE 359. Living in a Material World. 4 units

Term Typically Offered: F,W,SP,SU
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7
Sustainability Related

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: CHEM 124 or CHEM 127.

Evolution of materials (ceramics, metals, polymers, composites, semiconductors) in the context of history. Traces the link between historical and technological developments enabled by materials from the Stone Age to the Electronic Age. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

MATE 360. Metallurgical Materials Systems. 4 units

Term Typically Offered: SP
Prerequisite: MATE 235.

Physical metallurgy of engineering alloys including ferrous (steel) and nonferrous (aluminum, copper) systems. Connection to phase diagrams, microstructural development and phase transformations, physical and mechanical properties, precipitation hardening, cold work and annealing treated in detail. Laboratory focuses on microstructure development in steels and aluminum alloy casting. 3 lectures, 1 laboratory.

MATE 370. Kinetics of Materials and Process Design. 4 units

Term Typically Offered: F
Prerequisite: MATE 280 or MATE 380.

Design of processes for engineering materials. Topics include kinetics in materials: solid-state diffusion (steady-state and non-steady-state), nucleation and growth kinetics, solid state phase transformations. 3 lectures, 1 laboratory.

MATE 380. Thermodynamics and Physical Chemistry. 4 units

Term Typically Offered: SP
Prerequisite: CHEM 125, PHYS 133, MATH 143, MATE 210 and MATE 215; Materials Engineering students only.

Thermodynamics concepts related to materials engineering systems and processes: process flowsheets, mass and energy balances, Ellingham diagrams. Physical chemistry concepts related to materials engineering: ideal gases, systems and surroundings, first through third laws of thermodynamics, phase equilibria, chemical reactions. 4 lectures.

MATE 390. Textile and Fiber Engineering. 4 units

Term Typically Offered: W
Prerequisite: Junior standing; MATE 210 and MATE 310.

Structure, properties and engineering applications of fibers and textiles. Investigation of natural and synthetic fibers and use in technical applications. Methods of fiber formation. Chemical functionalization. High performance fibers, wearable electronics, composites, geotextiles, medical devices and apparel. 3 lectures, 1 laboratory.

MATE 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F,W,SP,SU
Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

MATE 401. Materials Characterization Techniques. 4 units

Term Typically Offered: F, W, SP
Prerequisite: MATE 210 and MATE 215.

Hands-on experience with materials characterization instruments, such as scanning electron microscopy (SEM), light optical microscopy, x-ray diffraction (XRD), and atomic force microscopy (AFM). Open-ended projects to develop expertise with trouble-shooting ability, and the process of materials characterization and analysis 2 lectures, 2 laboratories.

MATE 402. Materials Characterization Theory. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATE 210. Recommended: MATE 401.

Fundamentals of materials characterization methods and thin-film microanalytical techniques, including optical techniques, electron microscopy, X-ray techniques, and ion beam techniques. Selection of surface analysis techniques. 4 lectures. Formerly MATE 510.

MATE 403. Computational Materials Analysis. 4 units

Term Typically Offered: SP

Prerequisite: CSC 231, ME 211, MATE 280.

Theory and practice of continuum-scale computational methods applied to engineering materials. Finite element modeling to predict mechanical, thermal, and damage behavior. Micro-structural development and heat treatments modeled using thermodynamic principles. Micro-scale materials modeling of plasticity and phase transformations. 4 lectures.

MATE 410. Nanoscale Engineering. 3 units

Term Typically Offered: F, W, SP

Prerequisite: CHEM 125, PHYS 133 and MATE 210.

Material properties (mechanics, electronics, heat transfer, photonics, fluid mechanics and biomechanics) at the nanometer scale. Evaluation of nano-scale systems designed from a bottoms-up approach with unique properties. Exploration of integration of biology, chemistry, physics and engineering. 3 lectures.

MATE 420. Biopolymers and Bionanocomposites. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATE 310 or CHEM 444 or CHEM 544.

Exploration of the synthesis, processing, properties, and performance of biologically derived polymers. Examination of nano-scale reinforcements and their use to enhance performance of biopolymers. Emphasis on reading and interpreting contemporary scientific literature. 4 lectures.

MATE 422. Ceramics and Glasses. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATE 210.

Development, utilization, and control of properties in ceramic materials (inorganic-nonmetallic solids). Emphasis on application on processing to achieve structure and properties. Structure of crystalline ceramics and of glasses. Mechanical, thermal, optical, magnetic, and electrical properties. Application of ceramics in technology. Physical chemistry of ceramics. 4 lectures. Formerly MATE 522.

MATE 425. Corrosion Engineering. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CHEM 125 or CHEM 128, MATE 210, MATE 215.

Forms of corrosion. Influences of environmental variables on corrosion. Methods of corrosion control. 3 lectures, 1 laboratory.

MATE 430. Micro/Nano Fabrication. 3 units

Term Typically Offered: W

Prerequisite: BMED 212 or MATE 210.

Fabrication science and technology for creating micro and nano scale devices. Explore basic processes such as oxidation, diffusion, ion implantation, etching, chemical and physical vapor deposition, photolithography. Develop an understanding of the science of each process and how to select the right steps for fabricating electronic, photon and micro-electro-mechanical systems devices. 3 lectures. Crosslisted as BMED 434/EE 423/MATE 430.

MATE 435. Microfabrication Laboratory. 1 unit

Term Typically Offered: W

Corequisite: BMED 434/EE 423/MATE 430.

Application of basic processes involved in microfabrication: cleanroom protocol, oxidation, diffusion, photolithography etching and sputtering. Explore process development through fabrication of electronic, photonic or microfluidic devices. Each student will be part of a team that will fabricate and test a device. 1 laboratory. Crosslisted as BMED 435/EE 473/MATE 435.

MATE 440. Welding Metallurgy and Joining of Advanced Materials. 3 units

Term Typically Offered: F, W, SP

Prerequisite: MATE 210.

Principles, primary variables, and microstructural changes associated with the joining process. Physics of energy transfer. Heat and mass balances in joining, thermodynamic and kinetic justification of solidification and near interface microstructures. Heterogeneous interfaces, adhesion, wetting. Relation between process selection, interface design, microstructure, and properties, weldability. 3 lectures.

MATE 445. Joining of Advanced Materials Laboratory. 2 units

Term Typically Offered: F, W, SP

Prerequisite: MATE 210. Corequisite: MATE 440.

Laboratory to accompany MATE 440. Illustration of principles, primary variables, and microstructural changes associated with the joining process. Physics of energy transfer. Heat and mass balances in joining, thermodynamic and kinetic justification of solidification and near interface micro-structures. Heterogeneous interfaces, adhesion, wetting. Relation between process selection, interface design, microstructure, and properties, weldability. 2 laboratories.

MATE 446. Surface Chemistry of Materials. 3 units

Term Typically Offered: SP

Prerequisite: CHEM 125 or CHEM 128; CHEM 351, MATE 380, or ME 302.

Surface energy. Capillarity, solid and liquid interface, adsorption. Surface areas of solids. Contact angles and wetting. Friction, lubrication and adhesion. Relationship of surface to bulk properties of materials. Applications. 3 lectures. Crosslisted as CHEM/MATE 446.

MATE 450. Fracture and Failure Analysis. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATE 210; MATE 215; and MATE 350.

Fracture processes and fracture mechanics of structural materials concentrating on engineering alloys. Topics include fracture of alloys, fracture mechanics (Griffith analysis, Linear Elastic Fracture Mechanics), and fatigue. Laboratory focuses on fracture surface analysis, failure analysis, and mechanical testing. 3 lectures, 1 laboratory.

MATE 456. Materials for Electrochemical Energy Storage. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATE 210.

Exploration of electrochemical energy storage such as batteries, supercapacitors and hybrid systems. Fundamental principles with emphasis on electrochemistry of rechargeable batteries and supercapacitors. Advanced materials design, nanotechnology, testing techniques, safety issues and battery systems applications. 4 lectures.

MATE 458. Microelectronics and Electronics Packaging. 4 units

Term Typically Offered: F

Prerequisite: EE 112 or EE 113 or EE 201. Recommended: MATE 210.

Materials, processes, and reliability of microelectronics and electronics packaging, surface mount assembly and printed circuit board fabrication. Organic substrates and ceramic substrates. Mechanical design, thermal, and electrical considerations in electronic packaging. Design for manufacturability. Overview of optoelectronics packaging and other emerging technologies in microelectronics and electronic packaging. Project on design and manufacture of an electronic device. 3 lectures, 1 laboratory. Crosslisted as CPE 488/IME 458/MATE 458.

MATE 460. Materials Selection in Mechanical Design. 4 units

Term Typically Offered: TBD

Prerequisite: MATE 350.

Materials-based approach to mechanical design. Using mechanical and physical properties of materials (performance indices) to select structural materials for applications (Materials Selection Charts). Detailed background of material properties - information from materials and mechanics. Numerous case studies highlight the concepts covered. 4 lectures.

MATE 465. Ferrous Metallurgy. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATE 360.

Physical metallurgy principles applied to iron-based systems for steel making and thermo-mechanical processing. Mechanical properties related to microstructure of steel materials and their manipulation through chemical and physical processing. Exploration of major categories of steel, applications, surface treatment and welding. 4 lectures.

MATE 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

MATE 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

MATE 480. Composite Materials Systems. 4 units

Term Typically Offered: F

Prerequisite: MATE 350.

Properties, design and applications of composite material systems, concentrating on polymer-matrix, ceramic-fiber composites. Materials (matrices, fibers), mechanical behavior and properties, and manufacturing methods treated in detail. Laboratory practice concentrates on the mechanical testing of fiber-reinforced composite materials. 3 lectures, 1 laboratory. Formerly MATE 330.

MATE 482. Senior Project I. 1 unit

Term Typically Offered: F

Prerequisite: Senior standing; and Materials Engineering major.

Foundations of senior project design. Completion of the preliminary stages of selecting a senior project, designing experiments, evaluating realistic constraints, conducting initial experiments, and managing a project timeline. 1 laboratory.

MATE 483. Senior Project II. 2 units

Term Typically Offered: W

Prerequisite: MATE 482.

Continuation of senior project. Completion of a senior project experimental component under the guidance of a faculty supervisor. Research methodology, experimental design, experimental work and data analysis. 2 laboratories.

MATE 484. Senior Project III. 2 units

Term Typically Offered: SP

Prerequisite: MATE 483.

Continuation of MATE 483. Completion of a senior project data analysis and communication under the guidance of a faculty supervisor. Mathematical modeling and technical communication. 2 laboratories.

MATE 485. Materials and the Environment. 4 units

Term Typically Offered: F, W, SP

Sustainability Focused

Prerequisite: MATE 210.

Materials impacts on air, water, land, and human health. Introduction to climate change. Life cycle assessment for quantifying environmental impact. Green materials. Overview of renewable energy technologies. Non-technical aspects of environmental technologies. Field trip required. 4 lectures.

MATE 490. Solidification and Densification. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATE 210.

Thermodynamics, kinetics and morphologies of solid-liquid interfaces. Heat flow in castings, crystal growth. Solidification mechanics, solute redistribution. Production, characterization and testing of metal powders. Compacting of powder. Sintering with/without liquid phase. Hot pressing, properties of sinterings as a function of processing conditions. Application of theory to the production of useful materials. 4 lectures. Formerly MATE 590.

MATE 495. Cooperative Education Experience. 12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

MATE 500. Individual Study. 1-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of department head, graduate advisor, or supervising faculty member.

Advanced study planned and completed under the direction of a member of department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 12 units.

MATE 530. Biomaterials. 4 units

Term Typically Offered: W

Prerequisite: BIO 161, or BIO 213 and BMED/BRAE 213; MATE 210 and graduate standing or consent of instructor.

Structure-function relationships for materials in contact with biological systems. Interactions of materials implanted in the body. Histological and hematological considerations including foreign body responses, inflammation, carcinogenicity, thrombosis, hemolysis, immunogenic and toxic properties. Microbial interaction with material surfaces, degradation. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as BMED/MATE 530.

MATE 550. Micro Systems. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing.

Fundamentals of intelligent systems employing sensors, actuators and intelligent controls. Impact on material properties as devices shrink in the micrometer realm. Applications toward exploring nanotechnology. 4 lectures.

MATE 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

MATE 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Senior or graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

MATE 599. Design Project (Thesis). 2-5 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing.

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis.

Mathematics (MATH)

undefined

MATH Courses

MATH 92. Beginning Algebra Review. 3 units

Term Typically Offered: TBD

CR/NC

Review of basic algebra skills at the beginning algebra level intended primarily to prepare students for MATH 96. Course open only to students who have taken the ELM examination and are not qualified for MATH 96. Not for baccalaureate credit. Credit/No Credit grading only. 3 lectures.

MATH 94. Beginning Algebra Workshop. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 92.

Facilitated study and discussion of the theory, problems, and applications of beginning algebra. Not for baccalaureate credit. Credit/No Credit grading only. 1 laboratory.

MATH 95. Stretch Precalculus Algebra I Workshop. 1 unit

Term Typically Offered: F

CR/NC

Prerequisite: Appropriate Math Placement Level. Concurrent: MATH 115.

Review of basic algebra skills intended primarily to prepare students for the precalculus content in MATH 115. Not for baccalaureate credit. Credit/No Credit grading only. 1 activity.

MATH 96. Intermediate Algebra. 3 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Appropriate score on the ELM examination, or credit in MATH 92.

Review of basic algebra skills at the intermediate algebra level intended primarily to prepare students for MATH 116. Not for baccalaureate credit. Credit/No Credit grading only. 3 lectures.

MATH 98. Intermediate Algebra Workshop. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 96.

Facilitated study and discussion of the theory, problems, and applications of intermediate algebra. Not for baccalaureate credit. Credit/No Credit grading only. 1 laboratory.

MATH 112. Nature of Modern Math. 4 units

Term Typically Offered: W, SP
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: MATH 95 or appropriate Math Placement Level.

Topics from contemporary mathematics, their development, applications, and role in society. Some typical topics to be chosen by the instructor: graph theory, critical path analysis, statistical inference, coding, game theory, and symmetry. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE Area.

MATH 115. Stretch Precalculus Algebra I. 3 units

Term Typically Offered: F
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: Appropriate Math Placement Level. Concurrent: MATH 95.

First course in precalculus college algebra without trigonometry, with built-in review of basic algebra skills necessary to be successful in precalculus. Factoring, exponents, and radicals. Real and complex numbers. Modeling with equations and inequalities. Linear, quadratic, and polynomial functions and their graphs. MATH 115 or MATH 116, and MATH 117 are equivalent to MATH 118, but are taught at a slower pace. Upon completion of MATH 115 or MATH 116, and MATH 117, a student will receive 4 units of GE credit for Area B4. A grade of C- or better is required in one course in GE Area B4 to fulfill General Education requirements. Not open to students with credit in MATH 116, MATH 118, MATH 141, MATH 161, or MATH 221. 3 lectures.

MATH 116. Precalculus Algebra I. 3 units

Term Typically Offered: TBD
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: MATH 96 or appropriate Math Placement Level.

First course in precalculus college algebra without trigonometry. Factoring, exponents, and radicals. Real and complex numbers. Modeling with equations and inequalities. Linear, quadratic, and polynomial functions and their graphs. MATH 115 or MATH 116, and MATH 117 are equivalent to MATH 118, but are taught at a slower pace. Upon completion of MATH 115 or MATH 116, and MATH 117, a student will receive 4 units of GE credit for Area B4. A grade of C- or better is required in one course in GE Area B4 to fulfill General Education requirements. Not open to students with credit in MATH 115, MATH 118, MATH 141, MATH 161, or MATH 221. Credit will be granted in only one of the following courses: MATH 115, MATH 116, or MATH 118. 3 lectures.

MATH 117. Precalculus Algebra II. 3 units

Term Typically Offered: W
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: MATH 115 with a grade of C- or better; or MATH 116 with a grade of C- or better; or consent of instructor.

Second course in precalculus college algebra without trigonometry. Rational, exponential, and logarithmic functions. Matrices, determinants, and systems of linear equations. MATH 115 or MATH 116, and MATH 117 are equivalent to MATH 118, but are taught at a slower pace. Upon completion of MATH 115 or MATH 116, and MATH 117, a student will receive 4 units of GE credit for Area B4. A grade of C- or better is required in one course in GE Area B4 to fulfill General Education requirements. Not open to students with credit in MATH 118. 3 lectures.

MATH 118. Precalculus Algebra. 4 units

Term Typically Offered: F,W,SP,SU
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: Appropriate Math Level Placement.

Precalculus algebra without trigonometry. Factoring, exponents, and radicals. Real and complex numbers. Modeling with equations and inequalities. Rational, exponential, and logarithmic functions. Matrices, determinants, and systems of linear equations. MATH 118 is equivalent to MATH 115 or MATH 116, and MATH 117. Not open to students with credit in MATH 117, MATH 141, MATH 161, or MATH 221. Credit will be granted in only one of the following courses: MATH 115, MATH 116, or MATH 118. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

MATH 119. Precalculus Trigonometry. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: Appropriate Math Placement Level.

Rectangular and polar coordinates. Trigonometric functions, fundamental identities. Inverse trigonometric functions and relations. Complex numbers, conic sections, and analytic geometry. Not open to students with credit in MATH 141, MATH 161, or MATH 221. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

MATH 126. Pre-Calculus Algebra Workshop I. 1 unit

Term Typically Offered: TBD
 CR/NC
 Concurrent: Enrollment in the associated section of MATH 116.

Facilitated study and discussion of the theory, problems, and applications of precalculus algebra. Credit/No Credit grading only. 1 laboratory.

MATH 127. Pre-Calculus Algebra Workshop II. 1 unit

Term Typically Offered: TBD
 CR/NC
 Concurrent: Enrollment in the associated section of MATH 117.

Facilitated study and discussion of the theory, problems, and applications of pre-calculus algebra. Credit/No Credit grading only. 1 laboratory.

MATH 128. Pre-Calculus Algebra Workshop. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 118.

Facilitated study and discussion of the theory, problems, and applications of pre-calculus algebra. Credit/No Credit grading only. 1 laboratory.

MATH 129. Precalculus Trigonometry Workshop. 1 unit

Term Typically Offered: TBD

CR/NC

Corequisite: Concurrent enrollment in the associated section of MATH 119.

Facilitated study and discussion of the theory, problems, and applications of pre-calculus trigonometry. Credit/No Credit grading only. 1 laboratory.

MATH 141. Calculus I. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area B4

2019-20 or earlier catalog: GE Area B1

Prerequisite: Appropriate Math Placement Level; or MATH 117 and high school trigonometry; or MATH 118 and high school trigonometry; or MATH 119.

Limits, continuity, differentiation. Introduction to integration. 4 lectures. Crosslisted as HNRS/MATH 141. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

MATH 142. Calculus II. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area B4

2019-20 or earlier catalog: GE Area B1

Prerequisite: MATH 141 with a grade of C- or better or consent of instructor.

Techniques of integration, applications to physics, transcendental functions. 4 lectures. Crosslisted as HNRS/MATH 142. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

MATH 143. Calculus III. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area B4

2019-20 or earlier catalog: GE Area B1

Prerequisite: MATH 142 with a grade of C- or better or consent of instructor.

Infinite sequences and series, vector algebra, parametric curves. 4 lectures. Crosslisted as HNRS/MATH 143. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

MATH 151. Calculus Workshop I. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 141.

Facilitated study and discussion of the theory, problems, and applications of calculus. Credit/No Credit grading only. 1 laboratory.

MATH 152. Calculus Workshop II. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 142.

Facilitated study and discussion of the theory, problems, and applications of calculus. Credit/No Credit grading only. 1 laboratory.

MATH 153. Calculus Workshop III. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 143.

Facilitated study and discussion of the theory, problems, and applications of calculus. Credit/No Credit grading only. 1 laboratory.

MATH 161. Calculus for the Life Sciences I. 4 units

Term Typically Offered: W, SP, SU

2020-21 or later catalog: GE Area B4

2019-20 or earlier catalog: GE Area B1

Prerequisite: Appropriate Math Placement Level; or MATH 117; or MATH 118.

Differential calculus with applications in the biological sciences. Review of exponential, logarithmic, and trigonometric functions. Limits, continuity, differentiation. Examples, exercises, and applications to emphasize problems in the biological sciences. Not open to students with credit in MATH 141. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

MATH 162. Calculus for the Life Sciences II. 4 units

Term Typically Offered: F, SP, SU

2020-21 or later catalog: GE Area B4

2019-20 or earlier catalog: GE Area B1

Prerequisite: MATH 161.

Integral calculus with applications in the biological sciences. Techniques of integration. Matrices, partial derivatives, and introduction to differential equations and mathematical modeling. Examples, exercises, and applications to emphasize problems in the biological sciences. Not open to students with credit in MATH 142. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

MATH 171. Calculus for the Life Sciences Workshop I. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 161.

Facilitated study and discussion of the theory, problems, and applications of calculus for the life sciences. Credit/No Credit grading only. 1 laboratory.

MATH 172. Calculus for the Life Sciences Workshop II. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 162.

Facilitated study and discussion of the theory, problems, and applications of calculus for the life sciences. Credit/No Credit grading only. 1 laboratory.

MATH 182. Calculus for Architecture and Construction Management. 4 units

Term Typically Offered: W, SP
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: MATH 141.

Integral calculus with applications to architecture and construction management. The algebra of vectors. Polar, cylindrical, and spherical coordinate systems. Not open to students with credit in MATH 142. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

MATH 192. Calculus for Architecture and Construction Management Workshop. 1 unit

Term Typically Offered: TBD
 CR/NC
 Concurrent: Enrollment in the associated section of MATH 182.

Facilitated study and discussion of the theory, problems, and applications of calculus to architecture and construction management. Credit/No Credit grading only. 1 laboratory.

MATH 202. Orientation to Mathematics Major. 1 unit

Term Typically Offered: F, SP
 CR/NC
 Prerequisite: MATH 143.

Career opportunities in the field of mathematics, preparing a field of study, and a survey of departmental facilities and procedures related to research, study and graduation. Credit/No Credit grading only. 1 lecture.

MATH 206. Linear Algebra I. 4 units

Term Typically Offered: F,W,SP, SU
 Prerequisite: MATH 143.

Systems of linear equations. Matrix algebra, including inverses and determinants. Vectors, vector spaces, bases and linear transformations in real coordinate space of n dimensions. Eigenvalues, eigenvectors and diagonalization. Applications of linear algebra. Introduction to inner products and orthogonality. 4 lectures.

MATH 221. Calculus for Business and Economics. 4 units

Term Typically Offered: W, SP
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: Appropriate Math Placement Level; or MATH 117; or MATH 118.

Limits, continuity, differentiation. Exponential and logarithmic functions. Introduction to integration. Examples, exercises and applications to emphasize problems in business and economics. Not open to students with credit in MATH 141. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

MATH 227. Mathematics for Elementary Teaching I. 4 units

Term Typically Offered: F, W
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: MATH 95 or appropriate Math Placement Level.

Introduction to problem solving, set theory, number systems, arithmetic operations, models, and number theory. This class is designed for Liberal Studies majors. Other students will be admitted by consent of instructor. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

MATH 231. Calculus for Business and Economics Workshop. 1 unit

Term Typically Offered: TBD
 CR/NC
 Concurrent: Enrollment in the associated section of MATH 221.

Facilitated study and discussion of the theory, problems, and applications of business calculus. Credit/No Credit grading only. 1 laboratory.

MATH 241. Calculus IV. 4 units

Term Typically Offered: F,W,SP, SU
 Prerequisite: MATH 143.

Partial derivatives, multiple integrals, introduction to vector analysis. 4 lectures. Crosslisted as HNRS/MATH 241.

MATH 242. Differential Equations I. 4 units

Term Typically Offered: W, SP
 Prerequisite: MATH 206 and MATH 241.

Ordinary differential equations: first-order linear equations, separable equations, exact equations, second-order linear equations, nonhomogeneous equations, systems of first-order linear equations, systems of nonlinear equations, modeling and applications. Not open to students with credit in MATH 244. 4 lectures.

MATH 244. Linear Analysis I. 4 units

Term Typically Offered: F,W,SP, SU
 Prerequisite: MATH 143.

Separable and linear ordinary differential equations with selected applications; numerical and analytical solutions. Linear algebra: vectors in n -space, matrices, linear transformations, eigenvalues, eigenvectors, diagonalization; applications to the study of systems of linear differential equations. 4 lectures. Crosslisted as HNRS/MATH 244.

MATH 248. Methods of Proof in Mathematics. 4 units

Term Typically Offered: F,W,SP, SU
 Prerequisite: MATH 143.

Methods of proof (direct, contradiction, conditional, contraposition); valid and invalid arguments. Examples from set theory. Quantified statements and their negations. Functions, indexed sets, set functions. Proofs in number theory, algebra, geometry and analysis. Proof by induction. Equivalence and well-defined operations and functions. The axiomatic method. 4 lectures.

MATH 251. Calculus Workshop IV. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 241.

Facilitated study and discussion of the theory, problems, and applications of calculus. Credit/No Credit grading only. 1 laboratory.

MATH 254. Linear Analysis Workshop I. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 244.

Facilitated study and discussion of the theory, problems, and applications of linear analysis. Credit/No Credit grading only. 1 laboratory.

MATH 258. Methods of Proof in Mathematics Workshop. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 248.

Facilitated study and discussion of the methods and techniques of proof in mathematics. Credit/No Credit grading only. 1 laboratory.

MATH 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

MATH 300. Technology in Mathematics Education. 4 units

Term Typically Offered: F

Prerequisite: MATH 248.

Examination of existing hardware and software designed for educational uses. Discussion of mathematical topics appropriate for computer enhancement. Special methods and techniques for educational uses of computers. Emphasis on activity learning and applications. Computer as a classroom management device. 4 lectures.

MATH 304. Vector Analysis. 4 units

Term Typically Offered: W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing or Mathematics major; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); MATH 206 or MATH 244; and Math 241.

Differential and integral calculus of vector-valued functions. Green's Theorem, Stokes' Theorem, and the Divergence Theorem. Applications and generalizations. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

MATH 306. Linear Algebra II. 4 units

Term Typically Offered: F, W, SP

Prerequisite: MATH 206 or MATH 244; MATH 241; and a C- or better in MATH 248, or consent of instructor.

Rigorous development of real and complex vector spaces, including infinite dimensional spaces. Subspaces, bases, products and direct sums. Examples and properties of linear transformations. Similarity, eigenvalues, eigenvectors and diagonalization. Characteristic and minimal polynomials, Cayley-Hamilton Theorem. 4 lectures.

MATH 316. Introduction to Linear Algebra Workshop II. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 306.

Facilitated study and discussion of the methods and techniques of proof in linear algebra. Credit/No Credit grading only. 1 laboratory.

MATH 328. Mathematics for Elementary Teaching II. 4 units

Term Typically Offered: W, SP

Prerequisite: MATH 227 with a grade of C- or better or consent of instructor.

Introduction to rational and real numbers, probability and counting techniques, statistics, and proportional reasoning. Computer applications. 4 lectures.

MATH 329. Mathematics for Elementary Teaching III. 4 units

Term Typically Offered: F, SP

Prerequisite: MATH 328.

Introduction to concepts of Euclidean geometry, including shape, visualization and attributes of measurement, with an emphasis on problem solving and critical thinking. Computer applications. 4 lectures.

MATH 330. Algebraic Thinking with Technology. 4 units

Term Typically Offered: F, W

Prerequisite: MATH 329.

Algebraic concepts for elementary teachers. Mathematical patterns, equations and inequalities, linear and quadratic functions, exponential and logarithmic functions, systems of equations, roots of polynomials, factoring of polynomials, and right-triangle trigonometry. Computer applications. 4 lectures.

MATH 334. Combinatorial Math. 4 units

Term Typically Offered: F, W

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing or Mathematics major; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one of the following courses: CSC 248, MATH 206, or MATH 248.

Methods of enumerative combinatorics: sum, product, and division rules, bijective and recursive techniques, inclusion and exclusion, and generating functions. Advanced topics to be selected from the theory of partitions, finite difference calculus, Polya theory, designs, and codes. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

MATH 335. Graph Theory. 4 units

Term Typically Offered: F

Prerequisite: MATH 248 or junior standing.

Introduction to graph theory and its applications: isomorphism, paths and searching, connectedness, trees, tournaments, planarity, graph colorings, matching theory, network flow, adjacency and incidence matrices. Further topics to be selected from the theory of finite state machines, Ramsey theory, extremal theory, and graphical enumeration. 4 lectures.

MATH 341. Theory of Numbers. 4 units

Term Typically Offered: SP

Prerequisite: MATH 248 with a grade of C- or better or consent of instructor.

Properties of numbers. Euclid's Algorithm, greatest common divisors, diophantine equations, prime numbers, congruences, number theoretic functions, the quadratic reciprocity laws, primitive roots and indices. 4 lectures.

MATH 344. Linear Analysis II. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing or one of the following majors: BMED, MATH, or ME; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); MATH 206 and MATH 242, or MATH 241 and MATH 244.

Linear methods applied to the solution of differential equations. Laplace transforms. Series solutions to ordinary differential equations. Orthogonality in n -space, Gram-Schmidt orthogonalization and least squares methods. Orthogonal bases in function spaces, Sturm-Liouville theory. Fourier series and transforms. Special functions of applied mathematics. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

MATH 350. Mathematical Software. 4 units

Term Typically Offered: SP

Prerequisite: MATH 206 or MATH 244, and MATH 241, and an introductory college-level programming course, or consent of instructor.

Problem-solving using mathematical software. 4 lectures.

MATH 351. Typesetting with LaTeX. 1 unit

Term Typically Offered: W

CR/NC

Prerequisite: Junior standing.

Preparing documents, especially mathematical ones, using LaTeX and AMS-LaTeX. Credit/No Credit grading only. 1 lecture.

MATH 370. Putnam Exam Seminar. 2 units

Term Typically Offered: F

Prerequisite: Consent of instructor.

Directed group study of mathematical problem solving techniques. Open to undergraduate students only. Class members are expected to participate in the annual William Lowell Putnam Mathematical Competition. Course may be repeated up to eight units. 2 seminars.

MATH 371. Math Modeling Seminar. 2 units

Term Typically Offered: F

Prerequisite: Consent of instructor.

Directed group study of mathematical modeling techniques. Open to undergraduate students only. Class members are expected to participate in the annual Mathematical Competition in Modeling. Total credit limited to 8 units. 2 seminars.

MATH 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Junior standing and consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units.

MATH 404. Introduction to Differential Geometry. 4 units

Term Typically Offered: F

Prerequisite: MATH 304.

Theory of curves and surfaces in space. Topics such as Frenet formulas, curvature, geodesics, Cartan structural equations, Gauss-Bonnet Theorem. 4 lectures.

MATH 406. Linear Algebra III. 4 units

Term Typically Offered: SP

Prerequisite: MATH 306.

Rigorous development of real and complex inner product spaces. Orthogonal bases and direct sums of subspaces. Linear transformations on inner product spaces. Properties of self-adjoint and normal operators. Additional topics such as the Jordan Decomposition Theorem and the Spectral Theorem. 4 lectures.

MATH 410. Complex Analysis I. 4 units

Term Typically Offered: F

Prerequisite: MATH 242, or MATH 241 and MATH 244.

Geometry of the complex plane, analytic functions, the Cauchy-Riemann equations, and harmonic functions. Contour integrals, the Cauchy-Goursat theorem, and Cauchy integral formulas. Maximum modulus and mean value properties. Taylor and Laurent series, the calculus of residues, and applications to integration. 4 lectures.

MATH 411. Complex Analysis II. 4 units

Term Typically Offered: W

Prerequisite: MATH 408 or MATH 410.

Further applications of the calculus of residues, analytic continuation, Rouche's theorem, and the argument principle. Conformal maps, the Riemann mapping theorem, Mobius transformations and applications. Additional topics may include Riemann surfaces, special functions, Weierstrass and Hadamard factorization, and asymptotic methods. 4 lectures. Formerly MATH 409.

MATH 412. Introduction to Analysis I. 4 units

Term Typically Offered: F, W

Prerequisite: MATH 306.

Introduction to concepts and methods basic to real analysis. Topics such as the real number system, sequences, continuity, uniform continuity and differentiation. 4 lectures.

MATH 413. Introduction to Analysis II. 4 units

Term Typically Offered: W, SP

Prerequisite: MATH 412.

A continuation of Introduction to Analysis I covering such topics as integration, infinite series, uniform convergence and functions of several variables. 4 lectures.

MATH 414. Introduction to Analysis III. 4 units

Term Typically Offered: SP

Prerequisite: MATH 413.

Continuation of Introduction to Analysis II covering such topics as differentiation and integration of functions of several variables and other advanced topics. 4 lectures.

MATH 416. Differential Equations II. 4 units

Term Typically Offered: F, W

Prerequisite: MATH 206 and MATH 242, or MATH 241 and MATH 244.

Qualitative theory of ordinary differential equations: Existence and Uniqueness Theorem, phase portraits, limit sets, stability of fixed points and periodic orbits, energy functions, Poincare-Bendixson Theorem, Poincare maps, bifurcations, attractors, chaos. 4 lectures.

MATH 418. Partial Differential Equations. 4 units

Term Typically Offered: F, SP

Prerequisite: MATH 344. Recommended: MATH 304.

Mathematical formulation of physical laws. Separation of variables. Orthogonal functions and generalized Fourier series. Bessel functions, Legendre polynomials. Sturm-Liouville problem. Boundary value problems; nonhomogeneous techniques. Applications to heat flow, potential theory, vibrating strings and membranes. 4 lectures.

MATH 419. Introduction to the History of Mathematics. 4 units

Term Typically Offered: W

Prerequisite: MATH 248 with a grade of C- or better and at least one upper division course in mathematics, or consent of instructor.

Evolution of mathematics from earliest to modern times. Major trends in mathematical thought, the interplay of mathematical and technological innovations, and the contributions of great mathematicians. Appropriate for prospective and in-service teachers. 4 lectures.

MATH 422. Introduction to Analysis I Workshop. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 412.

Facilitated study and discussion of the methods and techniques of proof in introductory analysis. Credit/No Credit grading only. 1 laboratory.

MATH 423. Advanced Mathematics for Teaching. 4 units

Term Typically Offered: SP

Prerequisite: MATH 442 and MATH 481.

Introduction to mathematics education research and advanced exploration of the mathematics taught in California's public high schools and middle schools through problem analysis, concept analysis, and problem connections. 4 lectures.

MATH 424. Organizing and Teaching Mathematics. 4 units

Term Typically Offered: F

CR/NC

Prerequisite: Acceptance into the Mathematics Single Subject Credential Program.

Organization, selection, presentation, application and interpretation of subject matter in mathematics. Introduction to current issues in mathematics education. For students who will be teaching in secondary schools. Credit/No Credit grading only. 4 lectures.

MATH 425. Mathematics Student Teaching Seminar. 2 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: Acceptance into Step II of the Single Subject Credential Program in Mathematics. Concurrent: EDUC 469 or EDUC 479.

Principles and practice in effective teaching of mathematics at the middle and high school level, learning theories, curriculum content and structure, classroom issues, and the teaching profession. Credit/No Credit grading only. Total credit limited to 4 units. 2 seminars.

MATH 435. Discrete Mathematics with Applications I. 4 units

Term Typically Offered: F

Prerequisite: MATH 248 with a grade of C- or better and MATH 336, or consent of instructor.

Methods of discrete mathematics with applications. Generating functions and Lagrange inversion, partition theory, permutation statistics and q -analogues, posets and Moebius inversion. Additional topics including lattice paths and basic hypergeometric series. 4 lectures. Not open to students with credit in MATH 530.

MATH 436. Discrete Math with Applications II. 4 units

Term Typically Offered: TBD

Prerequisite: MATH 435. Corequisite: MATH 482.

Methods of discrete mathematics with applications. Polya theory, codes, designs, matroids, the combinatorics of symmetric functions, and tableaux combinatorics. Additional topics including transversals and Latin squares, asymptotics, and discrete probability theory. 4 lectures. Not open to students with credit in MATH 531.

MATH 437. Game Theory. 4 units

Term Typically Offered: SP

Prerequisite: MATH 206 or MATH 244, and MATH 248 with a grade of C- or better, or consent of instructor.

Development of the mathematical concepts, techniques, and models used to investigate optimal strategies in competitive situations; games in extensive, normal, and characteristic form, Nash equilibrium points and Nash Bargaining Model. 4 lectures.

MATH 440. Topology I. 4 units

Term Typically Offered: W

Prerequisite: MATH 412. Corequisite: MATH 481.

Introduction to general topological spaces with emphasis on surfaces and manifolds. Open and closed sets, continuity, compactness, connectedness. Quotient spaces. 4 lectures. Not open to students with credit in MATH 540.

MATH 441. Topology II. 4 units

Term Typically Offered: TBD

Prerequisite: MATH 440.

Introduction to general topological spaces with emphasis on surfaces and manifolds. Fundamental group. Triangulations of spaces, classification of surfaces. Other topics may include covering spaces, simplicial homology, homotopy theory and topics from differential topology. 4 lectures. Not open to students with credit in MATH 541.

MATH 442. Euclidean Geometry. 4 units

Term Typically Offered: W

Prerequisite: MATH 248 with a grade of C- or better or consent of instructor. Recommended: MATH 300 or familiarity with dynamic geometry software.

Foundations of Euclidean geometry, finite geometries, congruence, similarities, polygonal regions, circles and spheres. Constructions, mensuration, the parallel postulate. Appropriate for prospective and in-service mathematics teachers. 4 lectures.

MATH 443. Modern Geometries. 4 units

Term Typically Offered: SP

Prerequisite: MATH 442.

Non-Euclidean and projective geometries. Properties of parallels, biangles, Saccheri and Lambert quadrilaterals, angle-sum and area. Limiting curves: hyperbolic trigonometry, duality, perspectivity, quadrangles, fundamental theorems of projective geometry, conics. 4 lectures.

MATH 451. Numerical Analysis I. 4 units

Term Typically Offered: W

Prerequisite: MATH 206 and MATH 242, or MATH 241 and MATH 244, and an introductory college-level programming course.

Topics in interpolation and approximation methods, initial value problems, and boundary value problems of ordinary differential equations. 4 lectures.

MATH 452. Numerical Analysis II. 4 units

Term Typically Offered: SP

Prerequisite: MATH 451.

Numerical techniques for solving partial differential equations of the parabolic, hyperbolic and elliptic type. Further topics in approximation theory. 4 lectures.

MATH 453. Numerical Optimization. 4 units

Term Typically Offered: SP

Prerequisite: MATH 306 and MATH 451.

Algorithms for solving optimization problems that cannot be solved analytically. Descent algorithms including exact and practical line-searches, steepest descent method, and Newton and quasi-Newton methods for unconstrained minimization. Optimality conditions for constrained optimization, linear programming. Projection and Lagrangian methods, and interior point methods for constrained minimization. 4 lectures.

MATH 459. Senior Project Seminar. 4 units

Term Typically Offered: F, SP

Prerequisite: MATH 412 or MATH 481.

Written and oral analyses and presentations by students on topics from advanced mathematics and mathematical modeling. Not open to students with credit in MATH 460. 4 seminars.

MATH 460. Senior Project Applied Seminar. 4 units

Term Typically Offered: F

Prerequisite: CSC/CPE 101 or MATH 350; MATH 306; and MATH 344.

Written and oral analyses and presentations by students on topics in applied mathematics, including applications to sustainability. Construction of mathematical models for physical and biological problems, with analysis and interpretation of the solutions of these models using both analytical and numerical techniques. Not open to students with credit in MATH 459. 4 seminars.

MATH 461. Senior Project I. 2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Senior Standing.

Selection and development of a mathematics project under faculty supervision. Minimum 60 hours total time.

MATH 462. Senior Project II. 2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: MATH 461.

Completion of a mathematics project under faculty supervision. Project results are presented in a formal report. Minimum 60 hours total time.

MATH 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures.

MATH 474. Advanced Topics in Geometry and Topology. 1 unit

Term Typically Offered: TBD

Prerequisite: MATH 248 and consent of instructor. Recommended: MATH 404 and MATH 440.

Exploration of advanced topics and problems in geometry and topology through reading, writing and oral presentations. The Class Schedule will list topic selected. Total credit limited to 6 units. 1 seminar.

MATH 475. Advanced Topics in Mathematics. 4 units

Term Typically Offered: TBD

Prerequisite: MATH 306 and consent of instructor.

Exploration of advanced topics and problems in mathematics. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

MATH 476. Advanced Topics in Applied Mathematics. 4 units

Term Typically Offered: TBD

Prerequisite: MATH 306 and consent of instructor.

Exploration of advanced topics and problems in applied mathematics. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

MATH 481. Abstract Algebra I. 4 units

Term Typically Offered: F, W

Prerequisite: MATH 306 or MATH 341.

Introduction to the study of groups. Topics include groups of permutations, cyclic groups, normal subgroups and quotient groups. Homomorphisms, Lagrange's Theorem, Cayley's Theorem, the Isomorphism Theorems and the Fundamental Theorem of Finite Abelian Groups. 4 lectures.

MATH 482. Abstract Algebra II. 4 units

Term Typically Offered: W, SP

Prerequisite: MATH 481.

Introduction to rings and fields. Reducible and irreducible polynomials, ideals, prime and maximal ideals, quotient rings, ring homomorphisms, the Isomorphism Theorems, integral domains, unique factorization domains, principal ideal domains, Euclidean domains, fields of fractions, field extensions and finite fields. 4 lectures.

MATH 483. Abstract Algebra III. 4 units

Term Typically Offered: SP

Prerequisite: MATH 482.

Algebraic field extensions, the tower law, ruler-and-compass constructions, the primitive element theorem, algebraic and transcendental numbers, algebraic closure, the fundamental theorem of algebra, finite fields, Galois extensions and the fundamental theorem of Galois theory. Not open to students with credit in MATH 560. 4 lectures.

MATH 485. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 12 units. Credit/No Credit grading only.

MATH 491. Abstract Algebra I Workshop. 1 unit

Term Typically Offered: TBD

CR/NC

Concurrent: Enrollment in the associated section of MATH 481.

Facilitated study and discussion of the methods and techniques of proof in abstract algebra. Credit/No Credit grading only. 1 laboratory.

MATH 495. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 12 units. Credit/No Credit grading only.

MATH 500. Individual Study. 1-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing and consent of department chair.

Individual research or advanced study planned and completed under the direction of a departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Total credit limited to 12 units.

MATH 501. Analytic Methods in Applied Mathematics. 4 units

Term Typically Offered: F

Prerequisite: MATH 344 or AERO 300, and graduate standing.

Introduction to advanced methods of mathematics useful in the analysis of engineering problems. Selected topics in perturbation theory, optimization and Fourier analysis. Not open to students in math major or master's degree program in mathematics. 4 lectures.

MATH 502. Numerical Methods in Applied Mathematics. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing, or CSC/CPE 101 or CSC 231 or CSC 232; and one of the following: AERO 300 or EE 228 or MATH 344 or PHYS 321.

Introduction to advanced numerical analysis. Numerical techniques for solving ordinary and partial differential equations, error analysis, stability, methods for linear systems. 4 lectures.

MATH 505. Graduate Teaching Seminar. 1 unit

Term Typically Offered: F

CR/NC

Prerequisite: Graduate standing.

Principles and practice in effective teaching of college-level mathematics. Issues related to present and future teaching experiences, including time management, professionalism, student assessment, grading, classroom management, and qualities of good mathematics teachers. Reflection on individual teaching, and consideration of improvements in instruction. Credit/No Credit grading only. Total credit limited to 2 units. 1 seminar.

MATH 520. Applied Analysis I. 4 units

Term Typically Offered: W

Prerequisite: MATH 408; MATH 412; and graduate standing.

Recommended: MATH 418.

Advanced mathematical methods of applied mathematics, integrated with modeling of physical phenomena. Topics include dimensional analysis, applications of complex analysis, and advanced techniques for ordinary differential equations. Additional topics selected from dynamical systems, calculus of variations, or other applied subjects. 4 lectures.

MATH 521. Applied Analysis II. 4 units

Term Typically Offered: SP

Prerequisite: MATH 520.

Advanced mathematical methods of applied mathematics, integrated with modeling of physical phenomena. Topics include asymptotic expansions, advanced techniques for partial differential equations, and Fourier analysis. Additional topics selected from integral equations, discrete time systems, numerical analysis, or other applied subjects. 4 lectures.

MATH 530. Discrete Mathematics with Applications I. 4 units

Term Typically Offered: F

Prerequisite: MATH 248 with a grade of C- or better and MATH 336 and graduate standing, or consent of instructor.

Methods of discrete mathematics with applications. Generating functions and Lagrange inversion, partition theory, permutation statistics and q -analogues, posets and Möbius inversion. Additional topics including lattice paths and basic hypergeometric series. 4 lectures. Not open to students with credit in MATH 435.

MATH 531. Discrete Mathematics with Applications II. 4 units

Term Typically Offered: W

Prerequisite: MATH 435 or MATH 530. Corequisite: MATH 482 or graduate standing in Mathematics.

Methods of discrete mathematics with applications. Polya theory, codes, designs, matroids, the combinatorics of symmetric functions, and tableaux combinatorics. Additional topics including transversals and Latin squares, asymptotics, and discrete probability theory. 4 lectures. Not open to students with credit in MATH 436.

MATH 540. Topology I. 4 units

Term Typically Offered: W

Prerequisite: MATH 412 or graduate standing in Mathematics. Corequisite: MATH 481 or graduate standing in Mathematics.

Introduction to general topological spaces with emphasis on surfaces and manifolds. Open and closed sets, continuity, compactness, connectedness. Quotient spaces. 4 lectures. Not open to students with credit in MATH 440.

MATH 541. Topology II. 4 units

Term Typically Offered: SP

Prerequisite: MATH 440 or MATH 540.

Introduction to general topological spaces with emphasis on surfaces and manifolds. Fundamental group. Triangulations of spaces, classification of surfaces. Other topics may include covering spaces, simplicial homology, homotopy theory and topics from differential topology. 4 lectures. Not open to students with credit in MATH 441.

MATH 548. Transition to Graduate Mathematics. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing.

Interactive construction and analysis of mathematical proof and exposition at the graduate level. Topics drawn from standard advanced material in real analysis, linear algebra, and modern algebra. Major credit limited to 4 units; total limited to 8 units. 2 lectures, 2 seminars.

MATH 550. Real Analysis. 4 units

Term Typically Offered: F

Prerequisite: Satisfactory completion of the Graduate Written Examination in Analysis or consent of the Graduate Committee.

Introduction to Lebesgue measure and integration, convergence theorems, L_p spaces, Radon-Nikodym Theorem and Fubini's Theorem. 4 lectures.

MATH 560. Field Theory. 4 units

Term Typically Offered: SP

Prerequisite: MATH 482 or graduate standing.

Polynomial rings, field extensions, normal and separable extensions, automorphisms of fields, fundamental theorem of Galois theory, and further topics such as solvable groups, solution by radicals, insolubility of the quintic. Not open to students with credit in MATH 483. 4 lectures.

MATH 561. Graduate Algebra. 4 units

Term Typically Offered: F

Prerequisite: Completion of the Graduate Written Exam in Algebra or consent of the Graduate Committee.

An introduction to advanced topics from modern algebra, including group actions, the Sylow theorems, semi-direct products, and modules over a principal ideal domain. Other topics may include commutative algebra, homological algebra, cryptography applications, and topics from advanced linear algebra. 4 lectures.

MATH 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing and consent of instructor.

Directed group study of selected topics for graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

MATH 580. Seminar. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing and consent of instructor.

Built around topics in advanced mathematics chosen according to the common interests and needs of the students enrolled. Each seminar will have a subtitle according to the nature of the content. Total credit limited to 12 units. 1-4 seminars.

MATH 599. Thesis. 3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing and consent of instructor.

Serious research endeavor devoted to the development, pedagogy or learning of mathematics. Total credit limited to 9 units.

Mechanical Engineering (ME)

undefined

ME Courses

ME 128. Introduction to Mechanical Engineering I. 1 unit

Term Typically Offered: F

Prerequisite: Mechanical Engineering student; first quarter of freshman year. Concurrent: ME 163.

Introduction to mechanical engineering and its application in professional practice. Includes design, analysis, testing and dissection of mechanical engineering systems, from simple machines to more complicated systems. Introduction to engineering graphic communication. Introduction to HVAC, Manufacturing and Mechatronics concentrations. Includes cornerstone service learning project. 1 laboratory.

ME 129. Introduction to Mechanical Engineering II. 1 unit

Term Typically Offered: W

Prerequisite: ME 128; Mechanical Engineering student; second quarter of freshman year. Concurrent: IME 145.

Communication of designs for manufacturing using basic definitions of points, lines and planes in space. Pictorials, orthographic projection, section views and auxiliary views. Techniques from geometry and spatial definitions integrated to provide information to both the design and manufacturing processes. 1 laboratory.

ME 130. Introduction to Mechanical Engineering III. 1 unit

Term Typically Offered: SP

Prerequisite: ME 129; Mechanical Engineering student; third quarter of freshman year. Corequisite: IME 146.

Use of computer-aided design to communicate parts and assemblies. Dimensioned drawings for part fabrication. Introduction to fits and tolerances. Layout drawings and functional assemblies. 1 laboratory.

ME 161. Introduction to Composite Materials Manufacturing. 2 units

Term Typically Offered: F, SP, SU

Reinforcing fibers and matrix materials both synthetic and natural. Composite material molding and forming processes including hand layup, autoclave, compression molding, filament winding, and vacuum infusion molding. Mold, mandrel or tooling design. Composite component post-processing and machining. 2 laboratories.

ME 163. Freshmen Orientation to Mechanical Engineering. 1 unit

Term Typically Offered: F

Concurrent: ME 128.

Introduction to career opportunities in Mechanical Engineering, exploration of the ethical responsibilities of being a student and professional engineer, and familiarization with the Mechanical Engineering curriculum including cooperative education and international exchange opportunities. Cornerstone service learning project. Field trip may be required. 1 activity.

ME 211. Engineering Statics. 3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: MATH 241 (or concurrently), PHYS 131 or PHYS 141.

Analysis of forces on engineering structures in equilibrium. Properties of forces, moments, couples, and resultants. Equilibrium conditions, friction, centroids, area moments of inertia. Introduction to mathematical modeling and problem solving. Vector mathematics where appropriate. Course may be offered in classroom-based, online, or hybrid format. 3 lectures. Crosslisted as HNRS/ME 211.

ME 212. Engineering Dynamics. 3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: MATH 241; ME 211 or ARCE 211.

Analysis of motions of particles and rigid bodies encountered in engineering. Velocity, acceleration, relative motion, work, energy, impulse, and momentum. Further development of mathematical modeling and problem solving. Vector mathematics where appropriate. Course offered in hybrid format with classroom-based and online learning. 3 lectures. Crosslisted as HNRS 214/ME 212.

ME 228. Engineering Design Communication. 2 units

Term Typically Offered: F, W, SP

Use of engineering communication principles to communicate details of project designs including: sketching, orthographic projection, section and auxiliary views, dimensioning, and tolerances. Hand and computer based methods explored. Introduction to design for manufacturability. 2 laboratories.

ME 229. Introduction to Mechanical Engineering for Transfers. 2 units

Term Typically Offered: TBD

Introduction to Mechanical Engineering and its application in professional practice. Includes design, analysis, testing and dissection of mechanical engineering systems. Investigation of personal and professional ethics. Familiarization with the ME curriculum including cooperative education and international exchange opportunities. 1 lecture, 1 laboratory.

ME 234. Philosophy of Design. 3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Sophomore standing.

General approach to the meaning of engineering design. Conceptual blocks, creativity, design process, design considerations and elements. Course may be offered in classroom-based or online format. 3 lectures.

ME 236. Measurement and Engineering Data Analysis. 3 units

Term Typically Offered: F, W, SP

Prerequisite: Engineering majors. Recommended: CHEM 125, ENGL 149, and PHYS 132.

Introduction to principles and practice of measurement. Application of probability distributions, sampling, confidence intervals, uncertainty, and regression analysis to engineering experiments and design. Techniques for measuring common physical quantities such as temperature, pressure, and strain. Introduction to laboratory report writing and communication of technical data. 2 lectures, 1 laboratory.

ME 251. Introduction to Detailed Design with Solid Modeling. 2 units

Term Typically Offered: F, W, SP

Prerequisite: ME 130 or ME 228. Recommended: IME 143 or IME 146.

Part and system or assembly design with solid modeling using current software and hardware. Techniques of advanced communication including weld symbols, threaded fasteners, dimensioning and tolerancing. Creation of design layouts and part models with varied configurations and dynamic assembly models. Introduction to section mass and inertia properties. Emphasis of group work and peer review in the production of parts for assemblies. 1 lecture, 1 laboratory.

ME 263. Introduction to Mechanical Engineering for Transfer Students. 1 unit

Term Typically Offered: F, SP, SU

Introduction to mechanical engineering and its application in professional practice. Investigation of personal and professional ethics. Familiarization with the ME curriculum including cooperative education and international exchange opportunities. Course may be offered in classroom-based or online format. 1 lecture.

ME 264. Introduction to Mechanical Engineering for Transfers Lab. 1 unit

Term Typically Offered: F, SP

Introduction to Mechanical Engineering and its application in professional practice. Includes design, analysis, testing and dissection of mechanical engineering systems. 1 laboratory.

ME 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

ME 271. Selected Laboratory. 1-2 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics. The Class Schedule will list topic selected. Total credit limited to 4 units. 1 to 2 laboratories.

ME 302. Thermodynamics I. 3 units

Term Typically Offered: F,W,SP,SSU

Prerequisite: ME 212 and PHYS 132.

Properties of working fluids and fundamental relations for processes involving the transfer of energy. First and second laws of thermodynamics, irreversibility and availability. 3 lectures.

ME 303. Thermodynamics II. 3 units

Term Typically Offered: F,W,SP,SSU

Prerequisite: ME 302.

Vapor and gas power cycles, refrigeration cycles, thermodynamic relations, psychrometrics, and chemical reactions. Course may be offered in classroom-based, online, or hybrid format. 3 lectures.

ME 305. Introduction to Mechatronics. 4 units

Term Typically Offered: F, SP

Prerequisite: EE 201 and EE 251.

Introduction to microcontrollers and assembly language programming. Emphasis on components and techniques for interfacing that are typical of embedded microcontroller applications (A/D conversion, D/A conversion, interrupts, timers, and pulse-width modulation). Laboratory exercises involve real-time interfacing of microcontrollers to external mechanical and/or electromechanical devices. 3 lectures, 1 laboratory.

ME 313. Engineering Principles in Everyday Life. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and MATH 118 or equivalent. Recommended: PHYS 121.

Discover engineering principles and concepts such as natural frequencies, entropy, Coriolis acceleration, and Faraday's Law that govern our everyday lives, many aspects of human body, and consumer products. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

ME 318. Mechanical Vibrations. 4 units

Term Typically Offered: F,W,SP,SSU

Prerequisite: ME 212, MATH 344. Recommended: EE 201.

Free and forced vibration response of single and multiple degree of freedom systems. Experimental studies of the dynamic behavior of structures and machines. Instrumentation methods utilized in field and laboratory. 3 lectures, 1 laboratory.

ME 322. Introduction to System Dynamics. 4 units

Term Typically Offered: F,W,SP,SSU

Prerequisites: CPE/CSC 101 or CSC 231 or CSC 234; EE 201; EE 251; ME 318; ME 341.

Unified approach for mathematical modeling and numerical analysis of dynamic physical systems that store energy in multiple domains. Emphasis on developing lumped-parameter linear models from primitive elements in a systematic manner. 3 lectures, 1 laboratory.

ME 326. Intermediate Dynamics. 4 units

Term Typically Offered: F,W,SP,SSU

Prerequisite: ME 212; CPE/CSC 101 or CSC 231 or CSC 234. Corequisite: MATH 244.

Continuation of ME 212. Additional analysis of planar motion of rigid bodies with particular attention to rotating reference frames. Kinematics of linkages, three dimensional dynamics, introduction to numerical methods and dynamic simulation of mechanisms. 3 lectures, 1 activity.

ME 328. Design for Strength and Stiffness. 4 units

Term Typically Offered: F, W, SP

Prerequisite: BMED 212 or ME 234; CE 207 or CE 208; MATE 210; and ME 212. Corequisite: CPE/CSC 101, CSC 231, or CSC 234; and ME 251.

Design of machine parts by stress and deflection. Effects of fluctuating stresses and stress concentration. Design of shafts and other machine parts. Modern industrial design practice using standard components and design layout drawings. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

ME 329. Mechanical Systems Design. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ME 328.

Design of mechanical equipment and systems using various machine elements and components such as threaded fasteners, power screws, springs, gears, bearings, clutches, prime movers, etc. Decision modeling based on technical and economic feasibility. 3 lectures, 1 laboratory.

ME 341. Fluid Mechanics I. 3 units

Term Typically Offered: F,W,SP,SSU

Prerequisite: MATH 242 or MATH 244; ME 212.

Fluid properties and fluid statics. Euler and Bernoulli equations. Conservation equations; dimensional analysis. Viscous pipe flow. Course may be offered in classroom-based or online format. 3 lectures.

ME 343. Heat Transfer. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CPE/CSC 101, CSC 231, or CSC 234; and ME 236, ME 302, and ME 341.

Basic principles of heat transfer by conduction, convection, and radiation. Laboratory experiments to characterize thermodynamic material properties, energy conversion processes, thermodynamic cycles, and performance of heat transfer equipment. 3 lectures, 1 laboratory. Replaces ME 350.

ME 347. Fluid Mechanics II. 4 units

Term Typically Offered: F, W, SP
Prerequisite: ME 236, ME 341, ME 302.

Conservation equations of fluid dynamics. Viscous flow, boundary layer concepts, lift and drag, compressible flow, turbomachinery. Laboratory measurement of turbomachine performance, velocity profiles, boundary layers on surfaces. 3 lectures, 1 laboratory.

ME 359. Fundamentals of HVAC Systems. 4 units

Term Typically Offered: W
Corequisite: ME 302.

Fundamentals of heating, ventilating and air-conditioning (HVAC) systems, human comfort and indoor air quality, primary and secondary systems and components. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 laboratory.

ME 361. Fundamentals of Fire Protection Engineering. 4 units

Term Typically Offered: SP
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Fundamental physical and design principles of fire protection engineering. Fire safety strategy, egress, human behavior, fire dynamics, smoke control, alarm and detection, suppression, structural behavior, failure analysis, and engineering ethics. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

ME 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units.

ME 401. Stress Analysis. 4 units

Term Typically Offered: SP
Prerequisite: CE 207 or CE 208; MATH 344; and ME 328.

Advanced strength of materials: behavior of disks, plates, and shells. Theory of elasticity. Energy methods. 3 lectures, 1 laboratory.

ME 402. Orthopedic Biomechanics. 4 units

Term Typically Offered: W
Prerequisite: ME 328.

Biomechanical analysis of the musculoskeletal system. Emphasis on the use of statics, dynamics, strength of materials, viscoelasticity, and poroelasticity to analyze the mechanical loads acting on human joints, the mechanical properties of tissues, and the design of artificial joints. Course offered in hybrid format with classroom-based and online learning. 3 lectures, 1 laboratory.

ME 403. Access by Design: Introduction to Rehabilitation Engineering. 4 units

Term Typically Offered: TBD
Prerequisite: CE 204 or CE 208; and ME 212.

Project-based course focused on the design and analysis of systems to assist people with disabilities. Workplace assistance, mobility aids, educational accommodations, assistive technology and adaptive sports. Universal design, empathy in design, the Americans with Disabilities Act, and the social model of disability. 3 lectures, 1 laboratory.

ME 404. Applied Finite Element Analysis. 4 units

Term Typically Offered: F, W
Prerequisite: BMED 410, and CE 207 or CE 208; or CE 406; or ME 328.

Finite element based solutions to engineering problems with an emphasis on elastostatic problems in structural mechanics. The power and pitfalls associated with the finite element method highlighted through practical modeling assignments. Introduces the use of commercial finite element codes. 3 lectures, 1 laboratory. Crosslisted as BMED/CE/ME 404.

ME 405. Mechatronics. 4 units

Term Typically Offered: F, W
Prerequisite: EE 321, EE 361, ME 305, and ME 329 (ME329 may be taken concurrently); or CPE 316 or CPE/EE 329 or CPE/EE 336.

Microprocessor applications in machine control and product design. Applied electronics. Drive technology; transducers and electromechanical systems. Real-time programming. Mechatronic design methodology. 3 lectures, 1 laboratory.

ME 409. Interdisciplinary Study in Biomechanics. 4 units

Term Typically Offered: SP
Prerequisite: BMED 410 and CE 207 or CE 208; or KINE 403; or ME 326.

Examination of human motion biomechanics. Experimental and analytical methods in motion analysis based on rigid body dynamics. Protocols for protection of human subjects in research. Hypothesis-driven research in interdisciplinary teams, including written proposal development and written/oral communication of results to a scientific audience. 1 lecture, 3 activities. Crosslisted as BMED/KINE/ME 409.

ME 410. Experimental Methods in Mechanical Design I. 4 units

Term Typically Offered: TBD
Prerequisite: ME 328. Recommended: ME 318.

Bonded resistance strain gages for static and dynamic measurements; rosettes, bridge circuits, lead wire effects, special gages. Data acquisition systems, and measurement of displacement, velocity, and acceleration. Photoelastic methods including birefringent coatings. Applications in mechanical design and metrology. 3 lectures, 1 laboratory.

ME 412. Composite Materials Analysis and Design. 4 units

Term Typically Offered: W
Prerequisite: AERO 331 or ME 328.

Behavior of unidirectional fiber composites. Properties of short-fiber composites, and orthotropic lamina. Analysis of laminated composites. Strength and hygrothermal behavior of composite materials. Structural optimization. 3 lectures, 1 laboratory.

ME 415. Energy Conversion. 4 units

Term Typically Offered: SP
Sustainability Related
Prerequisite: ME 302.

Engineering aspects of energy sources, conversion and storage. Topics selected from fossil fuel systems, nuclear power, thermoelectric systems, thermionic converters, fuel cells, magnetohydrodynamic generators, and geothermal, tidal, wind and ocean temperature energy conversion systems. 4 lectures.

ME 416. Ground Vehicle Dynamics and Design. 4 units

Term Typically Offered: SP
Prerequisite: ME 318 and ME 329.

Design of ground vehicles for directional stability and control. Tire mechanics and their effects on vehicle performance. Simulation of vehicle dynamics using digital computer. Synthesis of steering mechanism and suspension system. 3 lectures, 1 laboratory.

ME 418. Implementation of Mechanical Controls. 4 units

Term Typically Offered: F, W, SP
Prerequisite: ME 322.

Analysis, design, and implementation of automated controllers for mechanical systems. Experimental measurement of dynamic properties and creation of system models. Analysis and simulation of the effect of control strategies on system dynamics. Design of closed-loop control systems, including control of dynamic properties and implementation using common embedded computing hardware. Not open to students with credit in ME 419 or ME 422. 3 lectures, 1 laboratory.

ME 419. Advanced Control Systems. 4 units

Term Typically Offered: W, SP
Prerequisite: ME 322, ME 236.

Modeling and control of physical systems. Design of mechanical, hydraulic and electrical feedback control systems using time response, transfer function, frequency response, state space and computer simulation. Address state feedback, observability and controllability of multi-input, multi-output systems. Not open to students with credit in ME 418 or ME 422. 3 lectures, 1 laboratory.

ME 422. Mechanical Control Systems. 4 units

Term Typically Offered: F
Prerequisite: ME 318.

Modeling and control of physical systems. Design of mechanical, hydraulic and electrical systems using time response, frequency response, state space, and computer simulation. Not open to students with credit in ME 418 or ME 419. 3 lectures, 1 laboratory.

ME 423. Robotics: Fundamentals and Applications. 4 units

Term Typically Offered: W
Prerequisite: ME 326. Corequisite: ME 418, ME 419, or ME 422.

Introduction to robots and their types. Homogeneous transformations. Kinematic equations and their solutions. Motion trajectories, statics, dynamics, and control of robots. Robot programming. Actuators, sensors and vision systems. 3 lectures, 1 laboratory.

ME 428. Senior Design Project I. 2 units

Term Typically Offered: F, W, SP
Prerequisite: ME 329. Corequisite: ME 318; ME 343 or ME 350; and IME 141, IME 142, IME 143, IME 146, ME 161, or ITP 341.

First of three courses taken sequentially in component and system design using real-world problems. Small teams study and apply techniques of the engineering design process including problem definition, concept generation, feasibility studies and decision making. Practice of professional skills including written and oral communication, teaming, project management, societal responsibility and ethics. 2 laboratories.

ME 429. Senior Design Project II. 2 units

Term Typically Offered: F, W, SP
Prerequisite: ME 428.

Continuation of a project begun in ME 428. Activities focused on detail design, analysis and material procurement. 2 laboratories.

ME 430. Senior Design Project III. 2 units

Term Typically Offered: F, W, SP
Prerequisite: ME 429.

Completion of a project begun in ME 428 and continued in ME 429. Design verified through prototyping and testing. 2 laboratories.

ME 434. Enhanced Oil Recovery. 4 units

Term Typically Offered: TBD
Prerequisite: ME 302; ME 347; and ME 343 or ME 350.

Primary, secondary, and tertiary (enhanced) oil recovery methods. Waterflooding, polymerflooding, gas injection, steam injection, in-situ combustion, chemical flooding, miscible flooding. Performance calculations and computer applications in EOR. 4 lectures.

ME 435. Drilling Engineering. 4 units

Term Typically Offered: TBD
Prerequisite: ME 329, ME 347.

Theory and practice of oilwell planning, drilling, well logging, and completion applied to the development of new oil and gas production, from onshore and offshore fields. 4 lectures.

ME 436. Petroleum Production Engineering. 4 units

Term Typically Offered: TBD
Prerequisite: ME 329, ME 347.

Design and operation of surface and subsurface equipment required in oil production. Processes and systems involved are rod pumping, gas lifting, acidizing, hydraulic fracturing, fluid gathering and storage, separation of oil, gas, water and sediment from produced fluid. Includes equipment used in enhanced oil recovery processes. 4 lectures.

ME 437. Nuclear Energy Power Generation. 4 units

Term Typically Offered: F
Prerequisite: Junior standing; PHYS 132 and PHYS 133.

Operation of a nuclear electric generation station; includes reactor water chemistry, material science, electric science, mechanical science, civil engineering for the nuclear power plant engineers and digital process control systems. Field trip may be required. 4 lectures.

ME 438. Nuclear Power Plant Design. 4 units

Term Typically Offered: W

Prerequisite: ME 302.

Principal elements of pressurized water reactor nuclear power systems; overview of reactor physics, thermodynamics, and heat transfer; includes basic reactor physics, reactor heat generation, reactor plant systems, support systems, and reactor safety. Field trip may be required. 4 lectures.

ME 439. Nuclear Power Plant Operations. 4 units

Term Typically Offered: TBD

Prerequisite: ME 437 or ME 438.

Overview of mass, momentum and energy conversion related to nuclear power plants; includes coupled neutronic/thermal models to study plant operation semi-quantitatively achieving an integrated plant understanding. Content includes: Neutron power kinetics, Coupled neutronic/thermal hydraulic modeling, Quantitative transient modeling, demonstration transients. Field trip may be required. 4 lectures.

ME 441. Single Track Vehicle Design. 4 units

Term Typically Offered: W

Prerequisite: ME 326 and ME 329; or consent of instructor.

Design of single track vehicles, including handling characteristics, ergonomics and human power, strength and stiffness considerations, braking and suspension. Laboratory focus on designing a single track vehicle, including fabrication of a handling prototype. 3 lectures, 1 laboratory.

ME 442. Design of Machinery. 4 units

Term Typically Offered: F

Prerequisite: ME 212.

Graphical synthesis and analysis of mechanisms and machines. Analytical fundamentals for study of displacements, velocities, accelerations, and static and dynamic forces necessary for design of planar linkages and gearing systems. Creative design projects using software simulation tools. 3 lectures, 1 laboratory.

ME 443. Turbomachinery. 4 units

Term Typically Offered: SP

Prerequisite: MATH 344; ME 303; ME 347; and ME 343 or ME 350.

Performance characteristics of various types for liquids and for gases. Criteria for proper selection of type and main dimensions. Cavitation criteria. Gas turbine cycles and performance. Two-dimensional cascades. Axial flow turbines and compressors. Centrifugal compressors and radial-inflow turbines. 4 lectures.

ME 444. Combustion Engine Design. 4 units

Term Typically Offered: TBD

Prerequisite: ME 303; ME 347; and ME 343 or ME 350.

Application of design parameters to the various engine cycles. Aspects of the combustion processes. Emission regulation effects on engine design. Static and dynamic loading. 3 lectures, 1 laboratory.

ME 448. Thermal System Design. 4 units

Term Typically Offered: F, W, SP

Prerequisites: ME 303, ME 343, and ME 347.

Design of thermal systems. Engineering economics, thermal component sizing, and simulation techniques applied to the design and performance analysis of thermal systems. Not open to students with credit in ME 420. 3 lectures, 1 laboratory.

ME 450. Solar Thermal Power Systems. 4 units

Term Typically Offered: F

Sustainability Related

Prerequisite: ME 343 or ME 350. Recommended: ME 415.

High and intermediate temperature systems for conversion of solar energy to mechanical power and heat. Thermal energy storage and total thermal energy system design. 3 lectures, 1 laboratory.

ME 451. Engineering, Design, and Social Justice. 4 units

Term Typically Offered: SP

Prerequisite: Senior standing. Recommended: ME 234 or equivalent engineering design course; and completion of USCP.

Explores topics at the intersection of engineering design theories and efforts for social justice and equity. Critiques dominant engineering mindsets, examines design practices, and articulates ways engineers can develop equity-mindedness in their problem-solving. 4 lectures.

ME 453. Trends and Opportunities in HVAC&R. 1 unit

Term Typically Offered: SP

Sustainability Focused

Prerequisite: ME 302 or ENVE 304.

Overview of the roles of the Heating, Ventilating, Air-Conditioning and Refrigeration (HVAC&R) industry. Presentation of state-of-the-art HVAC&R systems, components and design solutions. Includes guest speakers from HVAC&R industry. 1 activity.

ME 454. Benchmarking and Assessment of Building Energy Performance. 4 units

Term Typically Offered: W

Sustainability Focused

Prerequisite: ME 343 or ME 350. Recommended: ME 359.

An introduction and study of building energy assessment principles and protocols for existing commercial buildings. Course topics include techniques of energy measurement and verification, energy metric comparison and analysis, and energy auditing. Field trip required. 3 lectures, 1 laboratory.

ME 455. Introduction to Building Energy Modeling. 3 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: ME 343 or ME 350. Recommended: ME 359.

Introduction to principles and practices of building energy modeling. Case studies using state of the art energy modeling computer software to simulate the energy use of buildings. Methods to reduce energy consumption of buildings. 2 lectures, 1 laboratory.

ME 456. HVAC Air and Water Distribution System Design. 4 units

Term Typically Offered: F
Prerequisite: ME 302, ME 347.

Air and water distribution components and systems and the design of these systems with applications to the heating, ventilating and air-conditioning (HVAC) industry. Course offered in hybrid format with classroom-based and online learning. 3 lectures, 1 laboratory.

ME 457. Refrigeration Principles and Design. 4 units

Term Typically Offered: SP
Prerequisite: ME 341; ME 343 or ME 350.

Basic engineering principles of refrigeration processes including: vapor compression cycles, multipressure systems, absorption systems, steam jet cooling, air cycles, and low temperature refrigeration. 3 lectures, 1 laboratory.

ME 458. Building Heating and Cooling Loads. 4 units

Term Typically Offered: F
Prerequisite: ME 303; and ME 343 or ME 350.

Building heating and cooling load calculations, estimating energy consumption and operating costs for heating, ventilating and air-conditioning system design and selection. 3 lectures, 1 laboratory.

ME 459. HVAC Senior Design Project I. 3 units

Term Typically Offered: W
Prerequisite: ME 456.

First quarter of a two quarter sequence. Team project work in designing heating, ventilating and air-conditioning (HVAC) systems. New developments, policies and practices in the HVAC industry. Professional ethics relevant for practicing engineers. 1 lecture, 2 laboratories.

ME 460. HVAC Senior Design Project II. 2 units

Term Typically Offered: SP
Prerequisite: ME 459.

Continuation of work begun in ME 459. Team project designing heating, ventilating and air-conditioning (HVAC) systems. 2 laboratories.

ME 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 lectures.

ME 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

ME 488. Wind Energy Engineering. 4 units

Term Typically Offered: W
Sustainability Focused
Prerequisite: ME 329, ME 347, ME 302.

Engineering aspects of windpower systems including mechanical design, support structure design, aerodynamic analysis, wind field analysis, system concepts and analysis, and economics. 4 lectures.

ME 493. Cooperative Education Experience. 2 units

Term Typically Offered: F, W, SP
CR/NC
Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units.

ME 494. Cooperative Education Experience. 6 units

Term Typically Offered: F, W, SP
CR/NC
Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units.

ME 495. Cooperative Education Experience. 12 units

Term Typically Offered: F, W, SP
CR/NC
Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

ME 500. Individual Study. 1-4 units

Term Typically Offered: F, W, SP
Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 8 units.

ME 501. Continuum Mechanics and Elasticity. 4 units

Term Typically Offered: F
Prerequisite: Graduate standing.

Introduction to continuum mechanics. Kinematics, stress, and balance laws. Constitutive theory for isotropic and anisotropic solids and viscous fluids. Applications including design of beams and pressure vessels, stress concentrations, fiber-reinforced composites, and non-homogeneous biological materials. Course offered in hybrid format with classroom-based and online learning. 4 lectures. Crosslisted as CE 511/ME 501.

ME 503. Inelastic Stress Analysis. 4 units

Term Typically Offered: W
Prerequisite: ME 501 or CE 511.

Perfectly plastic and work hardening materials; von Mises and Tresca yield, isotropic and kinematic hardening flow rules, boundary-value problems. Finite elasticity: kinematics, Cauchy- and Green-elasticity, invariance, constraints, Neo-Hookean and Mooney-Rivlin materials, experimental approaches, non-uniqueness, anisotropy, residual stress, thermoelasticity, boundary-value problems. Course offered in hybrid format with classroom-based and online learning. 4 lectures. Crosslisted as CE 513/ME 503.

ME 504. Finite Element Analysis. 4 units

Term Typically Offered: SP
Prerequisite: CE/ME 404 and CE 511/ME 501 or consent of instructor.

Finite element theory and application with a focus on computer implementation of the method. Strong, weak and variational formulations, physical and isoparametric spaces, error estimates, numerical integration, finite element algorithms, and programming architecture. 3 lectures, 1 laboratory. Crosslisted as CE/ME 504.

ME 506. System Dynamics. 4 units

Term Typically Offered: SP
Prerequisite: Graduate standing or consent of instructor.

Unified approach for mathematical modeling and analysis of dynamic physical systems which may store energy in multiple energy domains. Emphasis on developing lumped-parameter linear system models from a set of primitive elements in a systematic manner. 4 lectures.

ME 507. Mechanical Control System Design. 4 units

Term Typically Offered: F, SP
Prerequisite: Graduate standing or consent of instructor.

Application of principles of high-level design to mechanical control system implementation. Use of modified state transition logic in conjunction with object-oriented programming as design methodology. Real-time programming using above techniques for control of mechanical systems. 3 lectures, 1 laboratory.

ME 517. Advanced Vibrations. 4 units

Term Typically Offered: SP
Prerequisite: ME 318, graduate standing or consent of instructor.

Vibration of complex engineering systems. Inertia and stiffness matrices. Natural frequencies and normal modes. Approximate solutions and computer techniques. Response to transient and periodic inputs. 3 lectures, 1 laboratory.

ME 518. Machinery Vibration and Rotor Dynamics. 4 units

Term Typically Offered: W
Prerequisite: ME 318, graduate standing or consent of instructor.

Vibrations relating to rotating machinery. Modeling of structural rotordynamic phenomena induced by shaft flexibility, bearings, and seals. Laboratory measurement of rotor system dynamic response and interpretation of machinery diagnostic information. Research project on a related topic. 3 lectures, 1 laboratory.

ME 540. Viscous Flow. 4 units

Term Typically Offered: W
Prerequisite: ME 347, MATH 344 and graduate standing or consent of instructor.

Introduction to tensor calculus and indicial notation. Development of Reynolds' Transport Theory. Special forms of the governing equations of fluid motion. Internal flows and other classical solutions to the Navier-Stokes equations. 4 lectures.

ME 541. Advanced Thermodynamics. 4 units

Term Typically Offered: TBD
Prerequisite: ME 303 and ME 347; ME 343 or ME 350; and graduate standing.

Selected modern applications of thermodynamics which may include topics from: 1) equilibrium and kinetics as applied to combustion and air pollution, analysis and evaluation of techniques used to predict properties of gases and liquids, and 2) improvement of modern thermodynamic cycles by second law analysis. 4 lectures.

ME 542. Dynamics and Thermodynamics of Compressible Flow. 4 units

Term Typically Offered: F
Prerequisite: MATH 244; ME 303; ME 347; ME 343 or ME 350; and graduate standing.

Control volume analysis of fluid-thermo equations for one-dimensional, compressible flow involving area change, normal shocks, friction, and heat transfer. Two-dimensional supersonic flow including linearization, method of characteristics, and oblique shocks. One-dimensional constant area, unsteady flow, 4 lectures.

ME 552. Advanced Heat Transfer I. 4 units

Term Typically Offered: W
Prerequisite: MATH 344; ME 347; ME 343 or ME 350; and graduate standing.

Advanced principles of heat transfer. Classical solution techniques to problems in conduction and/or radiation. 4 lectures.

ME 553. Advanced Heat Transfer II. 4 units

Term Typically Offered: F
Prerequisite: MATH 344; ME 347; ME 343 or ME 350; and graduate standing.

Advanced principles of heat transfer. Classical solution techniques to problems in convection. 4 lectures.

ME 554. Computational Heat Transfer. 4 units

Term Typically Offered: SP
Prerequisite: ME 347; ME 343 or ME 350; and graduate standing.
Recommended: MATH 418.

Numerical solutions of classical, industrial, and experimental problems in conduction, convection, and radiation heat transfer. 3 lectures, 1 laboratory.

ME 563. Graduate Seminar. 1 unit

Term Typically Offered: F
Prerequisite: Graduate standing in mechanical engineering program.

Current developments in mechanical engineering. Participation by graduate students, faculty and guests. 1 seminar.

ME 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units; may be repeated in same term. 1 to 4 seminars.

ME 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units; may be repeated in same term. 1 to 4 laboratories.

ME 579. Fluid Power Control. 4 units

Term Typically Offered: TBD

Prerequisite: ME 418 or ME 419 or ME 422.

Design, analysis, and control of fluid power systems. Analysis of fluid power system components such as valves, actuators, pumps and motors. System response and stability. Dynamic modeling and computer simulation 3 lectures, 1 laboratory.

ME 599. Design Project (Thesis). 1-9 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing.

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis.

Microbiology (MCRO)

undefined

MCRO Courses

MCRO 100. Introduction to Microbiology Research. 2 units

Term Typically Offered: W

CR/NC

Group research experience in microbiology through participation in a faculty-student research project. Foundations of the scientific method including literature review, design of experiments, common laboratory techniques, data analysis, interpretation of results and scientific communication. Intended for freshmen and sophomores with no research experience. Priority to MCRO majors. Credit/No Credit grading only. 1 seminar, 1 laboratory.

MCRO 221. Microbiology. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

Prerequisite: CHEM 110 or CHEM 124 or CHEM 127.

Microbial classification and identification, cell structure and function, metabolism, microbial systems and evolutionary processes, with applications to industry, agriculture, food production, environment, and health. Not open to students with credit in MCRO 224; not for credit for Biology and Microbiology majors. 3 lectures, 1 laboratory. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs).

MCRO 224. General Microbiology I. 5 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

Prerequisite: BIO 161; and CHEM 125 or CHEM 128. Recommended: CHEM 129.

Fundamental concepts of prokaryotes, eukaryotic microorganisms and microbiological entities. Microbial taxonomy, classification, cellular structure and function, metabolism, growth dynamics and control. Introduction to microbial genetics and molecular techniques. Microbial interaction with human and society. Fundamental laboratory techniques in microbiology. 3 lectures, 2 laboratories. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs).

MCRO 225. General Microbiology II. 5 units

Term Typically Offered: SP

Prerequisite: MCRO 224.

Microbial diversity, systematics, ecology, and symbiotic relationships. Introduction to host-microorganism interactions including pathogenesis, epidemiology, and immunology. 3 lectures, 2 laboratories.

MCRO 301. Wine Microbiology. 4 units

Term Typically Offered: SP

Prerequisite: MCRO majors must have MCRO 224; WVIT majors must have MCRO 221 or MCRO 224; and WVIT 202; open to MCRO or WVIT majors only.

Wine yeasts, bacteria, and molds: morphology and methods of identification; successful alcoholic and malolactic fermentations; management and prevention of unwanted microbial growth; microorganisms and flavor development. 3 lectures, 1 laboratory. Crosslisted as MCRO/WVIT 301.

MCRO 320. Emerging Infectious Diseases. 3 units

Term Typically Offered: F,W,SP,SU

Prerequisite: BIO 161; and MCRO 221 or MCRO 224.

Recent outbreaks of human diseases, interrelationships between infectious disease agents, human biology, and the environment. Infectious agents and disease processes, virulence mechanisms, and host immune response. Clinical approaches and surveillance methods to detect, investigate, and monitor emerging pathogens. Factors involved in the accelerating emergence of diseases and bioterrorist agents. 3 lectures.

MCRO 342. Public Health Microbiology. 4 units

Term Typically Offered: W, SP

Prerequisite: MCRO 221 or MCRO 224.

Principles of disease prevention and control. Water-, food-, and air-borne microbial contaminations and epidemiology of ensuing diseases. 3 lectures, 1 laboratory.

MCRO 402. General Virology. 4 units

Term Typically Offered: W

Prerequisite: BIO 351 or CHEM 373, or graduate standing in Biological Sciences. Recommended: BIO 452.

Infective macromolecules (prions, viroids, and viruses) associated with microbes, plants, and animals. Epidemiology, immune responses, pathogenicity, carcinogenesis, diagnoses, vaccination, and therapy. 3 lectures, 1 laboratory.

MCRO 421. Food Microbiology. 4 units

Term Typically Offered: F, SP

Prerequisite: MCRO 221 or MCRO 224. Recommended: CHEM 212/312.

Physiological activities of microorganisms involved in the preparation, preservation, deterioration, and toxicity of foods and related products. Detection and prevention of spoilage microorganisms and foodborne pathogens. 3 lectures, 1 laboratory.

MCRO 423. Medical Microbiology. 5 units

Term Typically Offered: F

Prerequisite: Junior standing; MCRO 225; and CHEM 216, CHEM 312 or CHEM 316; and consent of instructor.

Microorganisms as agents of disease in humans. Epidemiology, host-parasite relationships, and chemotherapy. The compromised host and opportunistic disease. Laboratory safety. Procedures for laboratory diagnosis of human diseases. Rapid miniaturized methods of identification. 3 lectures, 2 laboratories.

MCRO 424. Microbial Physiology. 5 units

Term Typically Offered: W

Prerequisite: MCRO 225 and CHEM 313 or CHEM 371, or graduate standing in Biological Sciences.

Cellular structure and life processes of bacteria; chemical composition, growth, and metabolism. General biological and evolutionary considerations. 3 lectures, 2 laboratories.

MCRO 433. Microbial Biotechnology. 3 units

Term Typically Offered: F

Prerequisite: MCRO 221 or MCRO 224; and BIO 303 or BIO 351 or equivalent; and CHEM 216, CHEM 312 or CHEM 316 or equivalent, or graduate standing in Biological Sciences.

Principles and methods used for production of enzymes, pharmaceuticals, chemicals, and food additives using micro-organisms. Topics include screening and strain improvement, regulation of metabolite production, genetic engineering, heterologous gene expression systems, large-scale production, and intellectual property. 3 lectures.

MCRO 436. Microbial Ecology. 4 units

Term Typically Offered: SP

Prerequisite: BIO 160; BIO 161; BIO 263; and MCRO 221 or MCRO 224; or graduate standing in Biological Sciences.

Ecology and interactions of microorganisms in natural environments. Role of microorganisms in ecosystem function such as nutrient cycling, extreme environments, symbioses. Applications of microorganisms in the environment such as bioremediation, biocontrol, biofuels. Field trip may be required. 2 lectures, 2 activities.

Military Science Leadership (MSL)

undefined

MSL Courses

MSL 101. Foundation of Officership I. 1 unit

Term Typically Offered: F

Introduction to issues and competencies of the Army officer profession. Emphasis on stereotypes about the military, the role of the Army officer, customs and traditions within the military, and personal and physical development. 1 lecture.

MSL 102. Foundation of Officership II. 1 unit

Term Typically Offered: W

The role of leadership within a large organization. Emphasis on the definition of leadership, leadership framework, individual and organizational core values, and the moral responsibility of leadership. 1 lecture.

MSL 103. Basic Leadership. 1 unit

Term Typically Offered: SP

The foundation of basic leadership fundamentals such as problem solving, communications, briefings and effective writing, techniques for improving listening and speaking skills, and an introduction to counseling. 1 lecture.

MSL 110. Exercises in Military Leadership. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Enrollment in any MSL course or consent of department head.

Hands-on instruction on the proper execution of small-unit military operations. Incorporation of the military decision-making process in the planning, execution and conducting of a wide variety of squad, platoon and company sized missions. Credit/No Credit grading only. 1 activity.

MSL 111. Orienteering. 2 units

Term Typically Offered: W, SP

Principles of orienteering, basic map reading and compass skills; course running techniques applied in field orienteering events. 1 lecture, 1 activity.

MSL 112. The Army Physical Fitness Program. 1 unit

Term Typically Offered: F, W, SP

The Army Physical Fitness Program and its proper execution. Physical training to the Army standard with the goal of successfully passing the Army Physical Fitness Test. 1 laboratory.

MSL 201. Foundations of Leadership I. 2 units

Term Typically Offered: F

The development of individual leadership traits and capabilities using the Army officer as a model. The Army's problem solving methods, written and oral communications, tactics and group leadership. 2 lectures.

MSL 202. Foundations of Leadership II. 2 units

Term Typically Offered: W

The development of individual leadership traits and capabilities using the Army officer as a model. The Army's problem solving methods, tactics and group leadership. 2 lectures.

MSL 203. Foundations of Leadership III. 2 units

Term Typically Offered: SP

The development of individual leadership traits and capabilities using the Army officer as a model. The Army's problem solving methods, land navigation techniques, tactics and group leadership. 2 lectures.

MSL 212. Leader's Training Course. 1-7 units

Term Typically Offered: F

One to seven units of credit may be granted depending upon successful completion of training. Five weeks of training, Fort Knox, Kentucky. Travel pay and salary provided through the Military Science Department. No obligation. LTC graduates eligible to enroll in ROTC Advanced Program.

MSL 229. Ranger Challenge. 2 units

Term Typically Offered: F

CR/NC

Selection and preparation of the Ranger Challenge Team which will represent Cal Poly in military tactical skills competition. Includes rope bridging, orienteering, weapons knowledge, hand grenade accuracy, 10K road march with equipment, first aid, marksmanship, physical fitness and tactics. Credit/No Credit grading only. 2 activities.

MSL 240. American Military History and the Evolution of Western Warfare. 4 units

Term Typically Offered: W, SP

Comprehensive analysis of American military history from the early Anglo-French period to the end of the 20th Century. Examination of the strategies, operations and tactics of military warfare, and exploration of how social, economic, and technological factors produced the distinct patterns of war that characterize the struggles of the past two hundred plus years. Open to all students. 4 lectures.

MSL 270. Selected Topics. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

MSL 275. Facilitation and Teambuilding. 2 units

Term Typically Offered: TBD

Techniques and models used in leadership, facilitation, and teambuilding. Emphasis on leadership and facilitation styles and models, teambuilding and group dynamics, and working with various populations. Field trip required. 2 seminars. Crosslisted as MSL/RPTA 275.

MSL 301. Tactical Leadership I. 3 units

Term Typically Offered: F

Prerequisite: Completion of MSL 101, MSL 102, MSL 103, MSL 201, MSL 202, MSL 203, or completion of MSL 212, and consent of department head.

Introduction to the life of a professional Army officer. Instruction in the operational art of small-unit leadership, and the roles and responsibilities of an Army 2nd Lieutenant in preparation for attendance at the Leader Development and Assessment Course. 3 lectures.

MSL 302. Tactical Leadership II. 3 units

Term Typically Offered: W

Prerequisite: MSL 301, and consent of instructor.

Continuation of study of the life of a professional Army officer. Instruction in the operational art of small-unit leadership, and the roles and responsibilities of an Army 2nd Lieutenant in preparation for attendance at the Leader Development and Assessment Course. 3 lectures.

MSL 303. Applied Leadership. 3 units

Term Typically Offered: SP

Prerequisite: MSL 301, MSL 302, and consent of instructor.

Demonstration of proficiency in leading small units. Emphasis on clear and concise oral communications, land navigation, weapons skills, and timely decision-making. Completion of training for the Leader Development and Assessment Course and preparation for attendance at the course. 3 lectures.

MSL 310. Advanced Leadership of Military Exercises. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: MSL 110. Recommended: MSL 203 or MSL 212.

The planning, resourcing and execution of selected Army tactical missions in a field environment, and leading all students enrolled in MSL 110. Total credit limited to 3 units. 1 activity.

MSL 312. Leadership of the Army Physical Fitness Program. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: MSL 112. Recommended: MSL 203 or MSL 212.

The planning, resourcing and execution of the Army Physical Fitness Program, and leading all students enrolled in MSL 112. Total credit limited to 3 units. 1 laboratory.

MSL 314. Leadership Development and Assessment Course. 6 units

Term Typically Offered: F

CR/NC

Prerequisite: MSL 301, MSL 302, MSL 303, and consent of instructor.

Five week summer training program required to achieve an Army commission. Testing and training as functional Army officers and determination of potential for service. Travel pay, room and board, and salary provided by the U.S. Army. Held at Fort Lewis, Washington. Credit/No Credit grading only.

MSL 400. Special Problems for Advanced Undergraduates. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MSL 401. Developmental Leadership I. 3 units

Term Typically Offered: F

Prerequisite: MSL 301, MSL 302, MSL 303 and consent of instructor.

In-depth study and analysis of the duties and responsibilities of an ethical Army officer. Emphasis on honing skills required at follow-on training. Administrative actions and self and subordinate developmental processes utilized by an Army 2nd Lieutenant. 3 lectures.

MSL 402. Developmental Leadership II. 3 units

Term Typically Offered: W

Prerequisite: MSL 401 and consent of instructor.

Continuation of MSL 401 with a focus on communications and personal development. Continuation of in-depth study and analysis of the duties and responsibilities of an ethical Army officer. Emphasis placed on honing skills required at follow-on training. Administrative actions and self and subordinate developmental processes utilized by an Army 2nd Lieutenant. 3 lectures.

MSL 403. Adaptive Leadership. 3 units

Term Typically Offered: SP

Prerequisite: MSL 401 and MSL 402.

Beginning of transition from student to commissioned officer. Emphasis on expectations of an Army 2nd Lieutenant. Cultural awareness, effective command climates, terrorism and force protection in the current operational environment, and individual officer skills. 3 lectures.

MSL 410. Administration and Evaluation of Exercises in Military Leadership. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: MSL 303 or MSL 310. Recommended: MSL 314.

The supervision and evaluation of the organization, planning, resourcing, and execution of selected Army tactical missions, and mentoring assigned students enrolled in MSL 310. Total credit limited to 3 units. 1 activity.

MSL 412. Administration and Evaluation of the Army Physical Fitness Program. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: MSL 303 or MSL 312. Recommended: MSL 314.

The supervision and evaluation of the organization, planning, resourcing, and execution of the Army Physical Fitness Program, and mentoring assigned students enrolled in MSL 312. Total credit limited to 3 units. 1 laboratory.

MSL 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

Music (MU)

undefined

MU Courses

MU 101. Introduction to Music Theory. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Introduction to materials of music and their use by composers and performers in diverse cultural contexts. Notation of dynamics, pitch, rhythm, scales, key signatures, intervals, and chords. Analysis of musical syntax based on these elements. 3 lectures, 1 activity. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

MU 103. Music Theory I: Diatonic Materials. 4 units

Term Typically Offered: F, W

Prerequisite: MU 101 with a grade of C- or better, or consent of instructor.

Introduction to species counterpoint, structure of tonality, four-part writing of root position and inverted triads, dominant seventh chord, phrase structure, harmonic progressions, harmonization of a melody and nonharmonic tones. Composition project. 4 lectures.

MU 104. Musicianship I. 2 units

Term Typically Offered: F

Prerequisite: MU 101; Music majors may be concurrently enrolled in MU 101 and MU 104.

Introductory sightsinging in the major mode; rhythmic performance and dictation in simple and compound meters; identification and performance of melodic and harmonic intervals and triads; dictation of major diatonic melodies and chord progressions using the primary triads. 2 activities.

MU 105. Music Theory II: Chromatic Materials. 4 units

Term Typically Offered: W, SP

Prerequisite: MU 103 with a grade of C- or better, or consent of instructor.

Construction and resolution of diatonic seventh chords, secondary dominants, augmented sixth, and Neapolitan chords. Modal mixture and modulation to closely-related keys. Binary, ternary, and variation forms. Introduction to 18th-century counterpoint. Composition project. 4 lectures.

MU 106. Musicianship II. 2 units

Term Typically Offered: W

Prerequisite: MU 104 with a grade of C- or better, or consent of instructor. Corequisite: MU 103.

Sightsinging and dictation in major and minor modes; performance and dictation of one- and two-part rhythms in simple and compound meters; syncopation; identification of compound intervals, triad inversions, and cadence types; harmonic dictation using diatonic root-position triads and the dominant seventh. 2 activities.

MU 108. Musicianship III. 2 units

Term Typically Offered: SP

Prerequisite: MU 106 with a grade of C- or better, or consent of instructor.

One- and two-part sightsinging and melodic dictation; alto and tenor clefs; one- and two-part rhythmic performance and dictation including syncopation and triplets; harmonic dictation including diatonic triads in all inversions and dominant and supertonic seventh chords; identification of phrase structure. 2 activities.

MU 114. Introduction to Composing. 4 units

Term Typically Offered: TBD

Prerequisite: MU 101 or consent of instructor.

Fundamental concepts in music composition. Creative projects. Compositional techniques, development, and structure. Analysis of examples from the literature. 3 lectures, 1 activity.

MU 120. Music Appreciation. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Explores the elements of music with emphasis on Western tradition. Language of music, the role of music in society. Historical context and major composers from the Middle Ages to the present. 3 lectures, 1 activity. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

MU 121. Introduction to Non-Western Musics. 4 units

Term Typically Offered: W

Prerequisite: MU 104 or consent of instructor.

Survey of selected non-Western music cultures. Emphasis on listening and understanding the ensemble type, aesthetic principle, musical style, and performance practice of each. 3 lectures, 1 activity.

MU 150. Applied Music. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual instruction in performance with emphasis on repertoire, technical skills, style, and interpretation. Total credit limited to 6 units. The Class Schedule will list topic selected.

MU 151. Beginning Class Piano. 2 units

Term Typically Offered: F, W, SP

Beginning piano for student with no background in keyboard instruments. Includes fundamentals of notation, keyboard techniques, tone production, sightreading and facility. 1 lecture, 1 activity.

MU 152. Elementary Class Piano. 1 unit

Term Typically Offered: TBD

Prerequisite: MU 151 or consent of instructor; for non-music majors.

Continuation of MU 151. Piano for students with the ability to play a simple Bach or Mozart Minuet. Total credit limited to 3 units. 1 activity.

MU 154. Beginning Voice. 1 unit

Term Typically Offered: F, W, SP

Beginning study of vocal and performance technique for the untrained singer. Includes the beginning study of the vocal mechanism and the fundamentals of notation. 1 activity.

MU 155. Beginning Guitar. 1 unit

Term Typically Offered: F, W, SP

Fundamentals of guitar technique and performance. Elements of classical, pop, and folk styles. Basics of staff and chord notations. No previous experience necessary. 1 activity.

MU 161. Piano Skills I. 1 unit

Term Typically Offered: F

Prerequisite: Music major or consent of instructor.

Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody, score-reading. 1 activity.

MU 162. Piano Skills II. 1 unit

Term Typically Offered: W

Prerequisite: MU 161 or consent of instructor.

Continuation of MU 161. Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody, score-reading. 1 activity.

MU 163. Piano Skills III. 1 unit

Term Typically Offered: SP

Prerequisite: MU 162 or consent of instructor.

Continuation of MU 162. Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody, score-reading. 1 activity.

MU 168. Piano Accompanying. 1 unit

Term Typically Offered: TBD

Corequisite: MU 253 or piano topic in any of the following courses: MU 150, MU 250, MU 350 or MU 450; or consent of instructor.

Preparation and performance of vocal and instrumental music written with piano accompaniment. Choral rehearsal accompanist techniques. Open to students who are proficient on piano at a collegiate level. Total credit limited to 6 units. 1 activity.

MU 170. University Jazz Band. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Rehearsal and public performance of jazz big band repertoire. Open to qualified students who sing or who play trumpet, trombone, saxophone, piano, guitar, vibes, bass, drums, or congas. Total credit limited to 6 units. 1 laboratory.

MU 171. Instrumental Ensembles. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Faculty-supervised small ensembles (e.g., string quartets, brass quintets), as permitted by departmental staffing. Performances take place in student recitals, large-ensemble concerts, and/or other university events. Open to students concurrently participating in large ensembles. Interested students should contact instrumental ensemble directors. The Class Schedule will list topic selected. Total credit limited to 6 units. 1 activity.

MU 172. Wind Orchestra. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Study and public performance of music written for large wind band. Open to all qualified students who perform on woodwind, brass, and percussion instruments. The Class Schedule will list topic selected. Total credit limited to 6 units. 1 laboratory.

MU 173. Wind Ensemble. 1 unit

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Study and public performance of music written for wind bands with limited doubling and flexible instrumentation. Open to all students who perform on woodwind, brass and percussion instruments on an advanced collegiate level. Total credit limited to 6 units. 1 laboratory.

MU 174. Symphony Orchestra. 1 unit

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor, based on audition.

Preparation and performance of orchestral music, including both standard repertoire and current works in various genres. Open to all qualified students who perform on string, woodwind, brass, and percussion instruments. Field trip required. Total credit limited to 6 units. 1 laboratory.

MU 176. Mustang Band. 1 unit

Term Typically Offered: F, W
Prerequisite: Consent of instructor.

Public performance of music and specially-designed shows written for marching band (woodwinds, brass, percussion, and flag team auxiliary). Limited to those students who have had marching experience with wind and percussion instruments, or flag, rifle or dance lines. Total credit limited to 6 units. 1 laboratory.

MU 177. Chamber Winds. 1 unit

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Study and public performance of chamber music written for woodwinds, brass, or percussion. Open to all instrumentalists who have high school or college level performance experience. Total credit limited to 6 units. 1 activity.

MU 178. Field Show Marching Skills. 1 unit

Term Typically Offered: F
Study and application of advanced field show marching techniques used in performance by the Cal Poly Mustang Band and other university bands. Limited to those students who have experience performing on a wind/percussion instrument, or in a marching band flag/dance team auxiliary. Total credit limited to 6 units. 1 activity.

MU 181. PolyPhonics. 1 unit

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Advanced study and public performance of music for mixed chorus. Total credit limited to 6 units. 1 laboratory.

MU 182. Cantabile. 1 unit

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Advanced study and public performance of music for soprano and alto chorus. A variety of styles of choral literature specifically intended for treble voices from various time periods is explored. Total credit limited to 6 units. 1 activity.

MU 183. Vocal Ensemble. 1 unit

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Open to qualified singers. Rehearsal and performance of specialized vocal music. Total credit limited to 6 units. 1 activity.

MU 185. University Singers. 1 unit

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Study and public performance of music for large mixed chorus. Total credit limited to 6 units. 1 laboratory.

MU 186. Chamber Choir. 1 unit

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Advanced study and public performance of music for small ensemble. This ensemble focuses on music of the Renaissance, Baroque and Modern Eras. A variety of styles of choral literature, specifically intended for a small performing ensemble, is explored. Total credit limited to 6 units. 1 laboratory.

MU 188. Arab Music Ensemble. 1 unit

Term Typically Offered: F, W, SP
Rehearsal and performance of instrumental and vocal repertoire drawn from art and popular music of wide-ranging Arabic-speaking societies and historically related cultures. Accompanying music theories, instrumental techniques, and performance practices, with presentation of seminal works in public concerts. Total credit limited to 6 units. 1 laboratory.

MU 189. Vocal Practicum. 1 unit

Term Typically Offered: F, W, SP
Prerequisite: MU 150, MU 250, MU 350 or MU 450, or consent of instructor.

Study and implementation of performing techniques used by vocalists in a recital or concert setting. Total credit limited to 6 units. 1 activity.

MU 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F, W, SP
Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MU 210. Musicianship IV. 1 unit

Term Typically Offered: F
Prerequisite: MU 108 with a grade of C- or better, or consent of instructor.
Corequisite: MU 105.

Continuation of MU 108. Sightsinging and melodic dictation using chromatic tones; rhythmic performance in changing meters; harmonic dictation including seventh chords, secondary dominants, and modulation to closely-related keys; seventh chord inversions; and aural identification of binary and ternary forms. 1 activity.

MU 211. Musicianship V. 1 unit

Term Typically Offered: W

Prerequisite: MU 210 with a grade of C- or better, or consent of instructor.

Continuation of MU 210. Sightsinging using chromatic tones; rhythmic performance and dictation in changing and asymmetric meters; harmonic dictation including Neapolitan triads, augmented sixth chords, modal mixture, and modulation to closely-related keys; aural identification of sonata, rondo, and variation forms. 1 activity.

MU 212. Musicianship VI. 1 unit

Term Typically Offered: SP

Prerequisite: MU 211 with a grade of C- or better, or consent of instructor.

Continuation of MU 211. Emphasis on previously acquired skills, plus sightsinging, melodic dictation, and harmonic dictation using modulation to foreign keys; performance and dictation of cross-rhythms and complex beat divisions; tempo modulation; aural identification of contrapuntal genres; and modulatory melodic dictation in two parts. 1 activity.

MU 221. Jazz Styles. 4 units

Term Typically Offered: W, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

USCP

Survey of Jazz as a significant American art form from 1900 to the present; its historical background and development in the United States; key elements, leading performers, and significant compositions in each style. Emphasis on listening skills. 3 lectures, 1 activity. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs); and USCP.

MU 227. Popular Music of the USA. 4 units

Term Typically Offered: W

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

USCP

Study of popular music of the USA from the nineteenth century to contemporary times. Emphases include cultural identity, social diversity, musical aesthetics, artistic significance, ethnic relations, gender issues, religious expression, performance practice, technological development, modernization, commodification, and political empowerment. 3 lectures, 1 activity. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs); and USCP.

MU 228. Music of the 60's: War and Peace. 4 units

Term Typically Offered: TBD

Explores wide spectrum of rock, folk and pop styles of the 60s. Relates music to social turmoil and historical trends, including Vietnam War, Civil Rights Movement, American Indian Movement, Chicano Movement, Free Speech Movement. 3 lectures, 1 activity.

MU 250. Applied Music. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: 3 units of MU 150 and consent of instructor.

Individual instruction in performance with emphasis on repertoire, technical skills, style, and interpretation. Total credit limited to 6 units. Specific areas of study are listed in the Class Schedule.

MU 253. Advanced Class Piano. 1 unit

Term Typically Offered: TBD

Prerequisite: MU 153 or consent of instructor; for non-music majors.

Advanced level piano techniques with emphasis on style, interpretation, sightreading, basic performance practices and the solution to general musical problems. Total credit limited to 3 units. 1 activity.

MU 259. Beginning Jazz Improvisation. 2 units

Term Typically Offered: TBD

Prerequisite: Facility on a musical instrument or singing ability; MU 101 or consent of instructor.

Development of fundamentals of jazz improvisation including scales, arpeggios, patterns, swing feel, expressiveness, and motifs through in-class performance of written materials and improvisations with play-along recordings. Total credit limited to 6 units. 2 activities.

MU 261. Piano Skills IV. 1 unit

Term Typically Offered: F

Prerequisite: MU 163 or consent of instructor.

Continuation of MU 163. Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, and improvisation of a melody, score-reading. 1 activity.

MU 262. Piano Skills V. 1 unit

Term Typically Offered: W

Prerequisite: MU 261 or consent of instructor.

Continuation of MU 261. Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody, score-reading. 1 activity.

MU 263. Piano Skills VI. 1 unit

Term Typically Offered: SP

Prerequisite: MU 262 or consent of instructor.

Continuation of MU 262. Completion of this course with a C- or better represents fulfillment of the Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody, score-reading. 1 activity.

MU 265. Accelerated Piano Skills. 1 unit

Term Typically Offered: W

Prerequisite: Consent of instructor.

Preparation for Piano Proficiency Examination. For students with an extensive piano repertoire background but needing focused preparation in sightreading, transposition, harmonization of a melody, accompanying, and score reading. Total credit limited to 3 units. 1 activity.

MU 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

MU 301. Counterpoint. 4 units

Term Typically Offered: SP

Prerequisite: MU 105.

Counterpoint as a compositional technique. Modal, tonal, and post-tonal practices. Composition project. 4 lectures.

MU 303. Music Theory III: Advanced Chromaticism. 4 units

Term Typically Offered: F

Prerequisite: MU 105 with a grade of C- or better, or consent of instructor.

Compositional procedures employed by composers of the Classical and Romantic periods. Chromatic third-related harmony, linear chromaticism, and extended tertian chords. Chromatic and enharmonic modulation to distantly-related keys. Sonata and rondo forms. Composition project. 4 lectures.

MU 305. Music Theory IV: Contemporary Practices. 4 units

Term Typically Offered: SP

Prerequisite: MU 303 or permission of instructor.

Examination of 20th- and 21st-century compositional practices including impressionism, developments in rhythm, polytonality, non-serial atonality, serialism, timbre and form, neoclassicism, minimalism, and the new eclecticism. Analysis and creative projects. 4 lectures.

MU 311. Introduction to Recording, Synthesis, and Production. 4 units

Term Typically Offered: F

Prerequisite: MU 101, MU 120 or consent of instructor.

Fundamental tools of electroacoustic music. Concepts and application of music studio procedure, recording, synthesis, and MIDI. Studio projects. 3 lectures, 1 activity.

MU 312. Advanced Recording, Synthesis, and Production. 4 units

Term Typically Offered: W

Prerequisite: MU 311 or permission of instructor.

Exploring creative and interactive uses of recording and synthesis. Analysis and creative projects. 3 lectures, 1 activity.

MU 320. Music Research and Writing. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs); and MU 105 with a grade of C- or better or consent of instructor.

Methodology for researching, analyzing, and writing about music. Exploration of investigative tools including library resources, periodicals, bibliographic tools, computerized search methods. Performance practice. 4 lectures.

MU 324. Music and Society. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area C.

Exploration into the role of music historically and culturally. Emphasis on deeper understanding and appreciation of the context of music through topics of special interest. The Class Schedule will list topic selected. Total credit limited to 12 units. 3 lectures, 1 activity. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

MU 325. America's Music. 4 units

Term Typically Offered: SP

USCP

Prerequisite: MU 105. Recommended: MU 120.

Explorations of the many styles of America's music through lectures, readings, sound recordings, musical scores, and performance. Includes "Native American," "folk," "popular," and "fine art" traditions. How American music reflects the different cultural heritages, social contexts, and philosophies of its creators. 4 lectures. Fulfills USCP.

MU 326. Cultural Concepts and Structures in Music. 4 units

Term Typically Offered: TBD

Prerequisite: MU 121 or consent of instructor.

Exploring the definition, concepts, and structures of music in terms of theory, performance practice, and compositional procedures of selected non-Western cultures. 3 lectures, 1 activity.

MU 328. Women in Music. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area C.

Survey of women's contributions as composers and performers of western art and popular music; historical overview of the experiences and perception of women as musicians. 3 lectures, 1 activity. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

MU 331. Music of the Middle Ages and Renaissance. 4 units

Term Typically Offered: W

Prerequisite: MU 320 with a grade of C- or higher or consent of instructor. Recommended: MU 120.

Musical literature, styles, composers, theory, genres and notation of the Middle Ages and Renaissance. Relationship to historical trends. 4 lectures.

MU 332. Music of the Baroque and Early Classic Eras. 4 units

Term Typically Offered: SP

Prerequisite: MU 320 with a grade of C- or higher or consent of instructor.

Recommended: MU 120.

Survey of the history of western art music from 1600 to 1780. 4 lectures.

MU 336. Jazz History and Theory. 4 units

Term Typically Offered: TBD

Prerequisite: MU 105.

Survey of Jazz theoretical techniques. Emphasis upon historical context and development of Jazz through study and analysis of scores and historical performances. 4 lectures.

MU 340. Conducting: Fundamentals. 2 units

Term Typically Offered: F

Prerequisite: MU 105 or consent of instructor.

Principles and techniques of conducting with experience in score reading. 2 activities.

MU 341. Conducting: Choral. 2 units

Term Typically Offered: W

Prerequisite: MU 340.

Continuation of MU 340. Emphasis on choral literature. Score reading, rehearsal techniques, and musical details associated with vocal music. 2 activities.

MU 342. Conducting: Instrumental. 2 units

Term Typically Offered: SP

Prerequisite: MU 340.

Continuation of MU 340. Emphasis on band and orchestra literature. Score reading, rehearsal techniques, and musical details associated with instrumental music. 2 activities.

MU 350. Applied Music. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual instruction in performance and composition. Total credit limited to 6 units. Specific areas of study are listed in the Class Schedule.

MU 351. Jazz and Popular Music Arranging. 2 units

Term Typically Offered: TBD

Prerequisite: MU 105.

Arranging for small and large jazz ensembles. Score and part preparation. 2 activities.

MU 352. Orchestration. 4 units

Term Typically Offered: TBD

Prerequisite: MU 105.

Ranges, transposition, technical capabilities, and scoring of vocal ensembles, band, and orchestra instruments. Creative project. 3 lectures, 1 activity.

MU 360. Music for Classroom Teachers. 4 units

Term Typically Offered: TBD

Prerequisite: MU 101.

Development of skills for fostering creative music experiences in the classroom. Exploration of various approaches to motivating children musically. Study of folk songs for singing, playing instruments, and learning about music as well as for their ethnic and cultural significance. 3 lectures, 1 activity.

MU 361. Instruments. 1 unit

Term Typically Offered: TBD

Prerequisite: Junior standing and consent of instructor.

Fundamentals of playing and teaching woodwind, brass, string, and percussion instruments. The Class Schedule will list topic selected. Total credit limited to 6 units. 1 activity.

MU 368. Piano Accompanying. 1 unit

Term Typically Offered: TBD

Prerequisite: Junior standing and MU 168 or consent of instructor.

Preparation and performance of vocal and instrumental music written with piano accompaniment. Choral rehearsal accompanist techniques. Open to students who are proficient on piano at a collegiate level. Total credit limited to 6 units. 1 activity.

MU 370. University Jazz Band. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor.

Rehearsal and public performance of jazz big band repertoire. Open to qualified students who sing or play trumpet, trombone, saxophone, piano, guitar, vibes, bass, drums, or congas. Total credit limited to 6 units. 1 laboratory.

MU 371. Instrumental Ensemble. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor.

Faculty-supervised small ensembles (e.g., string quartets, brass quintets), as permitted by departmental staffing. Performances take place in student recitals, large-ensemble concerts, and/or other university events. Open to students concurrently participating in large ensembles. Interested students should contact instrumental ensemble directors. The Class Schedule will list topic selected. Total credit limited to 6 units. 1 activity.

MU 372. Wind Orchestra. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor.

Study and public performance of music written for large wind band. Open to all qualified students who perform on woodwind, brass and percussion instruments. The Class Schedule will list topic selected. Total credit limited to 6 units. 1 laboratory.

MU 373. Wind Ensemble. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor.

Study and public performance of music written for wind band with limited doubling and flexible instrumentation. Open to all students who perform on woodwind, brass and percussion instruments on an advanced collegiate level. Total credit limited to 6 units. 1 laboratory.

MU 374. Symphony Orchestra. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor, based on audition.

Preparation and performance of orchestral music, including both standard repertoire and current works in various genres. Open to all qualified students who perform on string, woodwind, brass, and percussion instruments. Field trip required. Total credit limited to 6 units. 1 laboratory.

MU 376. Mustang Band. 1 unit

Term Typically Offered: F, W

Prerequisite: Junior standing and consent of instructor.

Public performance of music and specially-designed shows written for marching band (woodwinds, brass, percussion, and flag team auxiliary). Limited to those students who have had marching experience with wind and percussion instruments, or flag, rifle or dance lines. Total credit limited to 6 units. 1 laboratory.

MU 377. Chamber Winds. 1 unit

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Study and public performance of chamber music written for woodwinds, brass, or percussion. Open to all instrumentalists who have college level performance experience. Total credit limited to 6 units. 1 activity.

MU 378. Field Show Marching Skills. 1 unit

Term Typically Offered: F

Prerequisite: MU 178 or consent of instructor.

Study and application of advanced field show marching techniques used in performance by the Cal Poly Mustang Band and other university bands. Limited to those students who have experience performing on a wind/percussion instrument, or in a marching band flag/dance team auxiliary. Total credit limited to 6 units. 1 activity.

MU 381. PolyPhonics. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor.

Advanced study and public performance of music for mixed chorus. Total credit limited to 6 units. 1 laboratory.

MU 382. Cantabile. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor.

Advanced study and public performance of music for soprano and alto chorus. A variety of styles of choral literature specifically intended for treble voices from various time periods is explored. Total credit limited to 6 units. 1 activity.

MU 383. Vocal Ensemble. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor.

Open to qualified singers. Rehearsal and performance of specialized vocal music. Total credit limited to 6 units. 1 activity.

MU 385. University Singers. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor.

Study and public performance of music for large mixed chorus. Total credit limited to 6 units. 1 laboratory.

MU 386. Chamber Choir. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of instructor.

Advanced study and public performance of music for small ensemble. This ensemble focuses on music of the Renaissance, Baroque and Modern Eras. A variety of styles of choral literature, specifically intended for a small performing ensemble, is explored. Total credit limited to 6 units. 1 laboratory.

MU 388. Arab Music Ensemble. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: MU 188 or consent of instructor.

Rehearsal and performance of instrumental and vocal repertoire drawn from art and popular music of wide-ranging Arabic-speaking societies and historically related cultures. Accompanying music theories, instrumental techniques, and performance practices, with presentation of seminal works in public concerts. Total credit limited to 6 units. 1 laboratory.

MU 389. Vocal Practicum. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: MU 150, MU 250, MU 350 or MU 450, or consent of instructor.

Study and implementation of performing techniques used by vocalists in a recital or concert setting. Total credit limited to 6 units. 1 activity.

MU 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MU 411. Sonic Interactions with Technology. 4 units

Term Typically Offered: SP

Prerequisite: MU 312.

Performative and compositional applications of synthesis and recording techniques. Creative projects. 3 lectures, 1 activity.

MU 412. Sculpting Experience with Sound. 4 units

Term Typically Offered: TBD

Prerequisite: MU 312.

Production of electroacoustic music in media. Program analysis, technical planning, composition, and product development. 3 lectures, 1 activity.

MU 431. Music of the Classic and Romantic Eras. 4 units

Term Typically Offered: F

Prerequisite: MU 303; and MU 320 with a grade of C- or higher or consent of instructor. Recommended: MU 120.

Survey of the history of western art music from 1780 to 1900. 4 lectures.

MU 432. Music of the Modern Era. 4 units

Term Typically Offered: W

Prerequisite: MU 303; and one of the following courses with a grade of C- or better: MU 331, MU 332, or MU 431, or consent of instructor.

Recommended: MU 305.

Composers, important works, and significant trends in the Western European and American classical tradition during the 20th and 21st Centuries. 4 lectures.

MU 450. Applied Music. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual instruction in performance and composition. Total credit limited to 6 units. Specific areas of study are listed in the Class Schedule.

MU 461. Senior Project. 3 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing and consent of department head.

Selection and completion of a project under faculty supervision. Minimum of 90 hours total time. Results presented in a recital, creative work, formal report, or a combination of all three.

MU 465. Choral Literature and Rehearsal Techniques. 4 units

Term Typically Offered: TBD

Prerequisite: MU 341, or consent of instructor.

Survey of choral literature especially suited for secondary schools. Philosophy and strategy for developing a school program. Musical as well as non-musical techniques for effective rehearsal. 3 lectures, 1 activity.

MU 466. Instrumental Literature and Rehearsal Techniques. 4 units

Term Typically Offered: TBD

Prerequisite: MU 101 or MU 103; and MU 172 or MU 173 or MU 174.

Survey of instrumental literature written for orchestras, bands, solo instrument, and chamber ensembles. Philosophy and strategy necessary for developing a professional, semi-professional, or school instrumental music program. Musical as well as non-musical techniques for effective rehearsal. 3 lectures, 1 activity.

MU 470. Music History: Selected Advanced Topics. 4 units

Term Typically Offered: TBD

Prerequisite: MU 331, MU 332, MU 431, MU 432, or consent of instructor.

Intensive study of selected topics in music history through the use of readings, recordings, scores, and class presentations. The Class Schedule will list topic selected. Total credit limited to 8 units. 3 lectures, 1 activity.

Natural Resources (NR)

undefined

NR Courses

NR 140. Careers in Natural Resources Management and Environmental Sciences. 1 unit

Term Typically Offered: F

Analysis and development of career goals in natural resources and environmental sciences. Acquainting students with potential career options and preparation of academic plans for the majors in the Natural Resources Management and Environmental Sciences Department. 1 activity.

NR 141. Introduction to Forest Ecosystem Management. 3 units

Term Typically Offered: F

Sustainability Focused

Fundamentals of forestry including basic silviculture, forest protection, measurement and policy. Integrated resource management of forest lands for water production, forage, recreation, wildlife, and timber. 3 lectures.

NR 142. Environmental Management. 3 units

Term Typically Offered: F, W

Sustainability Focused

Recommended: NR 140.

Environmental management as a process within functioning societies seeking a harmonious balance between human activities and intrinsic behavior of the natural environment. Major components of the natural environment and the political and social activities that impact that environment. 3 lectures.

NR 200. Special Problems for Undergraduates. 1-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Credit/No Credit grading only. Total credit limited to 12 units. Formerly ERSC/SS 200.

NR 203. Resource Law Enforcement. 3 units

Term Typically Offered: W

Law enforcement applied to natural resource conservation on public and private lands. Examination of state and federal laws related to fish and wildlife management. Problems associated with implementation of resource laws examined. 3 lectures. Crosslisted as NR/RPTA 203.

NR 204. Wildland Fire Control. 3 units

Term Typically Offered: SP

Fire control techniques used on various wildland fuels. Elementary fire physics, fuels, weather, fire behavior, tactics and fire suppression techniques, line construction, "mop-up", fire line safety, air operations and fire organization. Meets basic wildland fire fighter certification requirements for the USDA Forest Service. Partially meets California Department of Forestry Firefighter I requirements. 2 lectures, 1 laboratory.

NR 208. Dendrology. 4 units

Term Typically Offered: F, W, SP

Recommended: BOT 121.

Identification, classification, silvical characteristics, distribution, environmental requirements and economic importance of woody plants in shrub, woodland, and forest ecosystems of the United States. Emphasis on species located in the Pacific Coastal, Sierran, and Cascade ecosystems. 2 lectures, 2 laboratories.

NR 215. Land and Resource Measurements. 1 unit

Term Typically Offered: F, W, SP

Introduction to land and resource measurement technology and methods - field instruments, property description, map and photograph reconciliation, data accuracy and precision. Trigonometric functions as applied to natural resources applications. Field trips required. 1 laboratory.

NR 218. Introduction to Geographic Information Systems (GIS). 3 units

Term Typically Offered: F, W, SP

Learn the fundamental concepts and functions of Geographic Information Systems (GIS) using ArcGIS platform. Create, manage, analyze, and display geographically referenced data. Explore how GIS is applied to analyze environmental, social, and natural resource issues. 1 lecture, 2 laboratories. Crosslisted as LA/NR 218.

NR 247. Forest Surveying. 2 units

Term Typically Offered: TBD

Prerequisite: NR 215.

Use and care of tapes, staff compass, abney levels, total stations, and GPS receivers. Keeping field notes, measurements by tape. Closed and open traverse by compass and total stations. Turning angles and determining directions of lines. Map reading and public land description. GPS measurements. Weekend field trips required. 1 lecture, 1 laboratory. Crosslisted as BRAE/NR 247.

NR 260. Forest Operations. 4 units

Term Typically Offered: SP

Recommended: NR 141 and NR 215.

Relationships between forest ecosystem management, forest practices, harvesting methods, timber harvest planning, components of forest harvesting, harvesting effects; cost analysis of harvesting methods; safety management; value-added forest utilization; environmental protection; and road location. Overnight or weekend field trips required. 3 lectures, 1 laboratory.

NR 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

NR 290. Intercollegiate Forestry Activities. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Enrollment limited to those qualified to compete in intercollegiate forestry activities and consent of instructor.

Beginning through advanced skills in the event areas of college forestry activities. Instruction in use of specialized equipment and safety. Minimum of 4 hours of laboratory per week. Total credit limited to 18 units. Credit/No Credit grading only.

NR 304. Agroecology. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and STAT 217 or STAT 218.

Ecological concepts and principles applied to the design and management of agricultural systems. Discussion of research in agroecology and assessment of cropping system sustainability. Laboratory section emphasizes field assessment of ecological structures and functions, experimental design and data interpretation. 3 lectures. 1 laboratory. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

NR 305. Forest Ecology and Silvics. 4 units

Term Typically Offered: F, SP

Sustainability Focused

Prerequisite: Completion of GE Area B2; and completion of GE Area B3 (GE Area B4 for students on the 2019-20 or earlier catalogs).

Examination of major forest types and the processes that determine their development and productivity across the earth (silvics). Integration of ecosystem ecology, plant physiology, and soil science to develop understanding of forest response to disturbance. Field trip required. 3 lectures, 1 laboratory.

NR 306. Natural Resource Ecology and Habitat Management. 4 units

Term Typically Offered: F, W

Sustainability Related

Prerequisite: Completion of GE Area B2; and completion of GE Area B3 (GE Area B4 for students on the 2019-20 or earlier catalogs).

Resource ecology and management implications in the major ecosystems of North America. Importance of maintaining the natural dynamics of energy flow and nutrient cycles at the community and ecosystem level to sustain uses and values. Humanity's role as a principal factor of change of the resources in natural systems. 3 lectures, 1 laboratory.

NR 307. Fire Ecology. 3 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area B2; and completion of GE Area B3 (GE Area B4 for students on the 2019-20 or earlier catalogs).

Effects of wildland fires on shrub, woodland, and forest environments to include fuels, plants, soil, water, wildlife, and air. Emphasis on western U.S. forest and shrub ecosystems. 2 lectures, 1 laboratory.

NR 308. Fire and Society. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Prehistorical and historical record of human use of and attitude toward fire. Mythology and religion of fire. Traditional, cultural and ethnic variations and their influence on modern U.S. institutions involved in managing fire. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as ES/NR 308. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

NR 310. Global Climate Change. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Examination and assessment of the physical and biological mechanisms that maintain current global climate regimes and the broad natural resource, political, and social conflict associated with a changing climate system. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

NR 312. Technology of Wildland Fire Management. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Related

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Historic, current and future perspectives of wildland fire in California. Sustainability and ecosystem health. The use of models and technology to solve complex land management problems. Assumptions and limitations of fire behavior and suppression models. 3 lectures, 1 activity. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

NR 314. Environmental Life-Cycle Analysis. 4 units

Term Typically Offered: SP

Prerequisite: BIO 263, NR 304, NR 305, or NR 306.

Estimation and assessment of environmental impacts of human activity and product development using life-cycle analysis methodology; organization and presentation of modeling results. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory.

NR 315. Forest Mensuration. 4 units

Term Typically Offered: W, SP

Prerequisite: BRAE 237 or BRAE 239; NR 215; and STAT 217 or STAT 218.

Recommended: MATH 161 or MATH 221.

Principles and methods of sampling and measurement for forest and natural resource quantities and qualities. Modeling and estimation for tree volumes, stand structure and composition, and related forest vegetation. Applications in sampling, statistical and inventory techniques. Field trip required. 2 lectures, 2 laboratories.

NR 317. The World of Spatial Data and Geographic Information Technology. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Foundation for understanding the world through geographic information as well as the tools available to utilize spatial data. Experience with Geographic Information Systems (GIS) and related technology. Not open to students with credit in GEOG 218 or LA/NR 218. 3 lectures, 1 activity. Crosslisted as LA/NR 317. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

NR 320. Watershed Processes and Management. 4 units

Term Typically Offered: F, W, SP

Prerequisite: NR/LA 218 and SS 120. Recommended: NR 304, NR 305, or NR 306.

Introduction, analysis, and measurement of watershed processes of precipitation, evapotranspiration, streamflow, stream channels, erosion, and riparian functions. Watershed management toward aquatic habitat and water quality goals. Weekend field trip required. 3 lectures, 1 laboratory.

NR 321. Water Resources Technology and Society. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Study of technologies for sustainable management of water resources. Focus on monitoring of drinking water supply and quality, groundwater wells, surface water storage and conveyance systems, industrial, and oil/gas water use and management, and stresses due to climate change. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

NR 323. Human Dimensions in Natural Resources Management. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area D1.

Social, economic, political and ecological conditions and institutions that influence decisions affecting the environment; examination of human-caused environmental impacts and how they in turn influence social institutions. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

NR 324. Social Dimensions of Sustainable Food and Fiber Systems. 4 units

Term Typically Offered: W
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5
 Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Historical, political, socio-economic, and cultural dimensions of sustainable food and fiber systems. Overview of frameworks used for understanding agro-ecological sustainability with an emphasis on human elements. Exploration of core sustainability concepts, practices, and goals through case studies. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

NR 326. Natural Resources Economics and Valuation. 4 units

Term Typically Offered: F, W, SP
 Sustainability Focused

Prerequisite: MATH 161 or MATH 221 or equivalent. Recommended: GE Area D2 (ECON 201 recommended), AGB 212.

Theory of efficient use of renewable and nonrenewable natural resources, including methods for attaching value to marketable and non-market natural resources. Environmental economic theories and techniques to address allocation of water, timber, wildlife/fisheries, open space, and recreation. 4 lectures.

NR 328. Environmental Leadership and Community Engagement. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5
 Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); one lower-division course in GE Area D; and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Theories and practices of leadership and community engagement for a wide range of environmental issues. Development of personal leadership skills and methods for effectively working with non-profit organizations, governmental agencies, community groups, and the private sector to advance sustainability principles. 4 lectures. Crosslisted as NR/RPTA 328. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

NR 335. Conflict Management in Natural Resources. 4 units

Term Typically Offered: F, W, SP
 Prerequisite: NR 141 or NR 142. Recommended: PSY 201 or PSY 202.

Application of behavioral science principles and techniques in the management of natural resource systems. Management of internal and external human resource issues and concerns in natural resources organizations is emphasized. 3 lectures, 1 laboratory.

NR 339. Internship in Forest and Natural Resources. 1-12 units

Term Typically Offered: F,W,SP,SU
 CR/NC
 Prerequisite: Consent of instructor.

Selected students will spend up to 12 weeks with an approved firm or agency engaged in forest or natural resources management. Applying and developing managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Credit/No Credit grading.

NR 340. Wildland Fire Management. 3 units

Term Typically Offered: F
 Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: NR 204.

Wildland fuels, fire weather, and fire danger ratings in chaparral, grassland, and forested areas. Advanced modeling of surface and crown fire behavior. Fire management strategies and implications, policies and objectives of fire management organizations. Saturday field trips may be required. 3 lectures.

NR 349. Water for a Sustainable Society. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later: Upper-Div GE Area D
 2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Historical, political, economic, socio-technical, and cultural dimensions of water sustainability. Overview of complex systems with an emphasis on individual choices and their impact on water sustainability. Exploration of core sustainability concepts; practices, barriers and goals related to water resources. Course offered online only. 4 lectures. Crosslisted BRAE/NR 349. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

NR 350. Urban Forestry. 3 units

Term Typically Offered: F
 Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: NR 208.

Establishment and management of municipal forests, wildland-urban interface, wildlife habitat, and pollution abatement. Management of forest areas requiring special attention because of heavy recreational use, fire hazard, watershed, and societal values. Full-day field trips may be required. 2 lectures, 1 laboratory.

NR 351. Introduction to Emergency Management in California. 3 units

Term Typically Offered: TBD
 Prerequisite: Completion of GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs) or GE Area D.

Emergency management emphasizing the Standardized Emergency Management System (SEMS) and Emergency Operations Center (EOC) operations. Earthquake hazard used as the case to explore potential wide geographic impacts, multiple secondary hazards, and multidisciplinary problem-solving methods in natural disasters faced by local governments and communities. 2 lectures, 1 activity. Crosslisted as CRP/NR 351.

NR 355. Drone Assisted Surveying. 4 units

Term Typically Offered: SP

Prerequisite: BRAE 237 or BRAE 239.

Integration of remote sensing, surveying, natural resource management, applied drone technology. Understanding laws, regulations, measurement concepts, and big data. Field applications using Unmanned Aerial Systems and Global Navigation Satellite Systems. Creation of maps and supporting documents for use in GIS. 2 lectures, 2 laboratories. Crosslisted as BRAE/NR 355.

NR 360. Ethnicity and the Land. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C. Recommended: Lower-division Ethnic Studies (ES) course and introductory natural resources course.

Comparative study of how race and culture shape landscapes, and how social hierarchies allocate the use of natural resources and the burdens of environmental pollution. 4 lectures. Crosslisted as ES/NR 360. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

NR 363. Undergraduate Seminar. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing.

Introduction to professional practices, including preparation of professional materials and interview skills. Review of current published research and library researching techniques in environmental science and management. Development of presentation skills. Course may be offered in classroom-based or online format. 2 seminars.

NR 365. Silviculture and Fuels Management. 4 units

Term Typically Offered: F, SP

Sustainability Focused

Prerequisite: NR 208 and NR 315. Corequisite: NR 260; and NR 304, NR 305, or NR 306.

Applied forest ecology focusing on development of prescriptions for achieving diverse forest ecosystem management objectives. Topics include natural stand dynamics, silvicultural systems, hazardous fuels reduction, forest health assessments/diagnoses, emulating natural disturbances, and managing ecosystem services. Overnight and/or weekend field trips required. 2 lectures, 2 laboratories.

NR 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 12 units.

NR 401. Disaster Recovery. 3 units

Term Typically Offered: TBD

Prerequisite: CRP/NR 351.

Strategies and procedures for public sector management of recovery from disasters. Understanding the role of, and relationship between, federal, state and local agencies to provide assistance to individuals and communities in the post-disaster environment. Issues in the recovery process. 2 lectures, 1 activity. Crosslisted as CRP/NR 401.

NR 402. Forest Health. 4 units

Term Typically Offered: F, W

Prerequisite: BIO 162, BIO 222, BIO 227, or NR 208; and NR 304, 305, or NR 306; and junior standing.

Impact and losses to forested areas caused by physical and biotic agents (such as insects and diseases) other than fire; relation of direct and indirect control practices to forest management. Saturday field trips required. 3 lectures, 1 laboratory.

NR 404. Environmental Law. 4 units

Term Typically Offered: F, W, SP

Sustainability Related

Prerequisite: Junior standing.

Detailed examination of the law governing use and protection of natural resources with focus on the legal institutions entrusted with the public duty of protecting the environment. 4 lectures. Crosslisted as CRP/NR 404.

NR 406. Indigenous Peoples and International Law and Policy. 4 units

Term Typically Offered: SP

Prerequisite: ES 253; and NR 141 or NR 142; and junior standing required.

Interdisciplinary examination of the evolution of international law effecting indigenous peoples in the U.S. and in the Americas. Development of international legal and sociological norms and their impact on human rights of indigenous peoples with particular attention to environmental issues. 4 lectures. Crosslisted as ES/NR 406.

NR 408. Water Resource Law and Policy. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing.

Detailed examination of the various legal systems of water use, regulation and management in California and the United States. Discussion on the key concepts and principles of state, federal and interstate water quantity and quality control; focusing on issues and problems, why conflicts occur and how solutions evolve. 4 lectures. Crosslisted as CRP/NR 408.

NR 412. Senior Assessment Project. 3 units

Term Typically Offered: TBD

Prerequisite: NR 326 and completion of GE Area A3 with grades of C- or better.

Principles and practices of integrated sampling and inventory of natural resource values in terrestrial ecosystems, culminating in a student project report. 2 lectures, 1 laboratory.

NR 413. Agricultural Law. 4 units

Term Typically Offered: TBD

Sustainability Related

Prerequisite: Junior standing.

Analysis of agricultural law and policy including the business of agriculture, agricultural legislation, and coverage of contemporary agricultural issues such as water, food safety, and labor. Examination of statutory, judicial, policy and administrative areas in agriculture. 4 lectures.

NR 414. Sustainable Forest Management. 4 units

Term Typically Offered: W

Prerequisite: NR 326, NR 365.

Biophysical, economic, social and political influences on optimal forest management for purposes of providing sustained yields of goods and services. Growth and yield modeling; forest investment analysis; sustainable forest production; harvest schedule modeling. Day field trip required. 3 lectures, 1 laboratory.

NR 416. Environmental Impact Analysis and Management. 4 units

Term Typically Offered: F, W, SP

Sustainability Related

Prerequisite: one of the following: BIO 263, NR 304, NR 305, NR 306, or SS 221.

National Environmental Policy and California Environmental Quality Acts as applied to environmental and natural resource management problems and projects. Intent, purpose and history of the laws; differences between laws identified. Request for proposals and preparation of environmental assessment documents covered. 3 lectures, 1 laboratory.

NR 418. Applied GIS. 3 units

Term Typically Offered: F, W, SP

Prerequisite: LA/NR 218 or GEOG 318.

Acquisition, organization and analysis of spatial data from diverse sources using Geographic Information System (GIS) software. GIS modeling applications and validation techniques used in development and preparation of client-driven projects. 1 lecture, 2 activities.

NR 420. Watershed Assessment and Protection. 4 units

Term Typically Offered: W

Prerequisite: NR 320; or graduate standing.

Analysis of streamflow, peak flows, and land management effects using established techniques and hydrologic models. Fluvial processes, sediment transport, and channel restoration techniques. Assessment and restoration of watersheds toward protection of aquatic and public resources. Field trip may be required. 3 lectures, 1 laboratory.

NR 421. Wetlands. 4 units

Term Typically Offered: TBD

Prerequisite: BOT 121 or BIO 162; CHEM 127; and SS 120 or SS 130.

Recommended: one of the following: BIO 327, BOT 313, BOT 326, MSC1 300, NR 304, NR 305, or NR 306.

The formation, characteristics, and functions of wetlands. Genesis of hydric soils. Plant adaptations to saturated soils. Wetlands as wildlife habitat. Policies and social issues associated with wetlands. The procedures of wetland delineations. 3 lectures, 1 laboratory. Crosslisted as BIO/NR/SS 421.

NR 422. Stream Measurements and Water Quality Monitoring. 1 unit

Term Typically Offered: SP

Sustainability Related

Prerequisite: Junior standing or consent of instructor.

Field measurement of streamflow, water quality, and water resources to support environmental evaluations of local water resources. Application of quality assurance procedures for monitoring water resources. Field trip required. Total credit limited to 2 units. 1 laboratory.

NR 425. Applied Resource Analysis and Assessment. 4 units

Term Typically Offered: F, W, SP

Sustainability Related

Prerequisite: NR 363 and NR 416.

Environmental impacts in responses to resource management, projects, programs and activities. Preparation, implementation, and coordination of environmental plans. Criteria for measurements, interpretation, and evaluation. Resource inventories, analysis, evaluation, synthesis, environmental assessment writing and preparation. 3 lectures, 1 laboratory.

NR 434. Wood Properties, Products and Sustainable Uses. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Principles of wood properties, green building practices, sustainable and efficient use of renewable wood resources including methods for using wood as an energy source. Field trips required. 3 lectures, 1 laboratory.

NR 435. Environmental Policy Analysis. 4 units

Term Typically Offered: F, W, SP

Prerequisite: NR 326. Recommended: NR 335.

Policy process approach to understanding the efforts to resolve natural resource problems in the public and private sector. Principles and techniques used to analyze the effects of environmental policies. Analysis of major federal and state environmental laws. 4 lectures.

NR 445. Systems Thinking in Environmental Management. 4 units

Term Typically Offered: TBD

Sustainability Focused

Prerequisite: One of the following: BIO 263, NR 304, NR 305, NR 306, or SS 321. Recommended: MATH 161.

Analysis of environmental challenges by incorporating systems thinking and system dynamics simulations with quantitative models; interpretation of modeling results and their social and political implications. 4 lectures.

NR 455. Wildland-Urban Fire Protection. 4 units

Term Typically Offered: W

Prerequisite: Junior standing. Recommended: NR 340.

Biophysical and socioeconomic issues affecting wildland fire management in urbanized landscapes. Fire risk assessment. Pre-fire prevention, mitigation, and preparedness, during-fire response, and post-fire recovery actions by public- and private-sector agencies and residents. 3 lectures, 1 laboratory.

NR 465. Senior Project - Ecosystem Management. 4 units

Term Typically Offered: W, SP

Sustainability Focused

Prerequisite: NR 326 and NR 416.

Capstone course integrating biophysical, economic and socio-political sciences. Principles, concepts and techniques designed to utilize resources while sustaining ecosystem health within acceptable limits of change. Ecosystem assessment, planning, management and monitoring project. Satisfies the senior project requirement. 3 lectures, 1 activity.

NR 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

NR 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Junior standing.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

NR 472. Leadership Practice. 1 unit

Term Typically Offered: F, W

Prerequisite: Junior standing.

Tasks associated with development of personal leadership skills. Study and practice in setting goals and objectives; developing, evaluating and implementing a project independently and as part of a team; decision making and problem-solving emphasized. Total credit limited to 4 units. 1 laboratory. Crosslisted as NR/RPTA 472.

NR 474. Forest Stewardship Practices. 8 units

Term Typically Offered: SU

Sustainability Focused

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); and junior standing. Concurrent: NR 475.

Sustainable forest management, ecosystem sampling and inventory methods, photo interpretation, hydrologic resources, road condition, project impact analysis, and best management practices related to forest stewardship. Guest lecturers from industry, agencies and universities share their perspectives on forest stewardship practices. Field trip required. 5 lectures. 3 activities.

NR 475. Senior Project - Forest Stewardship. 4 units

Term Typically Offered: SU

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); and junior standing. Concurrent: NR 474.

Sustainable forest practices and regulatory compliance issues related to Timber Harvest Plans (THP). Development of THP for specified project sites. Collection, assessment, interpretation of data culminating in production of a THP acceptable for interagency review. Satisfies senior project requirement. Field trip required. 3 lectures, 1 activity.

NR 476. Senior Project - Advanced Internship Experience in Environmental Science/Management. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Independent internship experience conducted under faculty supervision focusing on a discipline area of environmental science/management. Completion of a project as a component of their internship. Satisfies the senior project requirement. Minimum 90 hours required. Crosslisted as ERSC/NR 476.

NR 477. Senior Project - Research Experience in Environmental Science. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Guided research experience in a specific area of environmental science. Implementation of materials and methods. Collection, analysis and interpretation of data. Completion of formal written report. Satisfies senior project requirement. 1 lecture, 2 laboratories. Crosslisted as ERSC/NR 477.

NR 478. Senior Project - Current Topics in Environmental Science/Management. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; and ERSC 363 or NR 306 or NR 326.

Critical evaluation and formal presentation of current issues in environmental science/management. Evaluation of current topics, analysis of supporting evidence, and synthesis and presentation of resulting perspectives on different approaches to current challenges in environmental science/management. Satisfies the senior project requirement. 3 lectures. Crosslisted as ERSC/NR 478.

NR 479. Senior Project - Independent Study. 3 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; ERSC 363 or NR 306 or NR 326; and consent of instructor.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time. Crosslisted as ERSC/NR 479.

NR 532. Applications in Biometrics and Econometrics. 4 units

Term Typically Offered: TBD

Prerequisite: One course in undergraduate statistics, graduate standing, or consent of instructor.

Parametric and semi-parametric statistical methods in modeling biological and economic phenomena. Biometric modeling of stand growth and inventory. Econometric modeling of market and environmental values. 3 lectures, 1 laboratory.

NR 534. Environmental Modeling. 3 units

Term Typically Offered: TBD

Prerequisite: One course in statistics or graduate standing.

Methods and modeling approaches used in quantifying ecological and environmental processes and conditions, such as fire behavior, wildland hydrology, terrestrial and aquatic habitat condition, using GIS and other models. 2 lectures, 1 laboratory.

NR 539. Graduate Internship in Forest Resources. 1-9 units

Term Typically Offered: TBD

Prerequisite: Consent of internship instructor.

Application of theory to the solution of problems of forest resources or related businesses in the field. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty advisor before the internship commences. Degree credit limited to 6 units.

NR 570. Selected Topics in Forest Resources. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

NR 571. Selected Topics Forest Resources Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 laboratories.

NR 575. Applications in Advanced Watershed Hydrology. 2 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor. Recommended: NR 420.

Techniques and applications in watershed hydrology to real-world projects. Projects could include water quality or quantity assessments, water quality or channel morphology monitoring, and structural and non-structural enhancements for channel and upland watersheds, culminating in a final report and presentation. 2 laboratories.

Philosophy (PHIL)

undefined

PHIL Courses

PHIL 101. Introduction to Philosophy. 4 units

Term Typically Offered: F

Prerequisite: Philosophy majors only.

Foundational methods and central issues in contemporary philosophy including logic, epistemology, metaphysics and ethics. Advising and orientation to the Philosophy major for freshmen in their first quarter at Cal Poly. 4 lectures.

PHIL 126. Logic and Argumentative Writing. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area A3

2019-20 or earlier catalog: GE Area A3

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs).

Principles of argument analysis, evaluation and construction. Deductive and inductive reasoning, including analogical arguments, universal and statistical generalizations, and causal inferences. Principles of organizing and writing argumentative essays. Moral dimensions of rational discourse. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area A3 with a grade of C- or better.

PHIL 230. Philosophical Classics: Knowledge and Reality. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

Prerequisite: Completion of GE Area A with grades of C- or better.

Critical examination of primary philosophical works with focus on the nature of reality and the sources and limits of human knowledge. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as HNRS/PHIL 230. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

PHIL 231. Philosophical Classics: Ethics and Political Philosophy. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

Prerequisite: Completion of GE Area A with grades of C- or better.

Critical examination of primary philosophical works, with focus on the identification and evaluation of the central ethical, social and political themes and arguments presented in them. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as HNRS/PHIL 231. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

PHIL 241. Symbolic Logic. 4 units

Term Typically Offered: F, SP

Prerequisite: Completion of GE Area A3 with a grade of C- or better.

The nature of deductive logical systems. Methods of notation, translation and proof in sentential and predicate calculi including truth-trees and natural deduction systems. Introduction to meta-theory. 4 lectures.

PHIL 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

PHIL 300. Philosophical Writing and Research. 4 units

Term Typically Offered: F, SP

Prerequisite: PHIL 230 or PHIL 231; and Philosophy major.

Develop writing and research skills by composing a substantial research paper on a specific topic. Revisions based on instructor and peer feedback. Oral presentation of research project. The Class Schedule will list topic selected. 4 lectures.

PHIL 301. Philosophical Topics. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Examination and analysis of philosophical areas, movements, texts, or figures. Topics may be of historical or contemporary importance. The Class Schedule will list topic selected. Total credit limited to 16 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 309. Early Greek Philosophy through Plato. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Beginnings of Western philosophy and science in Ancient Greece. The Presocratics, Socrates, and Plato. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 310. Aristotle and Hellenistic Philosophy. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Development of Western philosophy and science in the Hellenistic and Roman periods. Aristotle, Epicureanism, Stoicism, Skepticism. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 312. Medieval Philosophy. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Development of Western philosophy from Augustine to Ockham, including Anselm, Abelard, Roger Bacon, Bonaventure, Aquinas, and Duns Scotus. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 313. Early Modern Rationalism. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Development of Western philosophy from the late Renaissance through Leibniz, with special emphasis upon the epistemology and metaphysics of the Continental Rationalists. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 314. Early Modern Empiricism. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Development of Western philosophy from the Renaissance through Mill, with special emphasis on British Empiricism. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 315. Kant and 19th Century European Philosophy. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Primary issues and concepts found in German philosophy from 1780 to 1900, with emphasis on Kant, Hegel, and Nietzsche. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 317. History of Analytic Philosophy. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Major developments within 20th century British and American philosophy, with focus chiefly around Analytic philosophy. Other schools, such as Pragmatism, may be included, as may some philosophers outside of Britain and America whose work was influential in those countries. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 318. Phenomenology. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Methods and uses of phenomenological analysis through study of 20th century philosophers and contemporary applications. Topics include phenomenological method, perception, meaning, and the role of experience in philosophical inquiry. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 319. Existentialism. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Major existentialist philosophers of the 19th and 20th century such as Kierkegaard, Nietzsche, Heidegger, Sartre, de Beauvoir, Merleau-Ponty, and Marcel. Existentialist themes in historical or contemporary context. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 321. Philosophy of Science. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

The rational foundations of inquiry and explanation in the physical, biological and social sciences. Justification of scientific claims, the difference between science and pseudoscience, the relationship between science and other fields of investigation. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 322. Philosophy of Technology. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Analyses of the philosophical foundations and implications of technology. Technology and the human condition, technology and philosophical ethics, technology and political philosophy, technology and the metaphysics of human nature, and the relationship between science and technology. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 323. Ethics, Science and Technology. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Ethical decision-making as applied to issues such as the use of robots, the treatment of animals, sustainability, scientific fraud, feminist analysis of science and technology, as well as questions about whether technology is just a value-neutral tool or, rather, embodies certain values. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as HNRS 325/PHIL 323. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 327. Robot Ethics. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Introduction, short history, and overview of robot (meta)ethics, with applied ethics issues to include programming, environment, military uses, sex, legal implications, risk, liability, diversity, sustainability, healthcare, education, religion, and the home. Finally, future issues of robot rights and personhood. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 328. Technologies and Ethics of Warfare. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Ethics of killing in warfare, including requirements of justice in declaring and waging war. Topics include terrorism, remotely piloted aircraft ('drones'), autonomous weapons ('killer robots'), cyber warfare, nuclear war, city bombing, and humanitarian intervention. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 331. Ethics. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Analyses of various traditional and contemporary positions on the difference between right and wrong, if there is one. Theories of metaethics and normative ethics including the divine command theory, relativism, intuitionism, noncognitivism, virtue ethics, egoism, utilitarianism and duty-based ethics. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 332. History of Ethics. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

The history of moral thought from Homer and the Pre-Socratics to the 20th century, and focus on theories of moral goodness and rightness of action. Related issues and areas of thought, e.g. metaphysics, theology, science, politics, psychology freedom/determinism to be considered, where they shed light on moral thought. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 333. Political Philosophy. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Analyses of the philosophical foundations of political ideologies, including theories of political authority, legitimacy, obligation, and rights, and of the proper function of the state, and the relation of these theories to issues in meta-physics, theory of knowledge, and ethics. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 334. Philosophy of Law. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Normative and analytic questions about law. Nature of law and legal systems. Justification of law. Moral obligation to obey the law. Nature and justification of punishment. Guilt and legal responsibility. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 335. Social Ethics. 4 units

Term Typically Offered: F,W,SP, SU

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Examination of contemporary moral problems, solutions to these problems, and the arguments for these solutions, with emphasis on two or more of the following sample problem areas: abortion, suicide and euthanasia, capital punishment, family ethics, race relations, social justice, war, women's issues. 4 lectures. Crosslisted as PHIL 335/HNRS 336. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

PHIL 336. Feminist Ethics, Gender, Sexuality and Society. 4 units

Term Typically Offered: F,W,SP, SU

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Critical examination of the relations between gender, sexuality, ethnicity, society and ethics from feminist perspectives, with special attention paid to problems in contemporary applied ethics. Joint focus on theory and application. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as PHIL/WGQS 336. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP. Formerly WGS 336.

PHIL 337. Business Ethics. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Critical examination of ethical problems that arise in business. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 339. Biomedical Ethics. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Critical examination of problems in biomedical ethics, proposed solutions to these problems, and the arguments for such solutions. Emphasis on two or more of the following sample problem areas: concepts of health and disease, human experimentation, informed consent, behavior control, genetic intervention, new birth technologies, euthanasia and physician-assisted dying. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 340. Environmental Ethics. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Sustainability Focused

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and lower-division PHIL course in GE Area C.

Analyses of various positions on the moral status of nonhuman entities and problems such as the treatment of animals, wilderness preservation, population, pollution and global warming. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 341. Professional Ethics. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Moral problems as they arise in professions such as law, medicine, engineering, research and education: deception, paternalism, confidentiality, discrimination and others. Consideration of various professional codes of ethics. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 342. Philosophy of Religion. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Inquiry into the rational and nonrational bases of religious claims. Arguments for and against the existence of God. Discussion of miracles, revelation, the definition of God, the problem of evil, the relation of faith and reason, the nature of religious experience, the verification of religious claims. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 343. Power, Alienation, and Political Life. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Analysis of social alienation, political resistance, and the interplay between power and individual life in 20th- and 21st-century Continental philosophy. Emphasis on issues such as structural injustice, cultural membership and exclusion, work, media, and the political impact of technology. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 350. Aesthetics. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Critical examination of philosophical views of art from both a historical and contemporary perspective. Treatment of theories from Plato and Aristotle through those of the twentieth century. Discussion of the problems raised by modern art. The relation between aesthetic values and metaphysics, epistemology, ethics and politics. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 351. Philosophy of Literature. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Analysis of philosophical issues related to literature such as interpretation, authorial intention, linguistic expression, ethical responsibilities of writers and readers, and use of literary styles by philosophers. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 361. Indian Philosophy. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Philosophies developed in South Asia including the metaphysical, epistemological, and logical presuppositions of the six Hindu schools, the Buddhist and Jain schools, and select theistic traditions. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 362. Chinese and East Asian Philosophy. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Philosophies developed in China, Japan and East Asia, including Buddhism, Confucian moral philosophy, Daoist metaphysics and social ecology. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 369. Postmodernism. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Primary issues and developments in European philosophy in the second half of the 20th century. Examination of the influence of postmodern philosophy in areas such as art, literature, architecture, culture studies, philosophy of language, and philosophy of religion. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

PHIL 385. Ethics Bowl. 3 units

Term Typically Offered: F, W

CR/NC

Prerequisite: One of the following: PHIL 231, PHIL 323, PHIL 327, PHIL 328, PHIL 331, PHIL 332, PHIL 333, PHIL 334, PHIL 335, PHIL 336, PHIL 337, PHIL 339, PHIL 340, PHIL 341, or PHIL 439; and completion of GE Area A with grades of C- or better.

Preparation for participation in Intercollegiate Ethics Bowl competitions. Preparation and discussion of current competition cases, development of research and presentation skills, and participation in competition. Field trips required. Total credit limited to 12 units. Credit/No Credit grading only. Course offered in hybrid format with classroom-based and online learning. 2 laboratories and competition time.

PHIL 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

PHIL 411. Metaphysics. 4 units

Term Typically Offered: W, SP

Prerequisite: Junior standing and completion of GE Area C2.

Traditional and current ideas and arguments about substance, the relation of universals to particulars, space and time, events, causation and necessity, the self and free will. 4 lectures.

PHIL 412. Epistemology. 4 units

Term Typically Offered: F, SP

Prerequisite: Junior standing and completion of GE Area C2.

Analysis of the concept of knowledge. Development of competing theories of epistemic justification and truth. Inquiry into relationship between knowledge, belief, justification and truth. Examination of skepticism. 4 lectures.

PHIL 421. Philosophy of Space, Time and Matter. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing and completion of GE Area C2.

Investigation of the philosophical foundations and interpretation of relativity theory and elementary quantum mechanics. Emphasis on philosophical issues relevant to contemporary philosophy of science such as scientific realism. Some discussion of very recent theories of space, time, and matter. 4 lectures.

PHIL 422. Philosophy of Mind. 4 units

Term Typically Offered: F

Prerequisite: Junior standing and completion of GE Area C2.

Classic and current work in the problems and issues of the nature and unity of the self, consciousness, mental representations, and action, and of the relation of philosophy of mind to psychology, linguistics and computer science. 4 lectures.

PHIL 423. Philosophy of Language. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing and completion of GE Area C2.

Traditional and contemporary philosophical issues that arise from the structure of language. Relevant concepts include: syntax, semantics, pragmatics, meaning, reference, truth, identity, thought, reality. Important distinctions: use/ mention, relations/properties of relations, sentences/statements/-propositions. 4 lectures.

PHIL 429. Special Topics in the History of Philosophy. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and completion of GE Area C2.

Advanced discussion of selected topics in the history of philosophy. Examination and analysis of important philosophical movements (e.g., positivism, postmodernism) or alternatively, of particular philosophers or philosophical works of exceptional importance (e.g., David Hume; Kant's Critique of Pure Reason). The Class Schedule will list topic selected. Total credit limited to 16 units. 4 lectures.

PHIL 439. Selected Problems in Ethics and Political Philosophy. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and completion of GE Area C2.

Advanced discussion of selected topics in ethics and political philosophy. Examination and analysis of significant ethical or political theories (e.g., utilitarianism, contractarianism) or alternatively, of particular philosophers or philosophical works of exceptional importance (e.g., John Stuart Mill; John Rawls' A Theory of Justice). The Class Schedule will list topic selected. Total credit limited to 16 units. 4 lectures.

PHIL 449. Selected Topics in Recent Philosophy. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing and completion of GE Area C2.

Advanced discussion of selected topics in recent philosophy. Examination and analysis of important recent movements in central philosophical areas (e.g., metaphysics, epistemology, philosophy of science, philosophy of language, philosophy of mind) or, alternatively, of particular philosophers or philosophical works of exceptional recent importance. The Class Schedule will list topic selected. Total credit limited to 16 units. 4 lectures.

PHIL 459. Senior Project Preparation. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Senior standing and consent of instructor; and Philosophy major only.

Group and individual discussion of senior project advisor selection and initial research for senior project. Library research training, completion of exit interview, and career advising for Philosophy majors nearing graduation. Credit/No Credit grading only. Course may be offered in classroom-based or online format. 1 activity.

PHIL 460. Senior Project I. 1 unit

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: PHIL 241, senior standing, and consent of instructor; Philosophy majors only. Concurrent: PHIL 459.

Selection, initial development, and formulation of a research plan for a project conducted under faculty supervision. Minimum of 30 hours per quarter. Credit/No Credit grading only.

PHIL 461. Senior Project II. 2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: PHIL 460; Philosophy majors only.

Development and completion of a research project under faculty supervision. Results presented in a formal thesis. Minimum of 60 hours per quarter.

PHIL 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topics selected. Total credit limited to 8 units. 1 to 4 lectures.

Physical Education: Men (PEM)

undefined

PEM Courses

PEM 182. Baseball. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEM 183. Basketball. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEM 184. Cross Country. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEM 185. Football. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEM 189. Soccer. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEM 191. Swimming. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEM 192. Tennis. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEM 193. Track & Field. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEM 195. Golf. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEM 196. Wrestling. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

Physical Education: Women (PEW)

undefined

PEW Courses

PEW 183. Basketball. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEW 184. Cross Country. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEW 189. Soccer. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEW 190. Softball. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEW 191. Swimming. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEW 192. Tennis. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEW 193. Track and Field. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEW 194. Volleyball. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEW 195. Golf. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

PEW 196. Beach Volleyball. 2 units

Term Typically Offered: TBD

CR/NC

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

Physical Science (PSC)

undefined

PSC Courses

PSC 101. Matter and Energy. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B1

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B3

2019-20 or earlier catalog: GE Area B4

Introduction to the basic principles of physical science, including observation, description, modeling, and the application of physical phenomena. Emphasis on interactions as described by energy, forces, and fields for mechanical, thermal, electric, and magnetic systems. 3 lectures, 1 laboratory. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs).

PSC 102. Atoms and Molecules. 4 units

Term Typically Offered: W

Prerequisite: PHYS 121 or PHYS 131 or PHYS 141 or PSC 101.

Introduction to the basic principles of physical science (observation, description, modeling of physical phenomena) with an emphasis on interactions at the molecular level. Interactions and the behavior of gases, physical change, and chemical change (including chemical reactions, chemical bonding, and solutions). 3 lectures, 1 laboratory.

PSC 103. The Physical Environment: Earth. 4 units

Term Typically Offered: SP

Prerequisite: PSC 101 or PHYS 121 or PHYS 131 or PHYS 141.

Recommended: PSC 102.

Introduction to the basic principles of the earth sciences, and applications of these principles in modern society. Structure and formation of the Earth, earthquakes, weather, and oceanography. 3 lectures, 1 laboratory.

PSC 201. Physical Oceanography. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B1

2019-20 or earlier catalog: GE Area B3

Sustainability Focused

Introduction to the motions of the ocean. Physical environment and sea floor features; seawater properties; atmosphere and ocean interactions; ocean currents and circulation; waves and tides; the El Niño cycle; coastal ocean processes; climate change and ocean stressors; ocean resources and marine life. 4 lectures. Fulfills GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs).

PSC 307. Nuclear Energy and Weapons in the Modern World. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Technology and basic science of fission/fusion weapons, uranium/plutonium, nuclear reactors, offensive/defensive missile systems, command/control, verification, weapon effects, nuclear testing. Historical context of Cold War and proliferation, recent events, global norms, arms control treaties. 3 lectures, 1 seminar. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

PSC 320. Energy, Society and the Environment. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Science and technology of current and future energy sources along with associated environmental problems and societal response. Energy production, consumption, efficient usage, fossil fuels, nuclear, solar, other renewables. Risks, benefits, planning, economics. 3 lectures, 1 activity. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

PSC 391. Appropriate Technology for the World's People: Development. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

A broad overview of international development and appropriate design for sustainability. Besides traditional classroom work, students work in teams to address problems with technical solutions. Collaboration with mentors from the university, private sector, and nonprofits serves to provide diverse background and project mentorship. 4 lectures. Crosslisted as HNRS/PSC/UNIV 391. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

PSC 392. Appropriate Technology for the World's People: Design. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: UNIV 391 and completion of GE Area D2.

Addresses the needs of international impoverished communities with technological solutions, which are inexpensive, ecologically sustainable, and socially appropriate. Group study of target communities, and design and construction of an appropriate technology prototype. Not open to students with credit in PSC/UNIV/HNRS 492. 3 lectures, 1 laboratory. Crosslisted as HNRS/PSC/UNIV 392. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

PSC 424. Organizing and Teaching Science. 4 units

Term Typically Offered: F

Prerequisite: Admission to the Single Subject Credential Program.

Techniques, aims and objectives in the teaching of physical and life sciences at the secondary level. Selection and organization of teaching material, including strategies for English language learners (ELL) and special needs students. Evaluation of results. 3 lectures, 1 activity. Crosslisted as BIO/PSC 424.

PSC 425. Clinical Experience in Teaching Science Seminar. 2 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: Acceptance into the Single Subject Credential Program in Science. Concurrent: EDUC 469 or EDUC 479.

Principles and practices in effective teaching of science at the middle and high school level, learning theories, curriculum content and structure, classroom issues, and the teaching profession. Credit/No Credit grading only. Total credit limited to 4 units. 2 seminars. Crosslisted as BIO/PSC 425.

PSC 491. Appropriate Technology for the World's People: Development. 4 units

Term Typically Offered: F

Prerequisite: Consent of instructor, and senior or graduate standing.

Corequisite: GE Area D5.

A broad overview of international development and appropriate design for sustainability. Besides traditional classroom work, students work in teams to address problems with technical solutions. Collaboration with mentors from the university, private sector, and nonprofits serves to provide diverse background and mentorship. Seminar paper required. Not open to students with credit in PSC/UNIV/HNRS 391. 4 lectures. Crosslisted as PSC/UNIV 491.

PSC 492. Appropriate Technology for the World's People: Design. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); or graduate standing. Recommended: UNIV 391 and two lower-division courses in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Addresses the needs of international impoverished communities with techno-logical solutions, which are inexpensive, ecologically sustainable, and socially appropriate. Group study of target communities, and design and construction of an appropriate technology prototype. Seminar paper required. Not open to students with credit in PSC/UNIV/HNRS 392. 3 lectures, 1 laboratory. Crosslisted as PSC/UNIV 492.

Plant Sciences (PLSC)

undefined

PLSC Courses

PLSC 101. Orientation to Horticulture and Crop Science. 1 unit

Term Typically Offered: F

CR/NC

Discussion of horticulture, field crop, and plant protection careers. Examination of Department's curriculum, including its field, orchard and greenhouse operations. Introduction to student and professional organizations. Discussion of advising and academic resources. Required of all Horticulture and Crop Science students. Credit/No Credit grading only. 1 lecture. Formerly AEPS 101.

PLSC 110. People, Pests and Plagues. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B2

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B2

2019-20 or earlier catalog: GE Area B4

Introduction to the science of entomology, including insect identification, biology, ecology and evolution. Insects as beneficials, disease vectors and crop pests, and their interactions with humans, including roles in human culture and history. Not open for credit to Agricultural and Environmental Plant Sciences, Plant Sciences, or Wine and Viticulture majors (Viticulture concentration). 3 lectures, 1 activity. Fulfills GE Areas B2 and B3 (GE Areas B2 and B4 for students on the 2019-20 or earlier catalogs). Formerly AEPS 110.

PLSC 120. Principles of Horticulture and Crop Science. 4 units

Term Typically Offered: F, W

Introduction to horticulture and crop science. Basic plant processes, classification, anatomy, physiology, and biotechnology. Effect of environment on plants and how we control it. Introduction to plant growth including propagation, media, irrigation, nutrition, management, harvest, and post harvest handling. People's use of plants. Field trip required. 3 lectures, 1 laboratory. Formerly AEPS 120.

PLSC 123. Landscape Installation and Maintenance. 4 units

Term Typically Offered: F

Prerequisite: PLSC 120.

Planting and maintenance of trees, shrubs, ground covers, perennial plantings, color beds, specialty plantings, and small turf areas. Site selection, cultural requirements, scheduling of maintenance activities, pruning, landscape renovation and irrigation system repair. Equipment operation, maintenance, and safety. Speakers from industry. 3 lectures, 1 laboratory. Formerly AEPS 123.

PLSC 124. Plant Propagation. 4 units

Term Typically Offered: SP

Prerequisite: PLSC 120 and BOT 121.

Plant propagation practices with emphasis on understanding why practices are used, how they work, and how they are applied in commercial horticulture. Field trip required. 3 lectures, 1 laboratory. Formerly AEPS 124.

PLSC 126. Landscape Construction. 3 units

Term Typically Offered: TBD

Prerequisite: PLSC 120.

Design, construction techniques, and materials used in landscape and horticulture construction. Material quantity estimating, sustainable building practices, construction material substitutions, tools and equipment associated with landscape and horticulture construction, and equipment safety. Field trip required. 2 lectures, 1 laboratory. Formerly AEPS 126.

PLSC 127. Horticulture and Landscape Design. 4 units

Term Typically Offered: W

Aesthetic aspects of environmental horticulture, introduction to computer aided design, presentation techniques and garden history. Field trip required. 2 lectures, 2 laboratories. Formerly AEPS 127.

PLSC 132. Pomology I. 4 units

Term Typically Offered: W

Prerequisite: PLSC 120.

Orchard design and development, cultural practices, physiological responses of trees to cultural practices, propagation and strategies to maximize orchard profitability and sustainability. Not open to students with credit in AEPS 250. 3 lectures, 1 laboratory. Formerly AEPS 132.

PLSC 133. Pomology II. 4 units

Term Typically Offered: SP

Prerequisite: PLSC 132.

Analysis of production and management strategies for major fruit and nut crops in California. 3 lectures, 1 laboratory. Formerly AEPS 133.

PLSC 150. Forage Crops. 4 units

Term Typically Offered: F

Forages as a world resource in food and animal production, soil and water conservation and sustainable agricultural systems. Forage use systems: pasture and range, green chop, silage, hay and cubes. Identification and management of limiting factors of forage plant growth. Botany of legumes and grasses. Grass, legume and weed identification. Forage crop improvement. Forage composition and quality. Antiquality factors. 3 lectures, 1 laboratory. Formerly AEPS 150.

PLSC 175. Beekeeping. 3 units

Term Typically Offered: F, SP

Studies and exercises in the handling of European honey bees with special reference to pollination of commercial crops. Honey processing and marketing. Hive inspection and disease detection. 2 lectures, 1 laboratory. Formerly AEPS 175.

PLSC 190. California Vegetable Production. 4 units

Term Typically Offered: SP

Prerequisite: PLSC 120.

History, botany, growth characteristics and climatic adaptation, pests, and harvesting methods for the most important vegetable crops grown in California. Use of transplants, plastic mulches and row covers in vegetable production. Current topics in agriculture important to the vegetable industry. Field trip to a major California vegetable production area required. Survey of vegetable production for Plant Sciences majors. 3 lectures, 1 laboratory. Formerly AEPS 190.

PLSC 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total graduation credit limited to 4 units, with a maximum of 4 units per quarter. Report required. Formerly AEPS 200.

PLSC 203. Organic Enterprise Project. 2 units

Term Typically Offered: F, W, SP

CR/NC

Beginning field experience in production and marketing of organic vegetable crops. May include cultural practices, harvesting, processing, sales and marketing activities. Credit/No Credit grading only. 1 lecture, 1 activity. Formerly AEPS 203.

PLSC 205. Orchard and Vegetable Enterprise Project. 2 units

Term Typically Offered: F, W, SP

CR/NC

Sustainability Related

Hands-on experience in the production and marketing of fruit and vegetable crops such as blueberries, stone fruits, pomegranates, apples, citrus, avocados, broccoli, cauliflower, sweet corn, tomatoes, peppers, squash and lettuce. Students will also receive hands-on training in crop management. Not open to students with credit in AEPS 202 or AEPS 204. Credit/No Credit grading only. 1 lecture, 1 activity. Formerly AEPS 205.

PLSC 212. Environmental Horticulture Enterprise Project I. 2 units

Term Typically Offered: F, W, SP

CR/NC

Beginning field experience in environmental horticulture. Selection and completion of a management/production project. Credit/No Credit grading only. 1 lecture, 1 activity. Formerly AEPS 212.

PLSC 215. Floral Design I. 3 units

Term Typically Offered: F, W

Fundamentals of theory, techniques and skills currently practiced in the floral industry. Intended as consumer education for non-majors as well as initial preparation for pre-professionals. Includes applied art principles, post-harvest care and handling practices, and proper use of florist tools and materials in developing basic designs. 1 lecture, 2 laboratories. Formerly AEPS 215.

PLSC 225. Floral Design II. 3 units

Term Typically Offered: SP

Prerequisite: PLSC 215.

Expanded exploration and application of design theory to commercial products and services in the retail floral industry. Appropriate utilization of current sales and business practices in a florist setting. Advanced techniques and skills for construction of designs for weddings, advanced arrangements, and designs for events. 1 lecture, 2 laboratories. Formerly AEPS 225.

PLSC 230. Environmental Horticulture. 4 units

Term Typically Offered: TBD

Technical information and recommendations for the residential horticulturist. Propagation, pruning, planting, media, fertilizers, pest and weed control, landscaping, maintenance, identification and care of ornamental plants. Being a wise horticultural consumer. Not open to Plant Sciences majors. 3 lectures, 1 laboratory. Formerly AEPS 230.

PLSC 232. Basic Viticulture. 4 units

Term Typically Offered: F, W, SU

Prerequisite: PLSC 120 or BOT 121; CHEM 127; and SS 120.

Fundamentals of grape growing, with emphasis on wine grapes. Fundamentals of vine anatomy and physiology, development and phenology, trellising systems, soils, climatic factors, vineyard establishment, grafting, irrigation, fertility, harvest practices, pruning, major pests, and major varieties and rootstocks. Not open to students with credit in WVIT 231. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as PLSC 232/WVIT 233. Formerly AEPS 232/WVIT 233.

PLSC 233. Plant Materials I. 4 units

Term Typically Offered: SP

Identification, habits of growth, cultural requirements, and use of ornamental plants in the landscape. 3 lectures, 1 laboratory. Formerly AEPS 233.

PLSC 234. Plant Materials II. 4 units

Term Typically Offered: F

Identification, habits of growth, cultural requirements, and use of ornamental plants in the landscape. 3 lectures, 1 laboratory. Formerly AEPS 234.

PLSC 240. Commercial Seed Production. 4 units

Term Typically Offered: SP

Prerequisite: PLSC 120.

Production of field and vegetable seed. Seed technology, germination, quality control, seed enhancement, storage and handling of seed, and seed laws. Field trip to a seed conditioning/seed enhancement facility required. 3 lectures, 1 laboratory. Formerly AEPS 240.

PLSC 244. Precision Farming. 4 units

Term Typically Offered: W

Prerequisite: One of the following: PLSC 133, PLSC 190, PLSC 260, BRAE 237, or BRAE 239.

Precision agriculture applications. Integrating GIS, GPS, and remote sensing technologies with site-specific farming practices to optimize agricultural productivity. Field trip required. 3 lectures, 1 laboratory. Crosslisted as BRAE/PLSC 244.

PLSC 245. Horticultural Production Techniques. 4 units

Term Typically Offered: F

Sustainability Focused

Applied principles of plant growth in relation to the production horticulture industry. Emphasis on container media, fertilizing practices, irrigation, plant growth regulators, and miscellaneous growing structures. Field trip required. 3 lectures, 1 laboratory. Formerly AEPS 245.

PLSC 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures. Formerly AEPS 270.

PLSC 304. Introduction to Plant Breeding. 4 units

Term Typically Offered: W, SP

Prerequisite: PLSC 120 and STAT 218. Recommended: one of the following: PLSC 132, PLSC 190, PLSC 230, PLSC 245, PLSC 250, or PLSC 232/WVIT 233.

Principles of qualitative and quantitative genetics useful in the development of new plant varieties. Procedures for the creation of genetic variability, testing procedures, and selection schemes for development of improved plant types. 4 lectures. Formerly AEPS 304.

PLSC 312. Environmental Horticulture Enterprise Project II. 2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of instructor.

Field experience in environmental horticulture. Selection and completion of a management/production project under faculty supervision. Credit/No Credit grading only. 1 lecture, 1 activity. Formerly AEPS 312.

PLSC 313. Agricultural Entomology. 4 units

Term Typically Offered: F, SP

Prerequisite: PLSC 120 or BOT 121; and one of the following: CHEM 110 or CHEM 127.

The science of entomology as it relates to insects of importance in agriculture. Focus on the biology, ecology and identification of insects and mites important to California horticulture, field crops and landscapes. 3 lectures, 1 laboratory. Formerly AEPS 313.

PLSC 315. Principles of Organic Crop Production. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Origins, application, regulation and technology of organic crop production. Theoretical and practical issues surrounding organic crop production from a cross-disciplinary perspective. Topics include the history of the organic movement; current regulation and certification; and field management practices and technologies. Features industry guest lecturers. Field trip required. 3 lectures, 1 activity. Crosslisted as AG/PLSC 315. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog). Formerly AEPS/AG 315.

PLSC 321. Weed Biology and Management. 4 units

Term Typically Offered: F, SP

Prerequisite: PLSC 120 or BOT 121.

Weed ecology, biology, and implications for management. Identification of weedy and invasive plant species in annual agricultural, perennial semi-managed, range, aquatic, and forest ecosystems, to elucidate weaknesses and strengths in order to facilitate vegetation management. Organic, cultural, biological, mechanical, and chemical methods and their integrated pest management (IPM) uses. 3 lectures, 1 laboratory. Formerly AEPS 321.

PLSC 323. Plant Pathology. 4 units

Term Typically Offered: F, W, SP
Prerequisite: BIO 162 or BOT 121.

Comprehensive study of the causes and effects of diseases of plants. Designed to lead to an understanding of plant pathology, and modern methods to control plant disease. 2 lectures, 2 activities. Crosslisted as BOT/PLSC 323. Formerly AEPS/BOT 323.

PLSC 327. Vertebrate Pest Management. 4 units

Term Typically Offered: W
Prerequisite: Junior standing.

Vertebrate pests injurious to crops, livestock, forest products, wildlife, stored products and humans. Life habits, identification, control methods, and materials. Related laws and regulations. 3 lectures, 1 laboratory. Formerly AEPS 327.

PLSC 329. Plants, Biotechnology, and the Media. 4 units

Term Typically Offered: F, W
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one of the following courses: PLSC 120, BIO 111, BIO 114, BIO 161, or BOT 121.

Agriculture as applied biology and its impact on civilization. Application of technology to increase the efficiency of food production. Genetics and biotechnology; culminating in an assessment of genetically engineered foods, the myths, the controversy, the science. 3 lectures, 1 activity. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog). Formerly AEPS 329.

PLSC 331. Advanced Viticulture - Fall. 4 units

Term Typically Offered: F, SU
Prerequisite: PLSC 232 or WVIT 233.

Advanced viticulture theory and practice, with an emphasis on fall season activities. Identification of rootstocks, wine and table grapes, species taxonomy and diversity, and breeding for grapevine improvement. Field trips may be required. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Crosslisted as PLSC/WVIT 331. Formerly AEPS/WVIT 331.

PLSC 332. Landscape Contracting. 4 units

Term Typically Offered: TBD
Prerequisite: PLSC 126 and PLSC 127.

Practices in supervising personnel and applying standard techniques in landscape construction. Cost finding and estimating for landscape trades. 3 lectures, 1 laboratory. Formerly AEPS 332.

PLSC 333. Greenhouse Vegetable Production. 2 units

Term Typically Offered: F
Prerequisite: PLSC 120; CHEM 127; and SS 221.

Development, practices, history, and future of crop production in greenhouses. Research applications, commercial applications, production problems, marketing, and economics. Special emphasis on growing transplants in greenhouses and use of nutrient solutions. Field trips to a commercial greenhouse operation and/or analysis lab required. 2 activities. Formerly AEPS 333.

PLSC 334. Greenhouse Vegetable Enterprise Project. 2 units

Term Typically Offered: W
CR/NC
Sustainability Related
Prerequisite: PLSC 333.

Hands-on experience in the production, management and marketing of a variety of hydroponically-grown, greenhouse vegetables. Credit/No Credit grading only. 1 lecture, 1 activity. Formerly AEPS 334.

PLSC 336. Advanced Viticulture - Winter. 4 units

Term Typically Offered: W
Prerequisite: PLSC 232 or WVIT 233; and PLSC/WVIT 331.

Advanced viticulture theory and practice with emphasis on winter season activities. Pruning to influence vine balance, productivity, training and trellising systems, vineyard establishment, cover cropping and weed management. Field trips required. 3 lectures, 1 laboratory. Crosslisted as PLSC 336/WVIT 332. Formerly AEPS 336/WVIT 332.

PLSC 337. Advanced Viticulture - Spring. 4 units

Term Typically Offered: SP
Prerequisite: PLSC 232 or WVIT 233; and PLSC/WVIT 331.

Advanced viticulture theory and practices with emphasis on spring activities. Vine source/sink relations, factors impacting yield and berry composition, the role environmental conditions on vine physiology, and canopy management. Field trips required. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Crosslisted as PLSC 337/WVIT 333. Formerly AEPS 337/WVIT 333.

PLSC 339. Internship in Horticulture and Crop Science. 1-12 units

Term Typically Offered: F,W,SP,SU
CR/NC
Prerequisite: Consent of instructor.

Selected Plant Sciences students will spend up to 12 weeks with an approved agricultural/horticultural firm off-campus engaged in plant production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 6 units. Credit/No Credit grading only. Formerly AEPS 339.

PLSC 340. Principles of Greenhouse Environment. 4 units

Term Typically Offered: SP
Prerequisite: PLSC 245.

Analysis of problems and practices affecting the contemporary commercial horticulturist. Analysis and operation of greenhouses and related equipment stressing the effect of environment on plant growth. Field trip required. 3 lectures, 1 laboratory. Formerly AEPS 340.

PLSC 341. Cut Flower Production. 4 units

Term Typically Offered: F
Prerequisite: PLSC 120.

Production of cut flowers and other fresh florists' commodities in greenhouses and outdoors. Preparation and scheduling of such commodities for major markets. Field trip required. 3 lectures, 1 laboratory. Formerly AEPS 341.

PLSC 342. Potted Plant Production. 4 units

Term Typically Offered: W
Prerequisite: PLSC 245.

Production of major commercial flowering potted plants in greenhouses and outdoors. Preparation and scheduling of potted flowering greenhouse crops for major markets. Field trip required. 3 lectures, 1 laboratory. Formerly AEPS 342.

PLSC 343. Turfgrass Management. 4 units

Term Typically Offered: TBD
Prerequisite: PLSC 120 or BOT 121; and SS 120 or SS 121.

Turfgrass species and uses. Principles of turfgrass physiology and communities under different environments. Overview of procedures and equipment for propagation, mowing, irrigation, fertilization, aerification, and pest control. 3 lectures, 1 laboratory. Formerly AEPS 343.

PLSC 350. Abiotic Plant Problems. 4 units

Term Typically Offered: W, SP
Prerequisite: PLSC 120 or BOT 121.

Diagnosis of plant physiological disorders associated with environmental and nutritional stresses. Emphasis on the systematic inquiry process and contrasting abiotic and biotic stress. Lab includes application of various diagnostic instruments, analysis of test results, and treatment recommendations. 3 lectures, 1 laboratory. Formerly AEPS 350.

PLSC 351. Experimental Techniques and Analysis. 4 units

Term Typically Offered: W
Prerequisite: Junior standing and MATH 118 or equivalent, and STAT 218.

Principal experimental designs used in agriculture and methods of statistical analysis of data collected from each. Statistical software. Field practice in planning and layout of typical experiments. 3 lectures, 1 laboratory. Formerly AEPS 351.

PLSC 355. Citrus and Avocado Fruit Production. 4 units

Term Typically Offered: SP
Prerequisite: PLSC 120 or PLSC 250.

World citrus and avocado production and marketing. Orchard management techniques. Relationship of environment to species, cultivar, and rootstock selection. Field trip to a major California production area required. 3 lectures, 1 laboratory. Formerly AEPS 355.

PLSC 360. Nut Crops Production. 4 units

Term Typically Offered: TBD
Prerequisite: PLSC 132.

California nut crop production, focusing on almond, walnut and pistachio. Orchard establishment and management techniques. Environmental, physiological and biological factors affecting growth and production. 3 lectures, 1 laboratory. Formerly AEPS 360.

PLSC 381. Native Plants for California Landscapes. 4 units

Term Typically Offered: SP
Prerequisite: BIO 114 or BOT 121; and junior standing.

Survey of California flora with emphasis on landscape use and potential. Plant recognition, identification, propagation and culture. Utilization of native plants in landscape design and habitat restoration. Field trip required. 3 lectures, 1 laboratory. Formerly AEPS 381.

PLSC 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: FW,SPSU
Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total degree credit limited to 4 units, with a maximum of 4 units per quarter. Report required. Formerly AEPS 400.

PLSC 406. Advanced Weed Management. 4 units

Term Typically Offered: W
Prerequisite: PLSC 321.

Advanced coverage of sustainable weed and invasive plant management technologies. Concepts include environmental fates, plant metabolism, ecology and biology of weeds, and mechanisms of action of herbicides. Plant biotechnology as it relates to herbicide resistance in crops and weeds. 4 lectures. Formerly AEPS 406.

PLSC 410. Crop Physiology. 4 units

Term Typically Offered: SP
Prerequisite: PLSC 120 or BIO 263; BIO 162 or BOT 121.

Ecological and physiological factors associated with the production of crop plants. Physiological and biochemical processes that elucidate the mechanisms of whole plant performance and responses to the environment. 4 lectures. Formerly AEPS 410.

PLSC 414. Grape Pest Management. 4 units

Term Typically Offered: F
Prerequisite: PLSC 232 or WVIT 233; PLSC 313; BOT/PLSC 323.

Comprehensive survey of major grape pests including diseases, insects, weeds, vertebrates, and nematodes. Identification and biology of grape pests and natural enemies, monitoring, and integrated pest management (IPM) strategies, including cultural, biological, and chemical controls. Guest lectures. 3 lectures, 1 activity. Crosslisted as PLSC/WVIT 414. Formerly AEPS/WVIT 414.

PLSC 420. Organic Crop Production Systems. 4 units

Term Typically Offered: W
Sustainability Related
Prerequisite: PLSC 120 or BOT 121; SS 120; and junior standing.

Systems approach to crop management, soil fertility and plant nutrition, and crop and pest management including current regulations and modern technologies implemented in organic crop production. Intended for students with a background in the plant sciences. Field trip required. 3 lectures, 1 activity. Formerly AEPS 420.

PLSC 421. Postharvest Technology of Horticultural Crops. 4 units

Term Typically Offered: SP
Prerequisite: Junior standing.

Respiration, ethylene, ripening and senescence; modified atmosphere packaging, controlled atmosphere storage, packinghouses and transportation; survey of postharvest techniques to maximize commodity shelf-life. Field trip required. 3 lectures, 1 laboratory. Formerly AEPS 421.

PLSC 424. Nursery Crop Production. 4 units

Term Typically Offered: W

Prerequisite: PLSC 124.

Comprehensive and historical overview of the nursery industry. Types of wholesale nurseries and their products. Plant production systems, scheduling, and marketing. Emphasis on medium to large woody plants and deciduous field-grown ornamental trees and shrubs in the western U.S. Field trip required. 3 lectures, 1 laboratory. Formerly AEPS 424.

PLSC 425. Arboriculture. 4 units

Term Typically Offered: SP

Prerequisite: PLSC 123, PLSC 233, and PLSC 234 or NR 208 for FFS majors.

Theory and practice for the care and management of ornamental trees. Selection, planting, establishment, maintenance of specimen trees. Professional use of ropes and safety equipment. Tree evaluation, scheduling cultural practices, bracing, cabling, specialty hand and power equipment operation, safety regulations. 2 lectures, 2 laboratories. Formerly AEPS 425.

PLSC 427. Disease and Pest Control Systems for Ornamental Plants. 4 units

Term Typically Offered: W

Prerequisite: PLSC 120, PLSC 313, PLSC 321, and BOT/PLSC 323.

Recognition, prevention and control of diseases, insect/mite pests and weeds that impact commercial ornamental plantings. Integrated pest management strategies presented including biological, cultural, and safe and proper pesticidal controls. Laboratory emphasizes monitoring, problem-solving and application of appropriate pest control measures. 2 lectures, 2 activities. Formerly AEPS 427.

PLSC 428. Advances in Plant Pathology. 4 units

Term Typically Offered: F

Prerequisite: BOT/PLSC 323 and STAT 218.

Discussions of disease development, effect of pathogens on plant function, breeding for disease resistance, plant defense mechanisms, epidemiology and disease management, diagnosis techniques, and career opportunities in the field of Plant Pathology. 3 lectures, 1 laboratory. Formerly AEPS 428.

PLSC 431. Insect Pest Management. 4 units

Term Typically Offered: SP

Prerequisite: PLSC 313.

Principles of insect and mite pest management, including integrated pest management (IPM), applications of ecological theory to pest management, cultural, biological and chemical controls, pesticide resistance management, insect and mite monitoring, biotechnology applications, pesticide laws and regulations, pest control advisor and qualified applicator licensing and certification. Field trip required. 3 lectures, 1 laboratory. Formerly AEPS 431.

PLSC 432. Specialized Operations for Golf Courses and Athletic Fields. 4 units

Term Typically Offered: TBD

Prerequisite: PLSC 343.

Advanced maintenance and operation of golf course facilities and athletic field complexes. Specialized turf establishment and maintenance, environmental concerns, finance and personnel management, and professional development. Field trip required. Not open to students with credit in PLSC 430. 3 lectures, 1 laboratory. Formerly AEPS 432.

PLSC 437. Park and Public Space Management. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing.

Management and maintenance of private and public parks, arboreta, botanical gardens and recreational areas. Maintenance personnel management, safety and liability issues. Field trips required. 3 lectures, 1 laboratory. Formerly AEPS 437.

PLSC 441. Biological Control for Pest Management. 4 units

Term Typically Offered: F

Prerequisite: PLSC 313.

Control of arthropods, weeds and vertebrates to include history of biocontrol; biology of beneficial arthropods; methods of introduction, augmentation and conservation; and case studies. Identification of beneficial arthropods to appropriate taxonomic level. Technology, laws and regulations governing use of biocontrol agents. Field trips to insectaries, quarantine facilities and/or crop production areas. 3 lectures, 1 laboratory. Formerly AEPS 441.

PLSC 445. Cropping Systems. 4 units

Term Typically Offered: W

Prerequisite: PLSC 120; or BOT 121 and SS 120 or SS 121; or graduate standing.

Classification and description of agricultural systems of the world. Cropping systems as land management plans. Systems approaches to improvement of agricultural situations. Consideration of human factors and the agroecosystem in efforts to create a more sustainable agriculture. Field trip required. 3 lectures, 1 activity. Formerly AEPS 445.

PLSC 450. Current Issues in the Strawberry Industry. 2 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: PLSC 120. Corequisite: BOT 121.

Current issues in the California strawberry industry. Varied topics related to production techniques, pest management, labor, food safety, water quality, breeding, postharvest handling, automation, marketing, processing, and organics. Field trip required. Total credit limited to 4 units. 2 seminars. Formerly AEPS 450.

PLSC 461. Senior Project I. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing; completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs); and STAT 218.

Initial information research for project definition and development. Projects are typical of problems which graduates must solve in their fields of study or employment. Project results are presented in PLSC 462. Contract drawn up with approval of advisor. 2 lectures. Formerly AEPS 461.

PLSC 462. Senior Project II. 2 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Continuation of Senior Project development. Write-up of rough draft and formal draft of project. Completion of formal written report under advisor supervision. Minimum 60 hours. Formerly AEPS 462.

PLSC 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures. Formerly AEPS 470.

PLSC 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories. Formerly AEPS 471.

PLSC 500. Individual Study in Horticulture and Crop Science. 1-6 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Advanced independent study planned and completed under the direction of a member of the Plant Sciences faculty. Total credit limited to 6 units. Formerly AEPS 500.

PLSC 539. Graduate Internship in Horticulture and Crop Science. 1-9 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Consent of instructor.

Application of theory to the solution of problems of agricultural production or related business in the fields of horticulture and crop science. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty advisor before the internship commences. Degree credit limited to 6 units. Formerly AEPS 539.

PLSC 570. Selected Topics in Horticulture and Crop Science. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars. Formerly AEPS 570.

PLSC 571. Selected Topics Laboratory in Horticulture and Crop Science. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 laboratories. Formerly AEPS 571.

PLSC 575. Applied Systematics for Agriculture. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing. Recommended: a course in basic entomology, plant pathology, and weed science.

The application of evolutionary, phylogenetic, taxonomic and biogeographic principles as they pertain to current agricultural issues in the US. Attention is given to invasive species and their impact on California's agricultural industry. The course focus is insects, but invasive plants and microorganisms are also addressed. 4 seminars. Formerly AEPS 575.

PLSC 581. Graduate Seminar in Crop/Fruit Production. 3 units

Term Typically Offered: W

Prerequisite: Graduate standing.

Group study of current problems, trends and research results pertaining to production or marketing of field, vegetable or fruit crops. 3 seminars. Formerly AEPS 581.

PLSC 596. Thesis in Crop Science. 1-9 units

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing and consent of instructor.

Systematic research of a significant problem in Crop Science. Thesis will include problem identification, significance, methods, data analysis, and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Total credit limited to 9 units. Formerly AEPS 596.

PLSC 597. Thesis in Environmental Horticulture Science. 1-9 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Systematic research of a significant problem in environmental horticulture. Thesis will include problem identification, significance, methods, data analysis and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Total credit limited to 9 units. Formerly AEPS 597.

PLSC 598. Thesis in Fruit Science. 1-9 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Systematic research of a significant problem in Fruit Science. Thesis will include problem identification, significance, methods, data analysis, and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Total credit limited to 9 units. Formerly AEPS 598.

PLSC 599. Thesis in Plant Protection Science. 1-9 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Systematic research of a topic in plant protection science, including weed science, entomology, plant pathology, nematology or vertebrate management. Thesis to describe the problem and its significance, methodology, results, data analysis, discussion and conclusion. Enrollment required every quarter in which facilities are used or advisement received. Total credit limited to 9 units. Formerly AEPS 599.

Physics (PHYS)

undefined

PHYS Courses

PHYS 100. Introduction to the Physics Major. 1 unit

Term Typically Offered: F

CR/NC

Introduction to the skills, tools, and habits-of-mind physicists use to approach and investigate physical phenomena. Exploration of possible careers for physics majors and issues of diversity and representation in physics. Includes community building activities. Designed for new physics majors. 1 activity. Credit/No credit grading only.

PHYS 104. Introductory Physics. 4 units

Term Typically Offered: F

2020-21 or later catalog: GE Area B1

2019-20 or earlier catalog: GE Area B3

Prerequisite: Appropriate Math Placement Level; or MATH 115; or MATH 116; or MATH 118.

Elementary introduction to mechanics, gases, liquids and solids, heat, vibrations and waves, light, electricity and magnetism. Intended to provide non-science students with an understanding of basic physical concepts. Not open to students who have credit in a college physics course. 4 lectures. Fulfills GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs).

PHYS 111. Contemporary Physics for Nonscientists. 4 units

Term Typically Offered: F

2020-21 or later catalog: GE Area B1

2019-20 or earlier catalog: GE Area B3

Qualitative exploration of the key concepts of quantum mechanics and Einstein's special and general theories of relativity. Particle-wave duality, Heisenberg's uncertainty principle, Schrodinger's cat, warped spacetime, black holes. 4 lectures. Not open to students with credit in PHYS 211. Fulfills GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs).

PHYS 121. College Physics I. 4 units

Term Typically Offered: F,W,SP,SPU

2020-21 or later catalog: GE Area B1

2019-20 or earlier catalog: GE Area B3

Prerequisite: Appropriate Math Placement Level; or MATH 118 and high school trigonometry; or MATH 119.

Introductory course in mechanics emphasizing motion, force, and energy. Not open to students having a grade of C- or better in PHYS 141. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs).

PHYS 122. College Physics II. 4 units

Term Typically Offered: F,W,SP,SPU

2020-21 or later catalog: GE Area B1

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B3

2019-20 or earlier catalog: GE Area B4

Prerequisite: PHYS 121 or PHYS 141.

Continuation of PHYS 121. Topics include properties of materials, fluids, waves and vibrations, sound, heat, light and optics. Not open for credit to students having a grade of C- or better in PHYS 132. 3 lectures, 1 laboratory. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs).

PHYS 123. College Physics III. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PHYS 118, PHYS 121, PHYS 131, or PHYS 141.

Recommended: PHYS 122.

Continuation of PHYS 121 and 122. Electrostatics, electric current, magnetic fields and induction. Elements of modern physics. Not open for credit to students having a grade of C- or better in PHYS 133. 3 lectures, 1 laboratory.

PHYS 125. College Physics I Laboratory. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Consent of the College of Science and Mathematics

Advising Center. Co-requisite: PHYS 121.

Laboratory experiments to complement introductory course in mechanics, emphasizing experiments on motion, force, and energy. Not open to students with a grade of C- or better in PHYS 131 or PHYS 141. 1 laboratory.

PHYS 141. General Physics I. 4 units

Term Typically Offered: F,W,SP,SPU

2020-21 or later catalog: GE Area B1

2019-20 or earlier catalog: GE Area B3

Prerequisite: MATH 141 with grade C- or better. Corequisite: MATH 142 or MATH 182. Recommended: High School Physics.

Fundamental principles of mechanics. Vectors, particle kinematics. Equilibrium of a rigid body. Work and energy, linear momentum, rotational kinematics and dynamics. Primarily for engineering and science students. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as HNRS 134/PHYS 141. Fulfills GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs).

PHYS 142. General Physics II. 4 units

Term Typically Offered: F,W,SP,SPU

2020-21 or later catalog: GE Area B1

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B3

2019-20 or earlier catalog: GE Area B4

Prerequisite: PHYS 141; and MATH 142 or MATH 182.

Oscillations, waves in elastic media, sound waves. Temperature, heat and the first law of thermodynamics. Kinetic theory of matter, second law of thermodynamics. Geometrical and physical optics. 3 lectures, 1 laboratory. Crosslisted as HNRS 132/PHYS 142. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs). Formerly PHYS 132.

PHYS 143. General Physics III. 4 units

Term Typically Offered: F,W,SP,SU
 2020-21 or later catalog: GE Area B1
 2020-21 or later catalog: GE Area B3
 2019-20 or earlier catalog: GE Area B3
 2019-20 or earlier catalog: GE Area B4
 Prerequisite: MATH 142 and PHYS 141. Recommended: MATH 241.

Charge and matter, electric field, electric potential, dielectrics, capacitance, current and resistance, electromotive force and circuits, magnetic fields, magnetic field of a moving charge, induced emf. 3 lectures, 1 laboratory. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs). Formerly PHYS 133.

PHYS 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F, W, SP
 Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PHYS 202. Physics on the Computer. 4 units

Term Typically Offered: SP
 Prerequisite: PHYS 133; and MATH 241 or MATH 244.

Introduction to using computers for solving problems in physics: differential equations, matrix manipulations, simulations and numerical techniques, nonlinear dynamics. 4 lectures.

PHYS 206. Electronics and Instrumentation. 4 units

Term Typically Offered: W
 Prerequisite: PHYS 133 and MATH 143.

L-R-C circuits and electronic circuit elements emphasizing the applications of analog and digital electronics to instrumentation in modern physics. 3 lectures, 1 laboratory.

PHYS 211. Modern Physics I. 4 units

Term Typically Offered: F, W, SP
 Prerequisite: PHYS 132 and PHYS 133 and MATH 241. Recommended: MATH 242 or MATH 244.

Special relativity, fundamental principles of quantum mechanics, emphasizing the modern description of atomic phenomena. Wave-particle duality, Bohr theory, Schroedinger equation, elementary atomic structure. Course may be offered in classroom-based or online format. 4 lectures.

PHYS 212. Modern Physics II. 4 units

Term Typically Offered: SP
 Prerequisite: PHYS 211.

Applications of quantum physics to atoms, molecules, solid state systems, nuclei, and elementary particles including angular momentum and spin. Topics may include applications of statistical mechanics, principles of the laser, cooling and trapping of atoms, Bose-Einstein condensates, semiconductors, superconductors, heavy ion physics, and other topics of current interest. 4 lectures.

PHYS 220. Introduction to Physics Research. 1 unit

Term Typically Offered: F
 CR/NC
 Prerequisite: PHYS 132 or PHYS 133.

Introduction to the research programs of faculty in the department and opportunities for research. Survey of departmental facilities and procedures related to research. Overview of external research programs/ internships. Credit/No Credit grading. 1 lecture.

PHYS 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
 Prerequisite: Consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

PHYS 301. Thermal Physics I. 4 units

Term Typically Offered: W
 Prerequisite: PHYS 211.

Thermodynamics and statistical mechanics. Entropy, temperature, ensembles, partition functions, chemical potential, free energy. Selected applications including paramagnetism, ideal gas, Fermi-Dirac and Bose-Einstein distributions. 4 lectures.

PHYS 305. Classical Mechanics I. 4 units

Term Typically Offered: F
 2020-21 or later: Upper-Div GE Area B
 Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); PHYS 141; MATH 241; and MATH 242 or MATH 244.

Laws of motion, kinematics and dynamics of a particle. Oscillations. Work and energy. Linear and angular momentum. Lagrange's and Hamilton's equations and the calculus of variations. Newton's Law of gravity, Kepler's laws of orbital motion, and central force problems. Use of numerical methods for solving problems. Not open to students with credit in PHYS 302. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

PHYS 306. Classical Mechanics II. 3 units

Term Typically Offered: W
 Prerequisite: PHYS 305.

Mechanics in non-inertial reference frames. Dynamics of a rigid bodies. Coupled oscillators and normal modes. Use of numerical methods for solving problems. 3 lectures. Formerly PHYS 303.

PHYS 310. Physics of Energy. 3 units

Term Typically Offered: SP
 Sustainability Focused
 Prerequisite: PHYS 132.

Physics and mathematics applied to broad energy topics. Efficient usage, transportation, solar energy, nuclear fission and fusion. Plasma, hydrogen economy, fuel cells, wind wave, tidal, and geothermal energy. Transmission, storage, fossils. National planning, and energy economics. 3 lectures.

PHYS 313. Introduction to Atmospheric Physics. 3 units

Term Typically Offered: SP

Prerequisite: PHYS 132 or PHYS 122, and MATH 241. Recommended: MATH 304.

Properties of the atmosphere, atmospheric motions, solar and terrestrial radiation. Emphasis on conservation laws of momentum, energy and mass applied to understanding the Earth's atmospheric motions. 3 lectures.

PHYS 314. Ocean Dynamics. 3 units

Term Typically Offered: SP

Sustainability Focused

Prerequisite: PHYS 122 or PHYS 132; and MATH 241. Recommended: MATH 304 or PHYS 320.

Physics governing ocean circulation and transport processes. Physical environment, dynamics of fluid motion in the presence of rotation and stratification, balanced flows, heat budgets, ocean waves, mixing/transport, and applications to climate processes and the biological environment. 3 lectures.

PHYS 315. Lasers. 3 units

Term Typically Offered: SP

Prerequisite: PHYS 211 and MATH 143.

Interaction of light with matter, theory of laser action, characteristics and modification of laser output, types of lasers. Laser applications. Topics may include interferometry, fiber optics, holography. 3 lectures.

PHYS 318. Special Theory of Relativity. 3 units

Term Typically Offered: W

Prerequisite: PHYS 211.

Fundamental experiments and basic postulates of special relativity. Simultaneity, length and time measurements. Lorentz transformations. Four-Vectors. Space-time diagrams. Relativistic mechanics and electromagnetism. 3 lectures.

PHYS 320. Methods of Theoretical Physics I. 4 units

Term Typically Offered: F

Prerequisite: PHYS 211; MATH 242 or MATH 244; and Physics major.

Introduction to the mathematical techniques of theoretical physics with applications from classical mechanics, optics, electromagnetism and quantum mechanics. Maxwell's equations and vector calculus. Waves, the wave equation and Fourier analysis. Green's functions. Physics applications of complex contour integration and series. Not open to students with credit in PHYS 322 or PHYS 424. 4 lectures.

PHYS 321. Methods of Theoretical Physics II. 4 units

Term Typically Offered: W

Prerequisite: PHYS 320; and Physics major.

Continuing study of the mathematical techniques of theoretical physics. Methods for solving differential equations in classical mechanics, electromagnetism and quantum mechanics. Problems involving the heat equation, the wave equation and the Schrodinger equation in one, two and three dimensions. 4 lectures.

PHYS 323. Optics. 4 units

Term Typically Offered: W

Prerequisite: MATH 241; PHYS 133; and one of the following: PHYS 320, PHYS 322, EE 228, EE 201, or ME 318.

Ray optics, lens systems, optical instruments, wave optics, and polarization of light. 3 lectures, 1 laboratory.

PHYS 330. Teaching Physics. 4 units

Term Typically Offered: SP

Prerequisite: one of the following: PHYS 122, PHYS 123, PHYS 132, PHYS 133, PSC 102, or PSC 103.

Inquiry approaches to teaching physics incorporating insights from physics education research and the use of computer technology. Emphasis on pedagogical approaches and assessment that engage learners in scientific discourse and the development of basic models of physics phenomena such as motion, forces, energy, and momentum through experimentation. 2 lectures, 2 activities.

PHYS 340. Quantum Physics Laboratory I. 2 units

Term Typically Offered: F

Prerequisite: PHYS 206; PHYS 212; and one of the following: PHYS 202, CSC 101, CSC 231, or CSC 234.

Experimental studies of the quantum properties of atoms and nuclei. Measurements of fundamental constants. Statistics and data analysis. 1 lecture, 1 laboratory.

PHYS 341. Quantum Physics Laboratory II. 2 units

Term Typically Offered: W

Prerequisite: PHYS 340.

Experimental studies of quantum properties of atoms and nuclei. Interactions of radiation, particles and fields. 2 laboratories.

PHYS 342. Quantum Physics Laboratory III. 1 unit

Term Typically Offered: SP

Prerequisite: PHYS 341.

Advanced experimental studies of quantum properties of atoms and nuclei. Interactions of radiation, particles and fields emphasizing spectroscopic techniques. 1 laboratory.

PHYS 345. Quantum Computing. 4 units

Term Typically Offered: SP

Prerequisites: MATH 206 or MATH 244; and CHEM 353 or PHYS 211.

Quantum mechanical wave functions. Principle of superposition and entanglement. States of one or more quantum bits. Quantum gates and circuits. Application of quantum gates on simulators and quantum computers. Quantum computer architectures. Quantum algorithms. Ethics of quantum computing. 3 lectures, 1 activity. Crosslisted as CPE/PHYS 345.

PHYS 357. Advanced Instrumentation in Experimental Physics. 3 units

Term Typically Offered: SP

Prerequisite: PHYS 206.

Advanced analog and digital electronics, computer interfacing to experiments, robotics. 2 lectures, 1 laboratory.

PHYS 400. Special Problems for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigations, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PHYS 401. Thermal Physics II. 3 units

Term Typically Offered: SP

Prerequisite: PHYS 301.

Additional topics in thermodynamics and statistical physics, including chemical equilibrium, phase transitions, transport processes, and cryogenics. 3 lectures.

PHYS 403. Particle and Nuclear Physics. 3 units

Term Typically Offered: SP

Prerequisite: PHYS 212 and PHYS 405.

Elementary particles and their interactions, fundamental forces, the Standard Model of particle physics. Symmetries and conservation laws including parity, charge conjugation, and time reversal invariance, as well as charge-parity violation. Dirac equation, quantum electrodynamics, and Feynman diagrams. Advanced nuclear physics. Topics may include decays, symmetries of the quark model, neutrinos, nucleosynthesis, and the quark-gluon plasma. 3 lectures.

PHYS 404. Research Experience for Advanced Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of department chair.

Individual investigations, research, studies, or surveys of selected problems. Credit/No Credit grading only. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PHYS 405. Quantum Mechanics I. 4 units

Term Typically Offered: SP

Prerequisite: PHYS 212; PHYS 302 or PHYS 305; PHYS 320 or PHYS 322; MATH 241; and MATH 242 or MATH 244. Recommended: MATH 344 or PHYS 321.

Wave nature of matter and the basic postulates of quantum mechanics. The wave function, operators, and their interpretation. Schrodinger's equation and its solutions in one and more dimensions. The hydrogen atom and the periodic table. 4 lectures.

PHYS 406. Quantum Mechanics II. 3 units

Term Typically Offered: F

Prerequisite: PHYS 405.

Angular momentum operators and problems in three dimensions including the hydrogen atom. Elements of matrix mechanics and properties of spin state vectors. Time-independent and time-dependent perturbation theory. Topics may include variational principle, WKB approximation. 3 lectures.

PHYS 408. Electromagnetic Fields and Waves I. 4 units

Term Typically Offered: F

Prerequisite: PHYS 133; and MATH 304 or PHYS 320.

Electric and magnetic field theory using vector analysis. Electric fields, dielectric materials, magnetic fields, induced emf, magnetic materials, Maxwell's equations, wave equation. 4 lectures.

PHYS 409. Electromagnetic Fields and Waves II. 3 units

Term Typically Offered: W

Prerequisite: PHYS 408. Recommended: PHYS 320 or PHYS 322.

Wave equation, plane electromagnetic waves, guided waves. Dipole radiation, radiation from an accelerated charge. Special relativity. 3 lectures.

PHYS 410. Physics of Solid Earth. 3 units

Term Typically Offered: W

Prerequisite: PHYS 133; MATH 241; and MATH 242 or MATH 244.

Gravity and the figure of the Earth. Body wave seismology, structure and composition of the Earth, heat flow and heat sources, Earth tides, rotational dynamics, the geomagnetic field and its source, paleomagnetism. 3 lectures.

PHYS 418. Introduction to General Relativity. 3 units

Term Typically Offered: SP

Prerequisite: PHYS 211; and PHYS 302 or PHYS 305.

Introduction to Einstein's theory of gravity: general relativity. Geometric description of special relativity as flat spacetime. Extension to curved spacetimes and description of gravity. Topics include solar system tests of relativity, black holes, gravitational waves, and applications to astronomy and cosmology. 3 lectures.

PHYS 422. Polymer Electronics Laboratory. 1 unit

Term Typically Offered: SP

Prerequisite: EE 347 or MATE 340 or CHEM 319 or PHYS 340.

Experimental procedures in polymer electronics. Investigation of the characteristics of a polymer electronic device. 1 laboratory. Crosslisted as EE/PHYS 422.

PHYS 423. Advanced Optics. 4 units

Term Typically Offered: SP

Prerequisite: PHYS 323.

Advanced topics of modern optics. May include: fiber optics, Fourier optics, quantum optics, lasers, holography, non-linear optics. 3 lectures, 1 laboratory.

PHYS 425. Solid State Physics. 3 units

Term Typically Offered: F

Prerequisite: PHYS 211; and MATH 242 or MATH 244.

Physics of solids including the structural, mechanical, thermal, and electronic properties, energy band theory and the properties of metals and semiconductors. 3 lectures.

PHYS 426. Solid State Physics Laboratory. 1 unit

Term Typically Offered: SP

Prerequisite or concurrent: PHYS 412 or PHYS 425.

Selected experiments on X-ray diffraction, Hall effect, optical absorption, thermo-electric effect, photovoltaic cells, diode characteristics, and superconductivity. 1 laboratory.

PHYS 427. Advanced Topics in Solid State Physics. 3 units

Term Typically Offered: SP
Prerequisite: PHYS 412 or PHYS 425.

Semiconducting devices, including junction and field-effect transistors, LED's, and diode lasers. Magnetic properties of solids. Superconductivity, including discussion of high-temperature superconductors. Other topics of current interest in solid state physics. 3 lectures. Formerly PHYS 413.

PHYS 428. Nonlinear Dynamical Systems. 4 units

Term Typically Offered: SP
Prerequisite: PHYS 122, PHYS 132, or PHYS 142; and PHYS 123, PHYS 133, or PHYS 143; and MATH 241; and MATH 242 or MATH 244.
Recommended: Junior standing.

Analysis of linear and nonlinear dynamical systems with emphasis on geometrical methods and visualization techniques. Fixed points, phase plane analysis, bifurcations and limit cycles. Laboratory component includes data acquisition and analysis using computers, numerical simulations of dynamical systems, and analysis of discrete systems. 3 lectures, 1 laboratory.

PHYS 461. Senior Project I. 2 units

Term Typically Offered: F,W,SP,SU
Prerequisite: Consent of instructor.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 60 hours total time.

PHYS 462. Senior Project II. 2 units

Term Typically Offered: F,W,SP,SU
Prerequisite: Consent of instructor.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 60 hours total time.

PHYS 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

PHYS 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD
Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

PHYS 485. Cooperative Education Experience. 6 units

Term Typically Offered: TBD
CR/NC
Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 12 units; major credit limited to 2 units. Credit/No Credit grading only.

PHYS 495. Cooperative Education Experience. 12 units

Term Typically Offered: TBD
CR/NC
Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 12 units; major credit limited to 2 units. Credit/No Credit grading only.

Political Science (POLS)

undefined

POLS Courses

POLS 111. California Constitution and Government. 1 unit

Term Typically Offered: F, W, SP
Basic aspects of California state government. Satisfies GE D1 for students who have passed both AP US Government and US History exams, or transfer students who have received advice in writing from the Office of the Registrar to take POLS 111. Course may be offered in classroom-based or hybrid format. 1 lecture.

POLS 112. American and California Government. 4 units

Term Typically Offered: F, W, SP
2020-21 or later: GE Area D1
2019-20 or earlier catalog: GE Area D1
Study of U.S. and California government institutions, politics, issues and political behavior. Constitutional, historical, social, economic, and cultural perspectives. Relationships to social, economic, and political inequality, and unequal treatment of historically marginalized groups and efforts to address unequal treatment. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area D1.

POLS 180. Political Inquiry. 4 units

Term Typically Offered: F, W, SP
Introduction to the scope, language, concepts and approaches employed in political science and the social sciences. Includes emphasis on basic methodological and research strategies for assessing political issues, and an overview of the subfields of political science. Course may be offered in classroom-based or online format. 4 lectures.

POLS 225. Introduction to International Relations. 4 units

Term Typically Offered: F, W
Introduction to the basic concepts, issues, and theories surrounding the study of international politics. Changes in the nature of conflict, power, and national interests in the post-Cold War era. Role of states, non-governmental actors, and international organizations in the global arena. Course may be offered in classroom-based or online format. 4 lectures.

POLS 229. Introduction to Comparative Politics. 4 units

Term Typically Offered: F, SP

Introduction to basic concepts, issues, methodology, and theories in comparative politics. Major issues/theories include electoral laws and party systems, parliamentary and presidential institutions, socialization, democratization, corporatism and pluralism, religious and cultural impacts on politics. Topics explored through politics of countries and regions throughout the world. Course may be offered in classroom-based or online format. 4 lectures.

POLS 230. Basic Concepts of Political Thought. 4 units

Term Typically Offered: F, SP

Introduction to political theory. Focuses on concepts like: authority, liberty, equality, law, justice, community, rights, citizenship, property, class conflict, and constitutionalism. Readings from major thinkers, such as Plato, Aristotle, Augustine, Aquinas, Machiavelli, Locke, Hobbes, Rousseau, Marx, Nietzsche, Rawls, and others. Course may be offered in classroom-based or online format. 4 lectures.

POLS 245. Judicial Process. 4 units

Term Typically Offered: F, W, SP

The nature of the legal system. Topics may include: private and public law, civil and criminal law, trial and appellate courts, criminal procedure, judges, attorneys, and juries. Course may be offered in classroom-based or online format. 4 lectures.

POLS 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

POLS 285. Model United Nations. 4 units

Term Typically Offered: F

Prerequisite: One course in POLS or consent of instructor.

Introduction to the United Nations and major issues that confront it. Preparation for participation in collegiate Model United Nations conferences. Rules of procedure and debate, preparation of country position papers, and resolution writing. 4 lectures.

POLS 295. Foundations of Mock Trial. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area D1 and consent of instructor.

Introduction to evidence, trial procedure, objections, and witness examination. Preparation for intercollegiate mock trial competitions (held in winter and spring). Extensive hands-on experience in researching, preparing, and arguing a legal case. 4 lectures.

POLS 308. Political Violence and Conflict Resolution. 4 units

Term Typically Offered: SP

Prerequisite: POLS 225 or POLS 229.

Causes, methods, and consequences of non-state groups that use violent means to pursue revolutionary, separatist, or ideological goals both domestically and internationally. Dynamics of ethnic conflict, terrorist movements, paramilitary groups, insurgencies, and narco-trafficking. Processes of conflict resolution in divided societies through military responses, negotiated settlements, democracy, and peacekeeping missions. Course may be offered in classroom-based or online format. 4 lectures.

POLS 310. The Politics of Race, Class, Gender and Sexuality. 4 units

Term Typically Offered: W

USCP

Prerequisite: Completion of Area D1. Recommended: POLS 112.

The social construction of gender, race, ethnicity, class and sexuality as analytical concepts and social locations. Using a variety of sources - political essays, critical theory, and memoir - the course analyzes how gender, race, ethnicity, class, and sexuality are shaped by social, cultural, and political contexts. 4 lectures. Fulfills USCP.

POLS 315. The American Presidency. 4 units

Term Typically Offered: F

Prerequisite: Completion of Area D1. Recommended: POLS 112.

Nature and problems of contemporary presidential leadership emphasizing the impact of Congress, bureaucracy, public opinion, the courts, non-governmental factors, and the party system upon presidential power. 4 lectures.

POLS 316. Political Participation. 4 units

Term Typically Offered: F

Prerequisite: Completion of Area D1. Recommended: POLS 112.

Role of political participation as manifested through social, psychological, and institutional constraints. Analysis of consensus and conflict in present day political participation as reflected in electoral, protest, and related behavior. 4 lectures.

POLS 317. Campaigns and Elections. 4 units

Term Typically Offered: SP

Prerequisite: Completion of Area D1. Recommended: POLS 112.

Focus on contemporary political campaigns and elections in the U.S. Campaign management, message development and delivery. Impact of political ideology, mass media, technology, pressure groups on electoral outcomes. 4 lectures.

POLS 319. United States Congress. 4 units

Term Typically Offered: W

Prerequisite: Completion of Area D1. Recommended: POLS 112.

Congressional elections and their effects on congressional actions, including the organization, procedures and consequences of the legislative process in Congress. 4 lectures.

POLS 321. Comparative Political Culture. 4 units

Term Typically Offered: SP

Prerequisite: POLS 229.

Survey of major concepts and theories of political culture and relationships among culture, politics, and society. Cultural influences of Christianity, Confucianism, Islam, and contemporary democratic, civic culture. The role of political culture in the industrialization process and post-colonial and post-communist transitions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

POLS 324. International Relations Theory. 4 units

Term Typically Offered: TBD
Prerequisite: POLS 225 or POLS 229.

Survey of theoretical approaches to the study of international political processes and issues, including foreign policies, global political issues, cooperation and conflict. Analyses of selected problems to elucidate differences between realist, liberal, socialist, constructivist, and other theories. 4 lectures.

POLS 325. Global Political Issues. 4 units

Term Typically Offered: F, W
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Concepts and theories in international relations and contemporary global issues. Application of principles of international relations to political issues and subjects which affect our lives. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

POLS 328. Politics of Developing Areas. 4 units

Term Typically Offered: W
Prerequisite: POLS 225 or POLS 229.

A detailed survey of the domestic politics of developing countries from a comparative perspective. Assessment of theories of development with appropriate examples taken from particular areas and countries. Repeatable to 8 units with different subtitles (e.g., 'Latin America,' 'East Asia,' 'Africa'). The Class Schedule will list topic selected. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

POLS 329. Ancient and Medieval Political Thought. 4 units

Term Typically Offered: TBD
Prerequisite: POLS 230.

Political theory from ancient Greece, ancient Rome, and the Medieval period. Readings from major authors, such as Plato, Aristotle, Augustine, Aquinas, and others. 4 lectures.

POLS 330. Modern Political Thought. 4 units

Term Typically Offered: TBD
Prerequisite: POLS 230.

Theories of political participation and the relationship between the individual and the state as developed in the works of influential thinkers such as Locke, Rousseau, Mill and Marx. 4 lectures.

POLS 331. Contemporary Political Thought. 4 units

Term Typically Offered: TBD
Prerequisite: POLS 230.

Ideas of major contemporary political thinkers, such as Wolff, Singer, Rawls, Strauss, MacKinnon, Beauvoir, Dewey, Walzer and others in historical context, compared and contrasted. 4 lectures.

POLS 332. World Food Systems. 4 units

Term Typically Offered: SP
Sustainability Focused
Prerequisite: Junior standing.

Integrated, interdisciplinary study of the technologies of global food production, environmental and social issues related to the application of those technologies, and moral and ethical issues associated with global food production and distribution. Emphasis on the politics of change. Course may be offered in classroom-based or online format. 4 lectures.

POLS 334. Jurisprudence. 4 units

Term Typically Offered: TBD
Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Normative and analytical problems concerning law. Nature of law and legal systems including liberty and justice. Topics may include the connection between law and morality, feminist and critical race perspectives, crime and punishment, and economic analysis of the law. Course may be offered in classroom-based or online format. 4 lectures.

POLS 337. U.S. and China in the Contemporary World. 4 units

Term Typically Offered: TBD
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Investigation of China's political history with close attention to past and present U.S.-China relations. Topics include the conflict over Taiwan, territorial disputes in the South China Sea, and ongoing economic cooperation and competition, concerning trade and debt. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

POLS 338. Critical Issues in American Politics. 4 units

Term Typically Offered: W, SP
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area D1. Recommended: POLS 112 (GE Area D1).

Examination of significant social, legal, economic and political issues that face the country and how the basic institutions of government-national, state, local-are responding to them; assessment of policies to correct these problems. 4 lectures. Crosslisted as HNRS/POLS 338. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

POLS 339. Authoritarian and Democratic Rule. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

A comparative examination of governing institutions used throughout the world. Emphasis on the diversity of governmental designs found within both authoritarian and democratic regimes. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

POLS 340. American Judicial Politics. 4 units

Term Typically Offered: W

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Empirical aspects of the decision making of federal and state courts, with an emphasis on understanding how interactions between the courts and other political factors shape judicial behavior. 4 lectures.

POLS 341. American Constitutional Law. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

United States Supreme Court decisions in the areas of separation of powers, judicial review, commerce clause, federalism, due process. Course may be offered in classroom-based or online format. 4 lectures.

POLS 342. Constitutional Theory. 4 units

Term Typically Offered: W

Prerequisite: POLS 245. Recommended: POLS 112 or POLS 341.

Competing theories of constitutional interpretation. Emphasis on the conflict between judicial review and democracy, effects of political events on constitutional evolution, merits of different approaches to constructing constitutional meaning. 4 lectures.

POLS 343. Civil Rights in America. 4 units

Term Typically Offered: F, W, SP

USCP

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Case-based examination of discrimination based on race, ethnic, gender, and sexual orientation in the United States. Emphasis on the Supreme Court's interpretation of the Equal Protection Clause. Course may be offered in classroom-based or online format. 4 lectures. Fulfills USCP.

POLS 344. Civil Liberties. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Role of Supreme Court as interpreter of civil liberties. Topics may include freedom of expression and religion, search and seizure, due process of law. Course may be offered in classroom-based or online format. 4 lectures.

POLS 347. Politics and Popular Culture. 4 units

Term Typically Offered: TBD

Prerequisite: POLS 112.

Intersection of politics and mass media. How political actors use popular culture to establish issue agendas, convey political concepts, symbolism, rhetoric and values. 4 lectures.

POLS 348. Early American Political Thought. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); completion of GE Area D1; and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs). Recommended: POLS 112 (GE Area D1).

The central political ideas of America's leading thinkers from the arrival of the Mayflower to the Civil War. Selections may include readings of American political ideas from Winthrop, Paine, Publius, Hamilton, de Tocqueville, Douglass, Calhoun, Thoreau, and Lincoln, among others. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

POLS 349. Contemporary American Political Thought. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area D1. Recommended: POLS 112 (GE Area D1).

The central political ideas of America's leading thinkers from the Civil War to the present. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

POLS 351. Public Policy and Administration. 4 units

Term Typically Offered: F, W

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Systematic and critical approach to evaluating and designing public policies and the development of management functions in government. Attention given to intergovernmental relations and case studies in economic development, health, the environment, and other policy areas. Course may be offered in classroom-based or online format. 4 lectures.

POLS 359. Research Design. 4 units

Term Typically Offered: F, W, SP

Prerequisite: STAT 217.

Methodology and research design used in qualitative and quantitative analysis. Examination of multiple methods used to analyze political phenomena in the political science discipline. 4 lectures.

POLS 361. Data Analysis in Political Science. 4 units

Term Typically Offered: F, W, SP

Prerequisite: POLS 359.

Survey of data analysis in political science, up to and including multiple regression. Software instruction to facilitate understanding of quantitative approaches to political research. 4 lectures.

POLS 375. California Politics. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE D1. Recommended: POLS 112.

Political culture, processes, behavior, institutions, public policy and distribution of power in California state and substate governments. 4 lectures.

POLS 380. Religion and Politics in the Israeli-Palestinian Conflict. 4 units

Term Typically Offered: W

Prerequisite: Completion of GE Area A with grades of C- or better.

Recommended: Completion of one class in POLS or RELS.

The root causes of the Israeli-Palestinian conflict and its current manifestation. Possibilities for solutions from the perspectives of religious studies and political science. 4 lectures. Crosslisted as POLS/RELS 380.

POLS 381. Peace and War. 4 units

Term Typically Offered: SP

Prerequisite: POLS 225 or POLS 229.

Dynamics of interstate peace and war. Topics include: military strategy, the military-industrial complex, arms races and disarmament, diplomacy, deterrence and pre-emption, collective security and alliance behavior, civil-military relations, post-conflict reconstruction, and the role of international law and organizations. 4 lectures.

POLS 382. Comparative Foreign Policy. 4 units

Term Typically Offered: TBD

Prerequisite: POLS 225 or POLS 229.

Systematic analysis of the international and domestic pressures leading different states to take particular foreign policy stances, with appropriate examples taken from different regions of the world. Discussion of contemporary foreign policy issues and responses. 4 lectures.

POLS 383. Politics of the European Union. 4 units

Term Typically Offered: TBD

Prerequisite: POLS 225 or POLS 229.

History and development of the European Union in the context of theories of regional integration. Overview of institutional and policymaking machinery of the EU. Current issues facing member states. Impact of EU on US interests and world politics more generally. 4 lectures.

POLS 384. Comparative Law. 4 units

Term Typically Offered: TBD

Prerequisite: POLS 225 or POLS 229.

Survey of cultural, historic, institutional, and social contexts of legal traditions. Emphasis on comparing western common and code law to Confucian, Islamic, indigenous and other nonwestern societies. Comparative topics may include prison reform, property rights, constitutional law, international law, rule of law, and the judicialization of politics. Course may be offered in classroom-based or online format. 4 lectures.

POLS 385. Advanced Model United Nations. 2 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: POLS 285.

Preparation for participation in collegiate Model United Nations conferences. Rules of procedure and debate, preparation of country position papers, and resolution writing. Discussion of current issues of concern to the United Nations. Credit/No Credit grading only. Total credit limited to 6 units. 2 lectures.

POLS 386. Government Internship. 2-12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Consent of instructor. Recommended: Junior standing with a minimum 2.5 GPA.

Supervised work experience in a government or related public agency. Intern will function as an employee subject to all the duties and responsibilities of employees engaged in comparable work. 30 hours of work experience per unit of credit. Total credit limited to 12 units. Credit/No Credit grading.

POLS 387. Research Internship. 1-8 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: POLS 359 and POLS 361.

Faculty-supervised research experience on various topics related to politics and government. Student research assistantship with a faculty member engaging in a research project. Total credit limited to 8 units. Credit/No Credit grading only.

POLS 395. Advanced Mock Trial. 2 units

Term Typically Offered: W

CR/NC

Prerequisite: Consent of instructor.

Advanced preparation for participation in intercollegiate mock trial competitions. Emphasis on advanced topics and techniques related to evidence, trial procedure, objections, and witness examination. Extensive hands-on practice in arguing a legal case. Credit/No Credit grading only. Total credit limited to 4 units. 2 lectures.

POLS 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, study, or survey of selected problems. Total credit limited to 8 units.

POLS 417. Feminist Legal Theory. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Different approaches to US feminist legal theory and topics in gender and US law. Topics covered include employment, domestic violence, sexual harassment, reproductive justice, sex work, rape, and welfare reform. 4 seminars. Crosslisted as POLS/WGQS 417. Formerly WGS 417.

POLS 419. Social Movements and Political Protest. 4 units

Term Typically Offered: W

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Selected U.S. social movements, including abolitionism, feminism, civil rights, gay rights, the Christian right, and environmentalism. Political opportunities and constraints that impact collective political action, and effects of grassroots struggles for justice in U.S. politics and society. 4 lectures.

POLS 420. Contemporary U.S. Foreign Policy. 4 units

Term Typically Offered: W
Prerequisite: POLS 225 or POLS 229.

Historical influences and theoretical assumptions behind U.S. foreign policy. Examination of American power and influence, examining key concepts from public opinion, business interests, executive privilege, diplomacy, propaganda, trade, and military strategies. 4 lectures.

POLS 425. Comparative Political Corruption. 4 units

Term Typically Offered: TBD
Prerequisite: POLS 112 and POLS 229.

Examination of the causes and effects of corruption in the United States and around the world, and the problems corruption causes in different societies. Particular attention will be placed on the role of political and social institutions. 4 seminars.

POLS 426. International Organizations and Law. 4 units

Term Typically Offered: W
Prerequisite: POLS 225 or POLS 229.

Analysis of contemporary international legal issues, such as arms control and nonproliferation, intellectual property rights and the World Trade Organization, and human rights and the United Nations. Case studies drawn from advancements in the biological sciences, such as those affecting public health. 4 lectures.

POLS 427. Politics of the Global Economy. 4 units

Term Typically Offered: TBD
Prerequisite: POLS 225 and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Political conflicts surrounding the trading, financial, and security structures of the international economy. Motivations, resources, and responses of states, international organizations, multinational corporations and other nonstate actors as they address economic, political, environmental, and security issues within these structures. Desirability and inevitability of globalization. 3 lectures and a research paper.

POLS 428. Issues and Topics in Comparative Politics. 4 units

Term Typically Offered: TBD
Prerequisite: POLS 229.

Selected topics and issues in the field of comparative politics. The Class Schedule will list topic selected. Total credit limited to 8 units. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

POLS 429. Issues and Topics in International Relations. 4 units

Term Typically Offered: W
Prerequisite: POLS 225.

Selected topics and issues in the field of international relations. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

POLS 430. Advanced Topics in Political Theory. 4 units

Term Typically Offered: TBD
Prerequisite: POLS 230.

In-depth examination of a theme or thinker in political theory. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

POLS 431. Issues and Topics in American Politics. 4 units

Term Typically Offered: TBD
Prerequisite: POLS 112 and junior standing.

Selected topics and issues in the field of American politics. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

POLS 435. Political Communication. 4 units

Term Typically Offered: SP
Prerequisite: POLS 112 and Junior standing.

Introduction to political communication. Concepts, theories and methods from areas such as communication, media studies, journalism, political science, and public policy. How language and non-verbal communication used by the media, government, and other actors shapes public perception of and behavior in the social, political, and scientific world. 4 lectures.

POLS 440. California Student Bill Project. 2 units

Term Typically Offered: TBD
Prerequisite: POLS 112 and consent of instructor. Recommended: POLS 375.

Experiential, project-based course where students will draft a bill and work to move it through the California Legislature toward becoming law. Field trip may be required. Total credit limited to 6 units. 2 seminars.

POLS 445. Voting Rights and Representation. 4 units

Term Typically Offered: W
USCP
Prerequisite: POLS 112.

Philosophical, legal, and behavioral analysis of electoral representation; the 1965 Voting Rights Act; vote dilution; racial and partisan discrimination; voter identification and voter suppression. Similarities and differences across and within racial/ethnic/political groups in the US with regards to effective representation. 4 lectures. Fulfills USCP.

POLS 451. Technology and Public Policy. 4 units

Term Typically Offered: W
Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Exploration of the historical and contemporary political influences shaping modern science and technology policy. Addresses sources of technological innovation, such as public-private partnerships, military R & D, democratic governance, and competitiveness among industrialized nations. Case studies may include cybersecurity, geoenvironment, nanotechnology, and neurosciences. 4 seminars.

POLS 452. Technology and International Development. 4 units

Term Typically Offered: F
Prerequisite: One course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Examines potential for advanced technologies to support international development from political and social science perspective. Reviews historical efforts toward and socio-economic contexts of global development. Analyzes current applications of advanced technology for sustainable development, democracy-building, education, healthcare, and policy reform. 4 seminars.

POLS 455. Grant Writing. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing and POLS 112.

Provides instruction in writing grants, evaluating grant proposals, and in researching and cultivating funding sources while considering organizational mission and program development. 4 lectures.

POLS 457. U.S. Reproductive Politics. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Multi-disciplinary approach to the study of the law and politics of reproduction in the United States. Topics studied include histories of reproductive regulation, abortion law and politics, technology and fertility, and social policy and reproductive control. 4 seminars. Crosslisted as POLS/WGQS 457. Formerly WGS 457.

POLS 459. The Politics of Poverty. 4 units

Term Typically Offered: F

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Analysis of the politics and policies associated with the American welfare state, focusing on welfare and homelessness policies. Exploration of the causes of poverty and how social policy responds to poverty. 4 lectures.

POLS 461. Senior Project I. 2 units

Term Typically Offered: F, W, SP

Prerequisite: POLS 359, POLS 361, and senior standing.

Selection and completion of a project under faculty supervision. Project results presented in a formal paper.

POLS 462. Senior Project II. 2 units

Term Typically Offered: F, W, SP

Prerequisite: POLS 359, POLS 361, and senior standing.

Selection and completion of a project under faculty supervision. Project results presented in a formal paper.

POLS 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: POLS 112 and junior standing.

Directed courses on timely issues and topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 lectures.

POLS 471. Urban Politics. 4 units

Term Typically Offered: W

Prerequisite: POLS 112.

Theoretical approaches, concepts, and politics associated with urban governments. Urban power structures, the relationship between urban society and politics, and inter-governmental relations. 3 lectures and a research paper.

POLS 500. Independent Study. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing with minimum of 12 units.

Individual research, studies, or surveys under the supervision of the faculty. Total credit limited to 4 units.

POLS 510. Research Design. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or consent of instructor.

Approaches to policy research, question development, hypothesis framing, literature reviews, sampling, measurement, and approaches to analysis. 4 lectures.

POLS 515. Public Policy. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing, or consent of instructor.

Theoretical and practical approaches to public policy making and contemporary policy issues such as markets; regulation; criminal justice; housing; environment; poverty; health care and education. 4 lectures.

POLS 518. Public Policy Analysis. 5 units

Term Typically Offered: W

Prerequisite: Graduate standing or consent of instructor.

Contextual, problem oriented analysis of the societal problems and possible solutions to them. Development and use of concepts and tools related to policy evaluation with particular emphasis on qualitative methods. 4 lectures, 1 activity.

POLS 540. Leadership and Management in Public Policy. 2 units

Term Typically Offered: SP

CR/NC

Prerequisite: Graduate standing or consent of instructor.

An exploration of the changing notion of leadership in public policy. Focus on understanding and developing leadership capacity within the complex inter-organizational structure in which the student works. Credit/No Credit grading only. 2 seminars.

POLS 550. Regulatory and Economic Policy. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Theories of regulatory and economic policy, including markets and market failures, politics of economic policy, and applications of government regulatory and economic policy, and skills and experience necessary to social and economic questions. 4 seminars.

POLS 560. Quantitative Methods. 5 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor.

Social science methodology focusing on research design and quantitative methods used in policy and political research, such as multi-regression, non-linear techniques, diagnostics and time series. Advanced computer packages used to analyze challenging data sets. 4 lectures, 1 activity.

POLS 568. Topics and Issues in Public Policy. 4 units

Term Typically Offered: TBD

Prerequisite: POLS 515 or consent of instructor.

Selected advanced topics applicable to public policy problems. The Class Schedule will list topic selected. Total credit limited to 8 units. 3 seminars and a research project.

POLS 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

POLS 586. Policy Internship. 4-8 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Completion of 12 units in the Master of Public Policy Program, and consent of instructor.

Supervised work experience in a government or related public agency. Intern will function as an employee engaged in comparable work. Credit/No Credit grading only. Total credit limited to 8 units.

POLS 590. Graduate Seminar. 4 units

Term Typically Offered: F, W

Prerequisite: POLS 560 or consent of instructor.

Seminar designed as a culminating component to the Master of Public Policy Program. Individual research under the supervision of the faculty within a small discussion environment, leading to a graduate project or paper that demonstrates practical mastery of the MPP curriculum. Total credit limited to 8 units. 4 seminars.

POLS 595. Directed Readings for MPP Comprehensive Exams. 2 units

Term Typically Offered: SP

CR/NC

Prerequisite: POLS 590.

Directed readings and preparation for Master of Public Policy (MPP) comprehensive exams. Regular consultation between advisor and student. Credit/No Credit grading only. 2 seminars.

Psychology (PSY)

undefined

PSY Courses

PSY 102. Orientation to the Psychology Major. 2 units

Term Typically Offered: F

Prerequisite: Psychology major.

Orientation to the psychology major and psychology as a career. Introduction to requirements of the major, available resources, strategies for academic success, and career options in psychology and related fields. Course may be offered in classroom-based or online format. 2 lectures.

PSY 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: PSY 201 or PSY 202 and consent of department head.

Individual investigation, research, study or survey of selected problems in consultation and with prior approval of instructor. Written report required. Total credit limited to 4 units.

PSY 201. General Psychology. 4 units

Term Typically Offered: F, W, SP

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

Introduction to the psychological study of human beings. Applications and research in areas such as psychobiology, perception, learning, motivation, consciousness, memory and cognition, personality, emotion, development, psychological assessment, social behavior, psychopathology and psychotherapy. A student may enroll for credit in either PSY 201 or PSY 202, but not both. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

PSY 202. General Psychology. 4 units

Term Typically Offered: F, W

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

Introduction to the psychological study of human beings. Applications and research in areas such as psychobiology, perception, learning, motivation, consciousness, memory and cognition, personality, emotion, development, psychological assessment, social behavior, psychopathology and psychotherapy. A student may enroll for credit in either PSY 201 or PSY 202, but not both. 3 lectures, 1 discussion. Fulfills GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

PSY 251. Laboratory in Group Activities. 1-3 units

Term Typically Offered: TBD

CR/NC

Skills and techniques of solving problems in large and small groups. Conducting and reporting meetings. Analyses of leadership dynamics in campus organizations. Credit/No Credit grading only. Total credit limited to 6 units. 1-3 activities.

PSY 252. Social Psychology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202.

How attitudes, beliefs, and behavior are affected by the social situation. Gender roles, prejudice, aggression, altruism, attitudes and persuasion, liking and loving, and group behavior. Use of social psychology to understand diversity issues, reduce racism and sexism and international conflict, improve relationships, and communicate persuasively. 4 lectures.

PSY 254. Family Psychology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202.

Introduction to research and theory on family relationships and behavior across the lifespan. Contextual influences, diversity of family forms, and topics such as love, mate selection, marital quality, parenting, gender, household work, divorce, and remarriage. 4 lectures. Crosslisted as CD/PSY 254.

PSY 256. Developmental Psychology. 4 units

Term Typically Offered: F, W

Prerequisite: PSY 201 or PSY 202.

Introduction to the scientific study of development with emphasis on the lifespan, from infancy to old age. Basic research and concepts in understanding social, emotional, cognitive, contextual, and diversity influences on development. 4 lectures. Crosslisted as CD/PSY 256.

PSY 260. African American Psychology. 4 units

Term Typically Offered: TBD

USCP

Recommended: PSY 201 or PSY 202.

A historical overview of African American psychology, and a critical examination of the psychocultural forces (e.g., history of slavery, racism, oppression, education, familial factors) that have helped to shape the beliefs, attitudes, identities, behavior, and well-being of African Americans.

PSY 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

PSY 301. Psychology of Personal Development. 4 units

Term Typically Offered: TBD

Prerequisite: PSY 201 or PSY 202.

Application of developmental psychology to self awareness. Includes communication skills, self modification skills and examination of life goals and values. 4 lectures.

PSY 302. Behavior in Organizations. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202.

Characteristics of functioning organizations and their effects on individuals. Psychological issues relevant to the maintenance of the organization. Motivation, leadership, group phenomena, communication, decision-making, attitudes, personnel selection and organizational change. 4 lectures.

PSY 304. Intergroup Dialogues. 4 units

Term Typically Offered: W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D or GE Area E. Recommended: Completion of USCP requirement.

Weekly meetings of students from two distinct self-defined identity groups, with trained peer facilitators, in which readings, experiential activities, informed dialogue, and reflective writing are integrated as a means of encouraging self and group awareness and exploring ways to promote just community across difference. Supplemented by weekly lecture/discussions. 2 lectures, 2 discussions. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

PSY 305. Personality. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202.

Personality theories and research. Assessment, dynamics, and development of personality. Trait, behavioral, social learning, cognitive, humanistic, psychoanalytic and biological approaches. 4 lectures.

PSY 306. Adolescence. 4 units

Term Typically Offered: F, W, SP

Prerequisite: CD/PSY 256 or CD/EDUC 207.

Psychological analysis of the years from prepubescence to young adulthood. Current research on behavior and development during adolescence with emphasis on physical, affective, cognitive, sociocultural, historical, family, peer and school aspects of life during the post-child, pre-adult years. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as CD/PSY 306.

PSY 310. Psychology of Death. 4 units

Term Typically Offered: TBD

Prerequisite: PSY 201 or PSY 202.

Psychological aspects of death, loss and grief, including scientific findings, person-culture transactions and expressions in the arts and humanities. Personal exploration and interdisciplinary application of psychology to issues such as death anxiety, dying processes, funerals, immortality beliefs, suicide, and grieving. 4 lectures.

PSY 311. Environmental Psychology. 4 units

Term Typically Offered: W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Interrelationship between behavior and the built and natural environments. Evaluating and understanding environments, environmental stress, and the human aspects of environmental problems. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

PSY 318. Psychology of Aging. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or Psychology major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: PSY 201 or PSY 202.

Psychological and physiological aging in the context of the culture. Theories and research relating to the issues of stability and both positive and negative changes in perception, learning, memory, intelligence, personality, identity, motivation, sexuality, family relationships, career. Disorders, institutionalization, death and bereavement. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

PSY 320. Health Psychology. 4 units

Term Typically Offered: F, SP

Prerequisite: PSY 201 or PSY 202.

Scientific study of how mental, behavioral, and social processes affect physical health. Topics include health-risk behaviors and promotion of personal control over health improvement, social status and health disparities, stress and coping, and the patient-provider relationship. 4 lectures.

PSY 323. The Helping Relationship. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing, completion of one USCP course, Psychology and Child Development majors only, or consent of instructor.

Basic skills and approaches common to helping relationships with children, adults, and families. Examines theoretical, empirical, and practical applications of helping. Differentiation between professional, paraprofessional, and nonprofessional helping relationships. 2 lectures, 2 activities.

PSY 324. Psychology of Gender. 4 units

Term Typically Offered: W

Prerequisite: PSY 201 or PSY 202.

Investigation of psychological genders and sexualities beyond ideas associated with biological sex. Exploration of sex/gender/sexuality differences from a social psychological (e.g., socialization) perspective. Implications of gender roles (including masculinity, femininity, non-binary) and sexual identities for relationships and health. 4 lectures. Crosslisted as PSY/WGQS 324. Formerly WGS 324.

PSY 325. Introduction to Positive Psychology. 4 units

Term Typically Offered: TBD

Prerequisite: PSY 201 or PSY 202.

Scientific study of the enhancement of strengths and optimal functioning in humans. Basic research, assessment and helping concepts in understanding optimal functioning within diverse populations. 4 lectures.

PSY 329. Research Methods in Psychology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202; and STAT 217.

Introduction to research methods used in psychology and other behavioral sciences. Topics include the logic and ethics of research; experimental, correlational, and survey methodology; library search strategies; basic statistical procedures; and the format of the research report. 4 lectures.

PSY 330. Behavioral Effects of Psychoactive Drugs. 4 units

Term Typically Offered: W, SP

Prerequisite: Completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Pharmacokinetic, pharmacodynamic and behavioral effects of psychoactive drugs. Social and psychological issues related to drug use and misuse. 4 lectures.

PSY 333. Quantitative Research Methods for the Behavioral Sciences. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 329; and STAT 217.

Thorough introduction to the quantitative aspects of empirical research. Using SPSS statistical software, students will learn how to choose, conduct, and interpret analyses of research data from different behavioral science disciplines. 3 lectures, 1 activity.

PSY 340. Biopsychology. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and PSY 201 or PSY 202.

Relationship between physiological and behavioral processes such as learning and memory, language, sleep, and abnormal behavior. Information processing, biochemistry, and structural organization at the cellular and nervous system levels. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

PSY 344. Behavioral Genetics. 4 units

Term Typically Offered: F, W

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); PSY 201 or PSY 202; STAT 217 or STAT 218; and one of the following: ASCI 112, BIO 111, BIO 123, BIO 161, or BIO 213.

Examine the relative influence of genetic and environmental factors on human behavior. Emphasis on the foundation and application of behavioral genetics to the field of psychology. Topics include heritability, gene-environment interplay, ethics, and emerging technologies. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

PSY 350. Teamwork. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202.

Group dynamics applied to teams. Topics include team development, basic team processes, conflict management, decision making, leadership, problem solving, and the impacts of diversity and culture on teams. Focus on effective use of teams in the workplace. Not open to students with credit for PSY 351. 4 lectures.

PSY 352. Conflict Resolution: Violent and Nonviolent. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing or Psychology major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: PSY 201 or PSY 202.

Psychological, situational, political, and cultural determinants of violence and nonviolence in interpersonal, intergroup, and international conflict.

Self-assessment of conflict resolution attitudes, competencies, and behaviors. Negotiation, mediation, and other approaches to conflict management. Educational and structural approaches to violence prevention. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

PSY 356. Behavioral Disorders in Childhood. 4 units

Term Typically Offered: F, SP

Prerequisite: PSY 201 or PSY 202; CD/PSY 256 or CD 305; and junior standing.

Applications of psychological principles to childhood behavioral disorders. Aggression, delinquency, stress reactions, motivational, perceptual-attentional deficiencies, psychoses, anxiety disorders, biological dysfunctions, and social, emotional and intellectual disabilities. Course may be offered in classroom-based or online format. 4 seminars. Crosslisted as CD/PSY 356. Formerly CD 456.

PSY 357. Cognition. 4 units

Term Typically Offered: W, SP

Prerequisite: PSY 201 or PSY 202.

Principles and theories of cognition including models of perception, attention, memory, concept formation, language, intelligence, problem-solving/decision making, and creativity. Discusses applications to areas such as artificial intelligence, education, and implications for understanding related fields in arts, sciences, and technology. 4 lectures. Formerly PSY 457.

PSY 360. Applied Social Psychology. 4 units

Term Typically Offered: TBD

Sustainability Related

Prerequisite: PSY 252.

Applications of social psychology to education, business and industry, environmental problems, interpersonal and intergroup relations, health and welfare, mass communication, judicial systems, and politics. Analysis of social and organizational problems, methods of intervention, and program evaluation. 4 seminars.

PSY 370. Introduction to Clinical and Counseling Psychology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202 and at least one other PSY course.

Introduction to the fields of clinical and counseling psychology. History, education and training, theories, assessment, diagnosis, and treatment. Introduction to diverse settings, ethical principles, legal guidelines, credentialing and employment opportunities. 4 lectures.

PSY 372. Multicultural Psychology. 4 units

Term Typically Offered: F, W, SP

USCP

Prerequisite: PSY 201 or PSY 202; and sophomore standing.

The impact of culture, ethnicity, and race on human behavior within the framework of psychological theory and research. Emphasis on ethnic minority groups within the U.S. including: African Americans, Native Americans, Asian Americans/Pacific Islanders, and Latino/a Americans. Not open to students in MS Psychology program. 4 seminars.

PSY 375. Forensic Psychology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202.

Application and practice of psychology in both the civil and criminal justice systems. Examination of police and investigative psychology, correctional psychology, expert witness testimony, psychological evaluations for the courts, understanding aggression. 4 lectures.

PSY 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: PSY 201 or PSY 202.

Individual investigation, research, study or survey of selected problems in consultation and with prior approval of instructor. Written report required. Total credit limited to 4 units.

PSY 401. Special Problems: Experiential Learning. 2-4 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Psychology major or gerontology minor, junior standing, and consent of instructor.

Supervised experience in various community, governmental, educational, or research settings. Especially designed for individuals in applied settings requiring additional hours or a pre-fieldwork training experience. Applied psychological, developmental, or educational experiences determined by participating institution, supervising faculty member, and student. Cannot be substituted for PSY 448, PSY 449, PSY 453, or PSY 454. Credit/No Credit grading only. Total credit limited to 4 units.

PSY 405. Abnormal Psychology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202.

Normal and abnormal behavior in everyday life. Anxiety, somatoform, dissociative, mood, childhood, personality, psychotic, cognitive, eating, and substance use disorders and their treatment. 4 lectures.

PSY 410. History and Systems of Psychology. 4 units

Term Typically Offered: TBD

Prerequisite: PSY 333.

Survey of the philosophical and scientific roots of modern psychology, pioneer laboratories, systems, and schools of psychology, the refining of experimental methods, and applications of psychology in testing and psychological services. Examination of contributions by women and minorities in psychology. 4 seminars.

PSY 417. Interpersonal Relationships in Childhood and Adolescence. 4 units

Term Typically Offered: SP

Prerequisite: CD 304, CD 305 or CD 306; or CD/PSY 256 and PSY 305.

Current theories and research on the development of interpersonal relationships in childhood and adolescence. Topics may include parent-child relationships, peer relationships in childhood, intimate relationships in adolescence. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures. Crosslisted as CD/PSY 417.

PSY 419. Self and Identity. 4 units

Term Typically Offered: TBD

Prerequisite: PSY 256 or PSY 305 and senior standing.

Concepts, theories, and research related to the development of the self across the lifespan. Examination of the influence of temperament, culture, individuation, self-esteem, self-awareness, roles and identity on maturity. 4 seminars.

PSY 430. Sensation and Perception. 4 units

Term Typically Offered: W, SP

Prerequisite: PSY 340.

Principles of sensory systems, psychophysics, attention and the perception of color, shape, movement, space, and time. Survey of the development of perception through the lifespan. 4 lectures.

PSY 431. Assessing Children's Development and Environments. 4 units

Term Typically Offered: TBD

Prerequisite: CD 304 or CD 305 or PSY 419 or PSY 420 or PSY 421; and CD 329 or PSY 329.

Current developmental and environmental assessments used in care and educational settings and in prevention programs and research. Practice using, creating, and evaluating child assessments. 3 lectures, 1 activity. Crosslisted as CD/PSY 431.

PSY 432. Psychological Testing. 4 units

Term Typically Offered: TBD

Prerequisite: PSY 333.

Theory and practice of psychological measurement and testing. Principles of test construction, administration, and interpretation. Survey of common testing domains such as intelligence, scholastic aptitude and achievement, and personality. 4 lectures.

PSY 440. Memory. 4 units

Term Typically Offered: F, W

Prerequisite: PSY 201, PSY 202 or PSY 340.

Modern principles and theories of memory from a psychological and biological perspective. Discussion of different types of memory (e.g., short-term, episodic, semantic, implicit), variables that affect memory (e.g., emotion, stress, sleep), and real-life applications (e.g., disorders, eyewitness testimony). Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

PSY 448. Research Internship I. 5 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Junior standing; PSY 329; Psychology and Child Development majors only; and consent of instructor.

Faculty-supervised research experience on various topics in psychology. Student apprenticeship with a department faculty member to conduct research. Responsibilities include some or all of the following: collecting data, entering and/or analyzing data, electronic literature search, report writing. Credit/No Credit grading only.

PSY 449. Research Internship II. 5 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: PSY 329, PSY 333, Psychology and Child Development majors only, junior standing, and consent of instructor.

Faculty-supervised research experience on various topics in psychology. Student apprenticeship with a department faculty member to conduct research. Responsibilities include some or all of the following: collecting data, entering and/or analyzing data, electronic literature search, report writing. Credit/No Credit grading only.

PSY 450. Family Intervention. 4 units

Term Typically Offered: TBD

Prerequisite: PSY 254, or graduate standing.

Basic elements of marriage and family therapy and crisis intervention. Emphasis on concepts, goals, and techniques of various family therapy approaches and family crisis intervention. 4 lectures.

PSY 453. Supervised Fieldwork I. 5 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: PSY 323, Psychology and Child Development majors only, junior standing, and consent of instructor.

Supervised fieldwork experience in various community, governmental, and educational settings. Applied psychological, developmental, or educational experiences determined by participating institution, supervising faculty member, and student. Credit/No Credit grading only.

PSY 454. Supervised Field Work II. 5 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: PSY 323, Psychology and Child Development majors only, junior standing, and consent of instructor.

Supervised fieldwork experience in various community, governmental, and educational settings. Applied psychological, developmental, or educational experiences determined by participating institution, supervising faculty member, and student. Credit/No Credit grading only.

PSY 458. Learning. 4 units

Term Typically Offered: TBD

Prerequisite: PSY 333.

Theoretical and philosophical foundations of the experimental analysis of behavior. Principles of classical and operant conditioning including aversive control of behavior through punishment and avoidance learning and the theoretical basis for behavior therapy techniques and applications of learning principles in education and health settings. 4 lectures.

PSY 460. Child Abuse and Neglect. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 201 or PSY 202 and junior standing.

Issues in child maltreatment, including definitions and forms, causes, consequences, assessment, reporting, treatment, and prevention. Possible links among research, intervention, and public policy will be emphasized. 4 seminars. Crosslisted as CD/PSY 460.

PSY 461. Senior Project Seminar. 2 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing; PSY 329; Psychology and Child Development majors only.

Discussion of occupational and graduate school opportunities and current issues in psychology for the purpose of defining professional objectives and individual projects for PSY 462. Preparation for Senior Project by developing an annotated bibliography that will inform the organization and direction of their project. Course may be offered in classroom-based, online, or hybrid format. 2 seminars.

PSY 462. Senior Project. 2 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 461; Psychology and Child Development majors only.

Design and completion of a faculty-supervised project in psychology. The project must be presented in a formal, written report. Minimum of 60 hours total time.

PSY 465. Cross-Cultural International Psychology. 4 units

Term Typically Offered: TBD

Prerequisite: PSY 201 or PSY 202 and junior standing.

Psychological, cultural, ecological and behavioral influences on human development in different cultural settings. Focuses on from one to three different cultures outside the U.S. in any given quarter. 4 seminars.

PSY 470. Selected Advanced Topics. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing and consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 seminars.

PSY 475. The Social Psychology of Prejudice. 4 units

Term Typically Offered: SP

USCP

Prerequisite: PSY 252 or PSY 254 or PSY 256.

Examination of social psychological frameworks for understanding the origins and consequences of prejudice and ways to improve relationships between people who come from different social groups (e.g., race, ethnicity, class, age, sexual orientation, gender). 4 lectures. Fulfills USCP.

PSY 480. Cognitive Neuroscience. 4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 340.

Recent empirical and theoretical discoveries pertaining to the neural basis of cognition, including methodologies, applications, and controversies. Focus on reading and discussing research articles in the areas of perception, memory, language, decision making, executive function, neuroimaging, and more. 4 seminars.

PSY 485. Cooperative Education Experience. 6 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 12 units. Credit/No Credit grading only.

PSY 495. Cooperative Education Experience. 12 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 12 units. Credit/No Credit grading only.

PSY 500. Individual Study. 1-6 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head, graduate major advisor and supervising faculty member.

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Only 6 units may be applied to degree requirements.

PSY 504. Psychopharmacology. 4 units

Term Typically Offered: SP

Prerequisite: Graduate standing or consent of instructor.

Advanced course in brain-behavior relationships. Neuropathology of brain disorders including the neurochemical etiology and treatment of mental illness and chemical dependency. 4 seminars.

PSY 520. Marriage & Family Therapy: Professional Identity, Theory and Practice. 4 units

Term Typically Offered: F

Prerequisite: enrollment in the M.S. in Psychology program.

History, development, and systemic foundations of the field of Marriage and Family Therapy. Major models and theories of family therapy with focus on the sociocultural contexts of defining healthy and dysfunctional dynamics, treatment goals, and associated approaches. Current issues relating to professional identity and functioning in the field. 4 seminars.

PSY 535. Child and Adolescent Psychopathology. 4 units

Term Typically Offered: F

Prerequisite: enrollment in the M.S. in Psychology program.

Etiological, assessment, diagnostic, and treatment models of child and adolescent disorders. Diagnostic and Statistical Manual of Mental Disorders. Genetic, neurobiological, environmental, and sociocultural factors of childhood disorders within a developmental perspective. Current theory, research, and practice emphasized. 4 seminars.

PSY 555. Counseling & Communication. 4 units

Term Typically Offered: W

Prerequisite: PSY 560 and admission to MS Psychology program.

Overview of the counseling profession, history, philosophy, theory, and ethics. Emphasis on developing interviewing, assessment and communication skills. 3 seminars, 1 activity.

PSY 556. Multicultural Counseling and Psychology. 4 units

Term Typically Offered: SP

Prerequisite: PSY 555, PSY 560 and admission to MS Psychology program.

Psychological, cultural, and ecological analysis of the experiences and histories of various cultural groups within the United States. Development of personal self-awareness of multicultural issues and culturally relevant counseling skills. 4 seminars.

PSY 560. Individual Therapy: Theory and Application. 4 units

Term Typically Offered: F

Prerequisite: Admission to MS Psychology program.

Counseling theories and concepts applied to individuals. Develop skills in interviewing, assessment, intervention selection, termination and crisis intervention. Ethics and law included. 4 seminars.

PSY 564. Ethics and the Law: MF Therapy. 4 units

Term Typically Offered: SU

Prerequisite: PSY 520; PSY 560; and admission to MS Psychology program.

Ethical, legal and case management issues related to individual, child, family and group therapy. Client rights and professional orientation to ethical standards and state regulation of clinical practice. 4 seminars.

PSY 565. Diagnosis and Treatment: Psychopathology. 4 units

Term Typically Offered: W

Prerequisite: PSY 560 and admission to MS Psychology program.

Assessment of mental status. Diagnostic and statistical Manual of Mental Disorders, treatment planning, treatment case documentation and research applied to client psychopathology. 4 seminars.

PSY 566. Group Therapy: Theory and Application. 4 units

Term Typically Offered: SP

Prerequisite: PSY 560 and admission to MS Psychology program.

Group therapy theory, leadership and research applied to client assessment, screening, treatment selection, evaluation and termination. Ethics, law included. 4 seminars.

PSY 568. Advanced Psychotherapies. 4 units

Term Typically Offered: F

Prerequisite: PSY 555, PSY 560, PSY 565 and admission to MS Psychology program, or consent of instructor.

Theory and application of advanced approaches in psychotherapy, including, but not limited to: cognitive-behavioral therapies, psychodynamic therapies and humanistic/existential therapies. The Class Schedule will list therapy selected. Total credit limited to 12 units. 4 seminars.

PSY 569. Counseling Clinic Practicum. 3 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: PSY 520; PSY 555; PSY 560; PSY 565; and admission to MS Psychology program.

Applied experience and instruction in assessment, diagnosis, treatment planning and treatment of individuals, couples, families and children under direct supervision of faculty in program clinic. Total credit limited to 12 units. Credit/No Credit grading only.

PSY 570. Selected Advanced Topics. 4 units

Term Typically Offered: TBD

Prerequisite: Admission to MS Psychology program or consent of instructor.

Directed group study of selected topics for advanced students. Open to graduate students and selected seniors. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 seminars.

PSY 571. Advanced Family Therapy: Theory and Application. 4 units

Term Typically Offered: F

Prerequisite: PSY 520; PSY 555; and admission to MS Psychology program.

Theory and application of process, structural and systems approaches to family therapy. Assessment, diagnosis, treatment and follow-up of family therapy. Ethics and law related to family therapy. 4 seminars.

PSY 572. Child and Adolescent Therapy: Theory and Application. 4 units

Term Typically Offered: W

Prerequisite: PSY 535; PSY 555; PSY 560; and admission to MS Psychology program.

Assessment, diagnosis, treatment planning and therapeutic modalities appropriate for children and adolescents. Both theoretically based and empirically based treatment approaches presented. Instruction in the assessment and treatment of abuse and neglect of children with relevant ethics and law. 4 seminars.

PSY 574. Psychological Assessment. 4 units

Term Typically Offered: W

Prerequisite: Admission to MS Psychology program.

Administration, scoring and interpretation of psychological tests. Reliability and validity of psychological measures. Ethical and cultural issues in testing. 4 seminars.

PSY 575. Gender and Couple Therapy. 4 units

Term Typically Offered: SP

Prerequisite: PSY 520; PSY 560; and admission to MS Psychology program.

Antecedents to sex-role identity, gender aware therapy, couple therapy, treatment of spousal/partner abuse; human sexuality, behavior, and psychosexual dysfunction. 4 seminars.

PSY 576. Traineeship: Marital and Family Therapy. 4 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: PSY 569, PSY 564 and consent of MS program committee.

Supervised experience in applied psychotherapeutic techniques, assessment, diagnosis and treatment of individual, marital, family and child relationship problems. Total credit limited to 16 units. Credit/No Credit grading only. Weekly seminar with on-site and university supervisors.

PSY 577. Community Mental Health: Issues and Practices. 4 units

Term Typically Offered: SP

Prerequisite: Admission to the MS Program in Psychology; PSY 535; PSY 555; PSY 556; and PSY 560.

An overview of community mental health as envisioned via California's Mental Health Services Act. Examination of the opportunities and challenges in delivering effective mental health services in publicly-funded settings. Exploration of concepts and practices, including the recovery model and innovative approaches. 4 seminars.

PSY 585. Research Methods for Counseling Psychology. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing or consent of instructor.

Research methods relevant to practitioners in counseling psychology and human services. Basic understanding of descriptive and inferential statistics as well as applications related to these topics. 4 seminars.

PSY 588. Assessment and Treatment of Substance Use Disorders. 4 units

Term Typically Offered: W

Prerequisite: Graduate standing; PSY 560; PSY 565; and PSY 574.

Etiological and biopsychosocial factors, as well as assessment, diagnosis, and evidence-based treatment of substance use disorders. Differential diagnosis, co-occurrence with other conditions, unique population concerns, including use across the lifespan, and local treatment options will be discussed. 4 seminars.

PSY 599. Thesis. 2-4 units

Term Typically Offered: F, W, SP

Prerequisite: PSY 585 and advancement to candidacy.

Completion of a thesis pertinent to the fields of psychology and human services. Total credit limited to 8 units.

Recreation, Parks and Tourism Administration (RPTA)

undefined

RPTA Courses**RPTA 101. Introduction to the Experience Industry. 4 units**

Term Typically Offered: F, SP

Prerequisite: RPTA majors only.

History, philosophy, theory, and organization of the experience industry. Exploration of the experience industry profession; emphasis upon functions, areas, facilities, clientele, and career opportunities. 4 lectures.

RPTA 110. Orientation and College Success in Experience Industry Management. 1 unit

Term Typically Offered: F, W

CR/NC

Prerequisite: Recreation, Parks and Tourism Administration majors only.

Orientation to Experience Industry Management and Recreation, Parks, and Tourism Administration fields. Development of two- to four-year plan toward graduation. Exploration of skills, learning strategies, and problem solving for college success. Career planning in experience industry management and introduction to professionalism. Credit/No Credit grading only. 1 activity.

RPTA 112. Introduction to Parks and Outdoor Recreation. 4 units

Term Typically Offered: F

Introduction to park and outdoor recreation systems. History, philosophy, policy, and principles of outdoor recreation, wilderness, park management, environmental education, outdoor education, visitor experiences, and natural resources recreation at the local, regional, national, and international levels. Field trips required. 3 lectures, 1 laboratory.

RPTA 114. Introduction to Hospitality and Travel. 4 units

Term Typically Offered: F, SP

History and development of the hospitality and travel industries. Exploration of different sectors of the hospitality and tourism industries, travel motivations, supply and demand for tourism products and services, trends and issues, and effects of tourism on individuals, cultures and the natural environment. Career opportunities in the hospitality and travel industries. Field trips required. 4 lectures.

RPTA 121. Theories and Frameworks of Experience Design. 4 units

Term Typically Offered: W, SP

Prerequisite: RPTA majors only.

Foundational knowledge, introductory frameworks, and entry level experience design theory. Human-centered design. Examine experience design in terms of the experience industry as well as broader concepts of experience. Creative tools and processes including design thinking, narrative storyboarding, and experience mapping. 4 lectures.

RPTA 160. Introduction to Sport Management. 4 units

Term Typically Offered: W

Introduction to the philosophy, organization, issues and career paths of sport management. Emphasis on ethical decision-making and career opportunities in youth, interscholastic, intercollegiate, professional, and international sport. 4 lectures.

RPTA 201. Sociocultural Dimensions of Work and Leisure. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

History and theoretical framework associated with the interplay between work and leisure in the United States; global perspective examining sociocultural differences and marginalization of groups; issues impacting work-life balance including technology, demography, geography, corporate culture, and career fields. Course may be offered in an online or hybrid format. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

RPTA 203. Resource Law Enforcement. 3 units

Term Typically Offered: TBD

Law enforcement applied to natural resource conservation on public and private lands. Examination of state and federal laws related to fish and wildlife management. Problems associated with implementation of resource laws examined. 3 lectures. Crosslisted as NR/RPTA 203.

RPTA 210. Experience Design. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Recreation, Parks, and Tourism Administration major; and sophomore standing.

Methods of experience design, program planning, theme creation, execution, and evaluation in experience industry settings. Interrelationship of built and natural resources with structured and co-created experiences. Emphasis on experience design, program planning, and scheduling. Course may be offered in classroom-based, online or hybrid format. 3 lectures, 1 activity.

RPTA 216. Resort and Lodging Operations. 4 units

Term Typically Offered: SP

Prerequisite: major in RPTA, or minor in Event Planning and Experience Management, and sophomore standing.

Exploration of the technical operations integral to resort and lodging: food, beverage and restaurant; housekeeping and engineering; sales and catering departments; staff management and state, national, and international classification systems. Field trips required. 3 lectures, 1 activity.

RPTA 221. Professionalism and Customer Experiences. 4 units

Term Typically Offered: TBD

Prerequisite: major in RPTA, or minor in Event Planning and Experience Management, and sophomore standing.

Service qualities and behaviors across the experience industry, including recreation, parks, tourism, sport, events, outdoor and community environments. Professionalism and ethics, developing customer relationships, delivering memorable and meaningful customer experiences, and creating service-focused organizations. Developing competencies to enhance customer and participant experiences. 4 lectures.

RPTA 255. Leadership and Diverse Groups. 4 units

Term Typically Offered: F, W, SP

2019-20 or later catalog: GE Area E

2017-19 or earlier catalog: GE Area D4

Development and application of leadership skills in recreation activity settings. Emphasis on leadership techniques for working with groups consisting of people from diverse populations, such as people with disabilities or special needs, diverse social and cultural groups, and diversity of ages. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 activity. Fulfills GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

RPTA 260. Community Relations and Sports-Based Youth Development. 4 units

Term Typically Offered: SP

Prerequisite: Sophomore standing.

Philosophy, foundations, policy and techniques underlying community relations and sports-based youth development in public, private and commercial settings. Methods of program planning, organization, implementation and evaluation with emphasis on program planning and mission development. 3 lectures, 1 activity.

RPTA 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

RPTA 275. Facilitation and Teambuilding. 2 units

Term Typically Offered: W

Techniques and models used in leadership, facilitation, and teambuilding. Emphasis on leadership and facilitation styles and models, teambuilding and group dynamics, and working with various populations. Field trip required. 2 seminars. Crosslisted as MSL/RPTA 275.

RPTA 302. Environmental and Wilderness Education. 4 units

Term Typically Offered: TBD

Sustainability Related

Prerequisite: RPTA 210 with C- or better or consent of instructor; and junior standing.

Education and teaching techniques that apply to learning experiences in an outdoor environment. Impact of natural resource usage that affects sociological, cultural, biological and physical resources. Educational strategies for presenting environmental learning to grades K-12 in selected environments. 3 lectures, 1 activity.

RPTA 313. Sustainability in the Experience Industry. 4 units

Term Typically Offered: F, SP

Sustainability Focused

Prerequisite: RPTA 210 with C- or better or consent of instructor; and junior standing.

Investigation of the experience industry from a sustainability perspective. Emphasis on facility design, industry practices, and services provisions in the Experience Industry Management field that sustain social, cultural, heritage, and natural environments while generating economic development. 3 lectures, 1 laboratory.

RPTA 314. Sustainable Travel and Tourism Planning. 4 units

Term Typically Offered: W

Sustainability Focused

Prerequisite: RPTA 114 and RPTA 210 with C- or better or consent of instructor; and junior standing.

The planning and development of tourism destinations, agencies, and services from a sustainable development perspective. Emphasis on the economic, social and environmental impacts of tourism. Examination of alternative forms of tourism. Emphasis on sustainable tourism. Travel research and planning models. Field trips required. 3 lectures, 1 laboratory.

RPTA 317. Hospitality, Convention and Meeting Management. 4 units

Term Typically Offered: F, SP

Prerequisite: RPTA major or Event Planning and Experience Management minor; and junior standing.

Role of conventions, meetings management, and events in the hospitality and travel industry. Factors involved in meeting planning for small and large groups to include committees, amenities, operations logistics, venue selection, technology, virtual meetings, registration, catering arrangements, sustainable operations and evaluation. Field trips required. Course may be offered in classroom-based or hybrid format. 3 lectures, 1 activity.

RPTA 318. Destination Marketing & Management. 4 units

Term Typically Offered: TBD

Prerequisite: RPTA major or Event Planning and Experience Management minor; and junior standing.

Examination of the development and critical roles that destination management and marketing organizations, destination management companies, and convention and visitors bureaus play in the tourism industry. Exploration of the major areas of destination management including service, roles and responsibilities, research, and product development. 4 lectures.

RPTA 320. Strategic Event Planning. 4 units

Term Typically Offered: F, W

Prerequisite: major in RPTA, or major in WVIT, or minor in Event Planning and Experience Management; and junior standing.

Strategy and successful practices in special event planning. Emphasis on conceptualization, strategy, analysis, and planning considerations of small to large-scale events. Exploration of event planning and experience management as a profession. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 activity.

RPTA 321. Visitor Services in Experience Industry Management. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: RPTA 210.

Management issues in meeting the needs of experience industry businesses and organizations. Topics to include customer satisfaction, service quality, visitor experiences, customer service skills and procedures, and creating a customer focused organization. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 1-4 seminars.

RPTA 323. Sport Marketing and the Fan Experience. 4 units

Term Typically Offered: SP

Prerequisite: one of the following: RPTA major, Event Planning and Experience Management minor, or Exercise and Sport Studies minor; and junior standing.

Exploration of professional sports and intercollegiate athletics through the lens of sport marketing and the fan experience. Development of marketing strategies employed to increase attendance, enhance attendee experiences, and build fan loyalty. 4 lectures.

RPTA 325. Leadership in Outdoor Experiences. 4 units

Term Typically Offered: TBD

Prerequisite: RPTA 205, RPTA 255, or RPTA 257; and junior standing.

Theoretical principles and experience in leadership, judgment, and decision-making in outdoor and adventure settings. Field trip required. The Class Schedule will list topic selected. Total credit limited to 8 units. 3 lectures, 1 activity.

RPTA 328. Environmental Leadership and Community Engagement. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); one lower-division course in GE Area D; and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Theories and practices of leadership and community engagement for a wide range of environmental issues. Development of personal leadership skills and methods for effectively working with non-profit organizations, governmental agencies, community groups, and the private sector to advance sustainability principles. 4 lectures. Crosslisted as NR/RPTA 328. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

RPTA 330. Directed Field Experience. 4 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: RPTA 210 with C- or better; and consent of instructor.

Practical work experience in related phases of the experience industry in an organization under qualified supervision. Minimum of 12 hours per week. Total credit limited to 8 units. Credit/No Credit grading only.

RPTA 342. Risk Management for the Experience Industry. 4 units

Term Typically Offered: F, W

Prerequisite: RPTA 210 with C- or better or consent of instructor; and junior standing.

Legislative and legal aspects of public, private, commercial, and non-profit experience industry organizations. Emphasis on risk management, including liability, insurance, and negligence. Understanding of legal foundations and the legislative process. Field trip may be required. 3 lectures, 1 laboratory.

RPTA 350. Sport and Event Venue Management. 4 units

Term Typically Offered: TBD

Prerequisite: major in RPTA, or minor in Event Planning and Experience Management, and junior standing.

Management of sport and event venues: clientele considerations, facility and outdoor area site planning; day-to-day operations of common sport and event venues from sport stadiums to multi-use wineries to city streets (e.g., parades, marathons, etc.). Field trip required. 3 lectures, 1 activity.

RPTA 360. Assessment and Evaluation of Experience Industry Management. 4 units

Term Typically Offered: F, W, SP

Prerequisite: RPTA 210 with C- or better or consent of instructor; STAT 217 or STAT 218 or STAT 251 or STAT 252; and junior standing.

Evaluation of experience industry programs using a variety of research methodologies. Needs assessment, program evaluation, research design, and decision making based on data analysis. Course may be offered in classroom-based or hybrid format. 3 lectures, 1 laboratory.

RPTA 370. Experiential Marketing Strategies for Experience Industry Management. 4 units

Term Typically Offered: F, W, SP

Prerequisite: major in RPTA, or minor in Event Planning and Experience Management, and junior standing.

Core principles of experiential marketing within the realm of tourism, hospitality, and destination management; sport and recreation experience management, and event planning and experience management. Emphasis on strategies to actively engage consumers in experience industry settings. 4 lectures.

RPTA 393. Hospitality Sales and Service. 4 units

Term Typically Offered: TBD

Prerequisite: RPTA major, Event Planning and Experience Management minor, or Sales minor; junior standing; and RPTA 114.

Hospitality sales and service in the convention and event industry, with emphasis on customer organization characteristics, site selection, sales, and service provision. Hotel and venue sales, contract negotiation, sales management and catering/event service operations. 4 lectures.

RPTA 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: RPTA 210 with C- or better and consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

RPTA 405. Principles of Experience Industry Management. 4 units

Term Typically Offered: F, W

Prerequisite: RPTA 205, RPTA 255, or RPTA 257; RPTA 210; and senior standing.

The study, analysis, and practice of management processes as they are applied to experience industry management organizations: planning, organizing, leading, and controlling. Emphasis upon application of theories, practices and case studies in experience industry management settings. 4 lectures.

RPTA 412. Advanced Experience Industry Management Applications. 1-4 units

Term Typically Offered: W, SP

Prerequisite: RPTA 210.

Selected topics on aspects of experience industry management. Field trip may be required. The Class Schedule will list topic selected. Total credit limited to 12 units, repeatable in same term. 1 to 4 seminars.

RPTA 413. Tourism and Protected Area Management. 4 units

Term Typically Offered: TBD

Prerequisite: RPTA 210 and junior standing.

Practices of tourism and recreation resource management in protected areas. History and principles of protected areas. Social, cultural, economic, and environmental benefits of and risks to protected areas and communities. Environmental stewardship in tourism and recreation resource management worldwide. 3 lectures, 1 laboratory.

RPTA 416. Interpreting Experience Industry Data Analytics. 4 units

Term Typically Offered: F, SP

Prerequisite: RPTA 360.

Interpretation of data and metrics used in the experience industry. Exploration of methods to measure customer experiences and translate data into strategic decisions. Analytics software (CRM, PowerBI) will be used to visualize datasets. Techniques for interpreting datasets and building compelling presentations. 3 lectures, 1 laboratory.

RPTA 420. Strategic Event Implementation. 4 units

Term Typically Offered: W, SP

Prerequisite: RPTA 320 and junior standing.

Management strategies and practices for small to large-scale community festivals and events. Emphasis on strategy, sponsorship, marketing, staffing, production, and budgeting. 4 lectures.

RPTA 424. Financial Management in the Experience Industry. 4 units

Term Typically Offered: F, W, SP

Prerequisite: AGB 323 or BUS 215; RPTA 360 with C- or better or consent of instructor; and senior standing. Recommended: ENGL 310.

Financing experience industry products and services in public, private, commercial and voluntary settings. Emphasis on sources and methods of financing; operational/ financial cost analysis; forecasting, budgeting, pricing and fiscal master planning through use of computer technology. 4 lectures.

RPTA 450. Resource and Grant Development. 4 units

Term Typically Offered: W

Prerequisite: Junior, senior or graduate standing.

Explores principles of grant writing and resource development including: researching grant funding resources from both the private and public sector, preparing grant proposals, grant administration, partnerships, and sponsorships. 4 lectures.

RPTA 460. Senior Project in Experience Industry Management. 4 units

Term Typically Offered: F, W, SP

Prerequisite: ENGL 310 and completion of the Graduation Writing Requirement; RPTA 360 with a C- or better or consent of instructor; and senior standing.

Selection and completion of an individual senior project. Ability to collect data and/or synthesize and evaluate information and draw conclusions based on that process. Project results are presented in a formal oral and written report. Information synthesis and evaluation. Emphasis on critical thought and analysis of industry trends and issues. 3 lectures, 1 laboratory.

RPTA 461. Senior Project. 3 units

Term Typically Offered: TBD

Prerequisite: Senior standing and completion of RPTA 460 with C- or better or consent of instructor.

Completion, under faculty supervision, of an investigative project typical of problems which graduates must solve in their fields of employment. Required minimum of 90 hours. Analytical, formal report is required.

RPTA 463. Pre-Internship Seminar. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: RPTA majors only and junior standing. Recommended: Enrollment two quarters prior to RPTA 465.

Exploration of professionalism, internship opportunities and practices. Internship selection process and procedures introduced. Credit/No Credit grading only. 1 seminar.

RPTA 465. Internship. 12 units

Term Typically Offered: F,W,SP, SU

CR/NC

Prerequisite: Minimum GPA of 2.0; 1,000 verified hours of advisor-approved paid and/or volunteer experience subsequent to high school; completion of all university coursework other than Internship; or approval of Internship Coordinator.

400 hours of full-time concentration-specific practical work experience over a ten-week period in an approved organization. Comprehensive involvement in organization's programs and services. Credit/No Credit grading only.

RPTA 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to under-graduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

RPTA 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to graduate and undergraduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories.

RPTA 472. Leadership Practice. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Junior standing.

Tasks associated with development of personal leadership skills. Study and practice in setting goals and objectives; developing, evaluating and implementing a project independently and as part of a team; decision making and problem-solving emphasized. Total credit limited to 4 units. 1 laboratory. Crosslisted as NR/RPTA 472.

RPTA 500. Individual Study. 1-6 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of department head.

Advanced independent study planned and completed under the direction of a member of the department faculty. Total credit limited to 6 units.

RPTA 502. Current Issues in Recreation, Parks and Tourism. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Societal issues that influence the management and delivery of recreation, parks, and tourism services. Critical investigation of current research and trends. 4 seminars.

RPTA 527. Leisure Behavior and Theory. 4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Theories of recreation and leisure; conceptual and theoretical foundations of leisure; the role of leisure behavior in modern day society. The Class Schedule will list topic selected. Constructs that contribute to contemporary understanding of leisure behavior. Connection of theories to individual research. Total credit limited to 8 units. 4 lectures.

RPTA 539. Graduate Internship in Recreation, Parks and Tourism. 1-9 units

Term Typically Offered: TBD

Prerequisite: Consent of internship instructor.

Application of theory to the solution of problems of recreation, parks and tourism or related businesses in the field. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty advisor before the internship commences. Degree credit limited to 6 units.

RPTA 570. Selected Topics in Recreation, Parks and Tourism. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

RPTA 571. Selected Advanced Laboratory in Recreation, Parks and Tourism. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing and consent of instructor.

Directed group laboratory of selected topics for advanced students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 laboratories.

RPTA 581. Graduate Seminar in Recreation, Parks and Tourism. 1 unit

Term Typically Offered: TBD

Prerequisite: Graduate standing.

Group study of selected developments, trends and problems in the field of recreation, parks and tourism. Total credit limited to 4 units. 1 seminar.

RPTA 599. Thesis in Recreation, Parks and Tourism. 1-9 units

Term Typically Offered: TBD

Prerequisite: Graduate standing and consent of instructor.

Individual research in recreation, parks and tourism management under the general supervision of faculty, leading to a graduate thesis. Degree credit limited to 9 units. Students must enroll each quarter advisement is received.

Religious Studies (RELS)

undefined

RELS Courses

RELS 201. Religion, Dialogue, and Society. 4 units

Term Typically Offered: F, W, SP
2020-21 or later catalog: GE Area D2
2019-20 or earlier: GE Area D2 or D3

Examine how interactions between religious traditions shape society at various levels. Case studies drawn from eastern and western religious traditions during the ancient and modern periods. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

RELS 205. Jesus. 4 units

Term Typically Offered: F, W, SP
Exploration and analysis of the person of Jesus. Includes examination of our sources of knowledge about him, his self-understanding, and various interpretations of him in historical, comparative, and contemporary settings. 4 lectures.

RELS 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

RELS 301. Religions of Asia. 4 units

Term Typically Offered: F, W, SP
2020-21 or later: Upper-Div GE Area C
2019-20 or earlier catalog: GE Area C4
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Comparative study of the religions of Asia, particularly Hinduism, Buddhism, and the religions of China. Topics include historical continuities/discontinuities, worldviews, sacred texts, practices, responses to modernity, the place of women across the traditions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 302. Abrahamic Religions: Judaism, Christianity, and Islam. 4 units

Term Typically Offered: F, W, SP
2020-21 or later: Upper-Div GE Area C
2019-20 or earlier catalog: GE Area C4
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

An introduction to the global religions of Judaism, Christianity, and Islam, with a focus on their shared origin in the Patriarch Abraham. Topics include for each religion: the origins, worldview, scripture, practices, and relationship to modernity. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 304. Judaism. 4 units

Term Typically Offered: F, W, SP
2020-21 or later: Upper-Div GE Area C
2019-20 or earlier catalog: GE Area C4
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Origins, beliefs and practices of Judaism and central themes in the Hebrew Bible. The development of Judaism in the post-biblical and Talmudic period. Jewish philosophy, life, rituals and customs. The emergence of modern Judaism, Zionism and post-Holocaust philosophy. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 306. Hinduism. 4 units

Term Typically Offered: F, W, SP
2020-21 or later: Upper-Div GE Area C
2019-20 or earlier catalog: GE Area C4
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Origins, beliefs and practices of Hinduism from the Veda and the Upanishads through the teachings of the Bhagavad Gita and the Puranas. Modern Hindu institutions, saints and sages, and social philosophy contrasted with the ancient. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 307. Buddhism. 4 units

Term Typically Offered: F, W, SP
2020-21 or later: Upper-Div GE Area C
2019-20 or earlier catalog: GE Area C4
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Buddhist origins, viewpoints and practices will be seen in their development in India, Tibet, China, Japan, South Asia and America. The life of Buddha, Gautama, the rise of Theravada, Mahayana and Tantra. Encounters with Shinto and Confucianism. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 310. Christianity. 4 units

Term Typically Offered: F, W, SP
2020-21 or later: Upper-Div GE Area C
2019-20 or earlier catalog: GE Area C4
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

The development of the Christian religion from the story of Jesus, the New Testament, Church formation, the role of St. Paul, dissenting ideas, Protestant and Catholic views, and contemporary issues of conscience, such as the Social Gospel and liberation theologies. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 311. Islam. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

The development of Islamic civilization from the inspiration of the Qur'an and the Prophet Muhammad and the Sunni-Shi'i split to contemporary political and social issues. Emphasis of Sufi literature, art, architecture, and philosophies of Islam. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 344. Approaches to Religion and Spirituality. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs) or in GE Area E (or in GE Area D4 for students on the 2017-19 or earlier catalogs).

Examination of religion from an academic perspective by surveying the various historical approaches employed within the discipline of religious studies to collect, analyze, and interpret religious phenomena cross-culturally. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

RELS 370. Religion, Gender, and Society. 4 units

Term Typically Offered: F,W,SPSU

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Critical examination of religious ideas and institutions in the United States. Focus on interlocking systems of sex, gender, race, class and religion; individual and group experiences at the intersection of religion, politics and culture. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as RELS/WGQS 370. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP. Formerly WGS 370.

RELS 372. Spiritual Extremism: Asceticism, Mysticism, and Madness. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Shaping influence of ascetics, mystics and the insane on global religious traditions. Topics may include the relationship between spiritual extremists and society, cultural construction of holiness and insanity, and literary depictions of spiritual extremists. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 374. Religion and Violence. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Historical and contemporary case studies of how various religions have condoned, motivated and justified violence. The place of sacrifice, martyrdom, self-injury and forced conversion in religious doctrines. Representations of religious violence in the media. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 378. Religion and Contemporary Values. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Descriptive analysis of how diverse religious traditions construct moral decisions about a variety of contemporary issues including sexuality, ecology, and justice. Challenges for religious value systems in secular and pluralistic societies. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 380. Religion and Politics in the Israeli-Palestinian Conflict. 4 units

Term Typically Offered: W

Prerequisite: Completion of GE Area A with grades of C- or better.

Recommended: Completion of one class in POLS or RELS.

The root causes of the Israeli-Palestinian conflict and its current manifestation. Possibilities for solutions from the perspectives of religious studies and political science. 4 lectures. Crosslisted as POLS/RELS 380.

RELS 390. Topics in Religious Studies. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Examination and analysis of religious and spiritual themes and traditions. Topics may be of historical or contemporary importance. The Class Schedule will list topic selected. Total credit limited to 16 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

RELS 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair and instructor.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units.

RELS 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. The Class Schedule will list topics selected. Total credit limited to 8 units. 1 to 4 lectures.

RELS 490. Advanced Topics in Religious Studies. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Area C2.

An in-depth examination and analysis of specific religious and spiritual themes, traditions, texts, and figures. Topics may be of historical or contemporary importance. The Class Schedule will list topic selected. Total credit limited to 16 units; repeatable in the same term. 4 lectures.

Science and Mathematics (SCM)

undefined

SCM Courses

SCM 101. Introduction to Health Profession Careers. 1 unit

Term Typically Offered: SP

CR/NC

Introduction to health profession careers. Professionals from within the health care industry provide an overview of their careers. Emphasis on creating a pre-health career plan, academic course selection, obtaining appropriate experiences, and elements of a strong professional application. Intended for students undecided about their health professions career choice. Credit/No Credit grading only. 1 activity.

SCM 150. Supplemental Workshops in Science. 1 unit

Term Typically Offered: F,W,SP,SU

CR/NC

Concurrent: Enrollment in the designated section of the associated course.

Facilitated study and discussion of the theory, concepts, and applications of content material from selected biology, chemistry, physics, and statistics courses. Credit/No Credit grading only. Total credit limited to 8 units. Maximum of 2 units for degree credit. 1 laboratory.

SCM 220. Seminar for Science and Math Tutors. 1 unit

Term Typically Offered: F, W, SP

CR/NC

Concepts of teaching and learning as it relates to roles as K-12 grade science and math tutors and/or classroom assistants. Intended for participants in science, engineering, and mathematics tutoring and teaching assistant programs like Teaching Assistants in Mathematics and Science (TeAMS) and Mentors in Out of School Time (MOST). Participation in public schools requires mandated fingerprint clearance. Credit/No Credit grading only. Total credit limited to 3 units. 1 activity.

SCM 230. Seminar for Learning Assistants. 2 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: BIO 160, BIO 161, CHEM 124, CHEM 127, MATH 141, PHYS 131, or PHYS 141.

Introduction to learning theory and teaching practices for mathematics and science learning assistants regarding conceptual development, questioning techniques, cooperative learning, nature of math and science, and argumentation in mathematics and science. Restricted to students admitted to the Learning Assistant program. Total credit limited to 6 units. Degree credit limited to 4 units. 2 seminars.

SCM 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

SCM 300. Early Field Experience. 4 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Sophomore standing; for Math majors or Science and Engineering majors only.

Historical, philosophical, and social foundations of public science and mathematics education. Public school curriculum and professional education dispositions. Structured observation and participation in K-12 public schools with attention to instructional practices for diverse learners. Credit/No Credit grading only. 2 lectures, 2 activities.

SCM 301. Professional School Preparation for Health Profession Careers. 1 unit

Term Typically Offered: TBD

CR/NC

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; minimum of 3.0 CPSLO GPA; and consent of instructor.

Recommended: SCM 101 and completion of GWR.

Application strategies and preparation for health professions programs. Analysis of the application requirements and critique of personal application components. Credit/No Credit grading only. 1 activity.

SCM 302. The Learn By Doing Lab Teaching Practicum. 2 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Early teaching experience in an informal science, technology, engineering, and mathematics (STEM) teaching and learning environment. Principles of inquiry-driven STEM education, lesson design, implementation and assessment. Intended for undergraduates exploring STEM teaching as a career. Total credit limited to 4 units. Credit/No Credit grading only. 1 seminar, 1 laboratory. Crosslisted as ENGR 322/SCM 302/HNRS 302.

SCM 330. Cal Poly Land: Nature, Technology, and Society. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course from GE Area B1 (GE Area B4 for students on the 2019-20 or earlier catalogs); one course from GE Area B2; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Scientific investigation of the natural features of the Cal Poly landscape and their transformations by land management technology. Environmental, economic, social, and political effects of agriculture, resource extraction, construction technology. Educational, land-use, long term planning issues. 4 lectures. Crosslisted as AG/ISLA/SCM/UNIV 330. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

SCM 350. The Global Environment. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/ historical/political perspectives. Use of remote sensing maps. Sustainable solutions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as AG/EDES/ENGR/GEOG/ISLA/SCM/UNIV 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

SCM 360. Selected Environmental Issues of California's Central Coast. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Examination of several inter-related environmental issues currently affecting California's Central Coast region. Focuses on the role of technology in creating/mitigating environmental problems. Field trips required. 3 lectures, 1 activity. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

SCM 363. Public Health Fieldwork. 2 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Junior standing; a minimum GPA of 3.0; must have been enrolled at Cal Poly for at least two quarters; and consent of instructor.

Structured observational experiences for pre-health students. Designed to promote awareness and understanding of public health or allied health careers. Students participate in practical experiences under the direct supervision of an approved on-site coordinator. Limited space availability. Application process for enrollment available from CSM Student Services. Total credit limited to 6 units. Credit/No Credit grading only.

SCM 368. Theory and Practice of STEM Tutoring. 4 units

Term Typically Offered: SP

Prerequisite: Completion of one course in GE Area B1 (GE Area B3 for students on the 2019-20 or earlier catalogs), GE Area B2, or GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Theories and practices central to Science, Technology, Engineering, and Mathematics (STEM) tutoring, such as collaborative learning, social dimensions of the peer/tutor relationship, and STEM literacy. Recommended for those interested in tutoring and/or careers in STEM education. Course may be offered in classroom-based, online, or hybrid format. 3 lectures, 1 activity.

SCM 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

SCM 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

Sociology (SOC)

undefined

SOC Courses

SOC 110. Comparative Societies. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Introduction to sociological theory and methods, emphasizing a comparative analysis of social institutions of contemporary societies in major world regions, including the family, politics, and the economy. Direct comparisons made between United States social institutions and those of other societies. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

SOC 111. Social Problems. 4 units

Term Typically Offered: W, SP

An introduction to sociology with an emphasis on problems inherent in selected social institutions. Instruction in social analysis, including theories of social problems, how those problems are studied, and a survey of possible solutions. 4 lectures.

SOC 200. Special Problems for Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

SOC 216. US Race and Ethnic Relations. 4 units

Term Typically Offered: F, W, SP

USCP

Recommended: SOC 110.

Exploration of U.S. ethnic minorities' experiences and related contemporary issues. Sources and manifestations of economic and social discrimination patterns and how they affect individual and group life chances. Replaces SOC 316. 4 lectures. Fulfills USCP.

SOC 218. International Political Economy. 4 units

Term Typically Offered: F, SP

2020-21 or later catalog: GE Area D2

2019-20 or earlier: GE Area D2 or D3

Sociological perspectives on the historical development of the world system and why global inequality exists and is perpetuated within and between countries. Critical comparison of the political economy of nations with an emphasis on the Global South. Course may be offered classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area D2 (GE Area D2 or GE Area D3 for students on the 2019-20 or earlier catalogs).

SOC 222. Classical Social Theory. 4 units

Term Typically Offered: F, W

Prerequisite: SOC 110.

Overview of classical sociological theory. How foundational sociologists developed and delimited the field of sociology. Practice in application of classical social theory in relation to different aspects of social life. Examination of basic assumptions and comparison of different perspectives. Replaces SOC 421. 4 lectures.

SOC 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

SOC 301. Social Work and Social Welfare Institutions. 4 units

Term Typically Offered: F

Prerequisite: SOC 110. Recommended: Junior standing.

Introduction to the field of social welfare. Development of social work and social welfare services; major issues in social service policy. Scope and diversity of specific programs in the social services. Analysis of current programs and the recipients of welfare services. Field trip may be required. 4 lectures.

SOC 302. Criminology. 4 units

Term Typically Offered: F, W

Prerequisite: SOC 110.

Sociological theory and research on crime, criminality, and victimization in the United States. Critical analysis of crime, including how we define, study, and try to reduce and stop crime in our communities. Classic and contemporary perspectives on punishment, deterrence, and restorative justice are covered. Course may be offered in classroom-based or online format. 4 lectures.

SOC 305. Social Movements. 4 units

Term Typically Offered: F, SP

Prerequisite: SOC 110.

Description and analysis of social movements in contemporary societies as they relate to major revolutionary changes historically and in the present. Analysis of variables producing social movements and political violence, including terrorism. Impact on society. 4 lectures.

SOC 306. Sociology of the Family. 4 units

Term Typically Offered: W

Prerequisite: SOC 110 or SOC 111. Recommended: Junior standing.

Family stages, relationships and strengths. Alternative and diverse forms of families. Courtship, marriage, parenting, launching children and aging. Horizontal stressors (trauma and divorce) vs. vertical stressors (racism and poverty). 4 lectures.

SOC 308. Sociology of the Environment. 4 units

Term Typically Offered: W, SP

Sustainability Focused

Prerequisite: SOC 110 or GEOG 150.

Complex interactions between society and environment. Cultural relationships with nature. Environmental movements, food security, population growth. Local and global inequities regarding consumption, toxins, sea level rise, and natural disasters. Emphasis on environmental justice: race, class, and gender. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

SOC 309. The World System and Its Problems. 4 units

Term Typically Offered: SP

Prerequisite: SOC 110. Recommended: Junior standing.

Analysis of the historical background, structure, and dynamics of the world system; examines such issues as the origins of Third World poverty, colonialism, the changes in the world's dominant economic powers, the fall of communism, the growing economic competition between Europe, North America, and Asia; and possible strategies for the economic development of the Third World. 4 lectures.

SOC 310. Self, Organizations and Society. 4 units

Term Typically Offered: W

Prerequisite: Junior standing.

Analysis of the interactions relating to the development of self. Examination of the reciprocal interactions between biology, personal environment, and society. 4 lectures.

SOC 311. Sociology of Genders and Sexualities. 4 units

Term Typically Offered: F,W,S,PSU

Prerequisite: Junior standing.

Analysis of social constructions of sex, genders, and sexualities. Explores how gender stereotypes are created and reproduced. Focus on media representations; intersections of gender, race, class, sexuality; and effects on individuals and structures of work, education, family, and abusive relationships. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as SOC/WGQS 311. Formerly WGS 311.

SOC 315. Global Race and Ethnic Relations. 4 units

Term Typically Offered: F,W,S,PSU

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Diverse structures of unequal relationships among racial and ethnic groups in several countries including the United States. Theories about sources of economic and social discrimination and colonialism. Focus on the concept of ethnicity. Evaluation methods to restructure race and ethnic relations. International case histories. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

SOC 321. Migration. 4 units

Term Typically Offered: SU

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Critical examination of migration, with emphasis on migration to and within the United States. Social and economic impacts on sending communities, receiving communities, and migrants themselves. Grounded in migration theory. Comparisons between current and historical migration trends and policies. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

SOC 323. Social Stratification. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Junior standing.

Social class and the distribution of income, wealth, status and power in society, with emphasis on contemporary United States; social mobility; race, gender, and ethnic inequalities; political power and the nature of welfare; the nature, causes and solutions to poverty. 4 lectures.

SOC 326. Sociology of the Life Cycle. 4 units

Term Typically Offered: F, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Change and continuity of the self through the life course. Impact of aging on the physical, emotional, intellectual and social aspects of well being, and how this knowledge can be applied to enhance the quality of life. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

SOC 327. Social Change. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D. Recommended: HIST 216 or SOC 305.

Compares and contrasts social change strategies over time and across diverse social problems, focusing mainly on the U.S., but not exclusively. Theoretical and critical examination of contemporary efforts to address restricted opportunities by groups who have been historically marginalized due to race/ethnicity, lower socioeconomic status, sexuality, or other social identities. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP.

SOC 343. Contemporary Societies of the Developing World. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Sustainability Related

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs). Recommended: SOC 110.

Investigation of societies in developing countries, from broad regional trends to community-specific case studies. Gender, race, education, health, aging, families, inequality, and resilience. Readings and films emphasize voices from within the focal communities. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

SOC 354. Qualitative Research Methods. 4 units

Term Typically Offered: W, SP

Prerequisite: Two Sociology courses. Recommended: Junior standing.

Qualitative data collection for social research. The relationship among theory research and hypothesis testing. Data collection techniques: content analysis, face to face interviews, and ethnographic methods. 3 lectures, 1 activity.

SOC 355. Quantitative Research Methods. 4 units

Term Typically Offered: F, W

Prerequisite: STAT 217; and two Sociology courses. Recommended: Junior standing.

The basics of how to do quantitative social research. Includes topics on data collection techniques such as surveys, experiments, and the use of existing data. Also includes topics on univariate, bivariate, and multivariate analysis and the use of SPSS for data analysis. 3 lectures, 1 laboratory.

SOC 377. Sociology of Religion. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

Religion from a sociological perspective. Topics may include the nature of religious experience, the role of religion in politics, economics, and social change, and the role that social forces have in influencing religious beliefs and practices. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

SOC 395. Sociology of Complex Organizations. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing.

Bureaucracies and informal organizations from a sociological perspective. Organizational networks within and between organizations, relationship between organizations and their environment, and organizational socialization and career patterns, and gender and race or ethnic differences in organizational patterns. 4 lectures.

SOC 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of department head.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter.

SOC 402. Gender, Crime, and Violence. 4 units

Term Typically Offered: F

Prerequisite: SOC 311 or WGQS 201.

Criminal behavior of individuals and groups, including intimate partner violence, sexual violence, gun violence, police violence, white-collar criminality, hate crimes, and state violence. Intersectional examination of theories of causation, sources of data, and policing, punishment, and rehabilitation practices. 4 lectures.

SOC 406. Juvenile Justice and Delinquency. 4 units

Term Typically Offered: W

Prerequisite: One course in sociology.

Sociological examination of juvenile delinquency as a social and legal concept, covering the nature, volume and social distribution of juvenile crime; the formal structure of juvenile justice; and how justice for juveniles is applied in practice. 4 lectures.

SOC 412. Contemporary Issues in Criminal Justice. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing.

A sociological perspective of contemporary crime and criminal justice issues, such as racial profiling, drug enforcement, and mass incarceration. Incorporates criminological theory to examine the nature, function, and causes of crime in society. Focuses on the control and treatment strategies of adult offenders. 4 lectures.

SOC 414. Theories of Social Work in Counseling Agencies. 4 units

Term Typically Offered: W

Prerequisite: SOC 110 or SOC 111. Recommended: Junior standing.

Introduction to social work counseling/casework. Bio-psychological-social/strengths perspective: theories, skills, values, clinical knowledge. Possible career paths/agency settings. Traditional and innovative therapy techniques. Field trip may be required. 4 seminars.

SOC 420. Practical Interviewing and Counseling Skills in Social Work. 4 units

Term Typically Offered: SP

Prerequisite: SOC 413 or SOC 414.

Practical skills for interviewing, assessing and counseling clients. Hands-on practice and role play. Techniques to establish rapport, evaluate mental status and develop appropriate goals. Required documentation standards in social work agencies. Useful skill sets for medical or research interviewing. 4 seminars.

SOC 423. Gender and Work. 4 units

Term Typically Offered: F

USCP

Sustainability Focused

Prerequisite: Junior standing; and completion of GE Area A with grades of C- or better.

Extent, causes, and intersectional nature of workplace gender inequality. Strategies aimed at creating more egalitarian organizations. Topics include job segregation, tokenism, sexual harassment, work/family balance, gendered jobs, inequality regimes, personnel policies, workplace democracy, and social/labor movement activism. 4 lectures. Crosslisted as SOC/WGQS 423. Fulfills USCP. Formerly WGS 423.

SOC 431. World Population Processes and Problems. 4 units

Term Typically Offered: W

Prerequisite: SOC 110 or ANT 201. Recommended: SOC 354; SOC 355; or ANT/GEOG 455.

Introduction to demography, emphasizing historical patterns and impacts of population change. Is population a problem? Topics include fertility, mortality, the demographic transition, food security, environmental degradation, population control, population aging, intergenerational transfers, and migration. 4 lectures.

SOC 435. Sociology of Health and Illness. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing; and one of the following: ANT 201, ES 112, ES/WGQS 350, HLTH 255, HLTH 260, ISLA 123, SOC 110, SOC 111, or WGQS 210.

Provides a sociological examination of health and illness. Includes an introduction to sociological theories related to health, illness, and medicine. Focuses on how race, class, and gender influence illness experiences, health care, and health social movements. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

SOC 440. Internship. 2-8 units

Term Typically Offered: TBD

CR/NC

Prerequisite: Consent of instructor. Recommended: Junior standing.

Supervised training, research, and work in public and private organizations. Credit/No Credit grading only. Total credit limited to 12 units.

SOC 444. Incarceration and Society: Perspectives on the Criminal Justice System. 4 units

Term Typically Offered: TBD

Prerequisite: Junior standing, SOC 402 or SOC 412, and consent of instructor.

Compares and contrasts perspectives on the criminal justice system in dialogue with inmates. Examination of the social construction of deviance and inequality in the life course that may lead to incarceration. 3 lectures, 1 activity.

SOC 461. Senior Project I. 2 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

SOC 462. Senior Project II. 2 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

SOC 464. Professional Development for Sociologists. 1 unit

Term Typically Offered: SP

CR/NC

Prerequisite: SOC 110 and Sophomore standing.

Preparation for professional advancement in the field of Sociology. Supervised career planning emphasizing resume development, selection of an internship or international experience, exploration of career options and graduate programs. Lectures from outside, practicing professionals. Course may be offered in classroom-based or online format. Credit/No Credit grading only. 1 lecture.

SOC 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

Soil Science (SS)

undefined

SS Courses

SS 120. Introductory Soil Science. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B1

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B3

2019-20 or earlier catalog: GE Area B4

Sustainability Focused

Biological, chemical, physical and genetic properties of soils. Application of scientific principles to solving land use, water management, and soil conservation problems. Interpretation of soils data for making environmental decisions, applying management practices, and sustainable food production. 3 lectures, 1 laboratory. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs).

SS 130. Soils in Environmental and Agricultural Systems. 4 units

Term Typically Offered: TBD

2020-21 or later catalog: GE Area B1

2020-21 or later catalog: GE Area B3

2019-20 or earlier catalog: GE Area B3

2019-20 or earlier catalog: GE Area B4

Sustainability Focused

Soils' ecological functions; soil and the water cycle; soil in production of food, fiber, and forest materials; techniques and reports of soil analyses with agricultural and environmental applications; soil quality; introductory overview of soils and civilizations. Not open to students with credit in SS 120. 3 lectures, 1 laboratory. Fulfills GE Areas B1 and B3 (GE Areas B3 and B4 for students on the 2019-20 or earlier catalogs).

SS 221. Soil Health and Plant Nutrition. 4 units

Term Typically Offered: F, W, SP

Prerequisite: SS 120 or SS 121.

Plant nutrient requirements in the context of soil health. Composition, value, and use of fertilizer materials, conditioners and agricultural minerals for sustainable crop production and environmental quality. 3 lectures, 1 laboratory.

SS 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 lectures. Crosslisted as ERSC/SS 270.

SS 321. Soil Morphology. 4 units

Term Typically Offered: F, W, SP

Prerequisite: SS 120 or SS 121.

Identification of soil morphological and site properties. Correlation of soil physical and chemical properties with soil taxonomy and land use. Techniques of interpretations for agriculture, forest lands, wetlands, range lands and urban development. 3 lectures, 1 laboratory.

SS 322. Soil Plant Relationships. 4 units

Term Typically Offered: TBD

Prerequisite: one of the following: BOT 121, PLSC 120, or SS 120; and CHEM 124 or CHEM 127.

Investigation and evaluation of soil functions. Nutrient supplying ability, conditions and processes involved in the delivery of soil functions. Effects of cultural treatments on soil fertility. Diagnostic techniques and data interpretation in soil health. 3 lectures, 1 laboratory.

SS 339. Internship in Environmental Earth and Soil Sciences. 1-12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Consent of internship instructor.

Selected students will spend up to 12 weeks with an approved firm or agency engaged in work and study related to their major. A detailed written proposal and written interim and final reports required. One unit of credit may be allowed for each full week of internship. Credit/No Credit grading. Crosslisted as ERSC/SS 339.

SS 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 12 units. Crosslisted as ERSC/SS 400.

SS 402. Soil, Compost, and Water Testing Enterprise. 3 units

Term Typically Offered: TBD

Prerequisite: CHEM 111, CHEM 125 or CHEM 128; SS 221; and junior standing.

Experience in soil, compost, and water testing. Sampling rationale and protocol. Analyses of compost feedstocks and finished compost; monitoring for consistency. Theory and practice in use of analytical instrumentation. Interpretation of results for soil, compost, and water management. Total credit limited to 6 units for SS or ERSC majors. Total credit limited to 3 units for Soil Science minor.

SS 421. Wetlands. 4 units

Term Typically Offered: TBD

Prerequisite: BOT 121 or BIO 162; CHEM 127; and SS 120 or SS 130.

Recommended: one of the following: BIO 327, BOT 313, BOT 326, MSC1 300, NR 304, NR 305, or NR 306.

The formation, characteristics, and functions of wetlands. Genesis of hydric soils. Plant adaptations to saturated soils. Wetlands as wildlife habitat. Policies and social issues associated with wetlands. The procedures of wetland delineations. 3 lectures, 1 laboratory. Crosslisted as BIO/NR/SS 421.

SS 422. Soil Ecology. 4 units

Term Typically Offered: W

Prerequisite: CHEM 212, CHEM 312, or CHEM 313; and SS 221; or graduate standing.

Biochemical activities, ecology and environmental implications of soil organisms. Effects on the formation, characteristics, and productivity of soils. Methods of studying soil organisms. 3 lectures, 1 laboratory.

SS 423. Environmental Soil and Water Chemistry. 5 units

Term Typically Offered: F

Prerequisite: CHEM 129; CHEM 212, CHEM 216, CHEM 312, or CHEM 316; ERSC 223; MATH 118, MATH 141, or MATH 161; or graduate standing.

Chemical processes governing weathering, soil mineral formation and stability, common solubility equilibria. Use of chemical principles to explain surface chemical properties of soils and environmental problems in water and soil chemical systems. Preparation of professional quality reports based on laboratory data and library research. 3 lectures, 1 laboratory, 1 activity.

SS 424. Environmental Soil Physics - Senior Project. 5 units

Term Typically Offered: W

Prerequisite: CHEM 125 or CHEM 128; MATH 141 or MATH 161; PHYS 121 or PHYS 141; SS 120; NR 363; or graduate standing.

Matter and energy in soils, with emphasis on properties and behavior of solids, water, air, and heat. Applications to agriculture, forestry, range management, engineering, and environmental sciences. Preparation of professional reports based on laboratory data and library research. Satisfies senior project requirement. 3 lectures, 1 laboratory, 1 activity. Formerly SS 432.

SS 431. Digital Soil Mapping. 4 units

Term Typically Offered: SP

Prerequisite: GEOG 318 or LA/NR 218; STAT 217 or STAT 218; or graduate standing. Recommended SS 321.

Development and production of digital soil surveys for interpretive purposes. Use of soil taxonomy, land classification systems, geographic information system (GIS) software, and geostatistics to evaluate land for best management practices. 2 lectures, 2 laboratories.

SS 440. Forest and Range Soils. 4 units

Term Typically Offered: SP

Prerequisite: SS 120 or SS 121; and SS 321.

Ecosystem approach to chemical, biological, physical and mechanical properties of forest and range soils. Site quality, nutrient cycling, erosion and mass movement, fire effects. Preparation of soil management reports similar to those required by various land management organizations. Overnight field trips. 3 lectures, 1 laboratory.

SS 444. Soil Judging. 2 units

Term Typically Offered: F, SP

Prerequisite: SS 321.

Morphological description of soils in the field. Taxonomic determination of classifications and interpretive properties from soil descriptions. Participation in collegiate soil judging contests. Total credit limited to 12 units. 1 lecture, 1 laboratory.

SS 463. Undergraduate Seminar. 2 units

Term Typically Offered: TBD

Prerequisite: SS 461.

Review of current research, experiments, and problems related to the student's major field of interest. Preparation and presentation of reports on problems or research activities. 2 seminars.

SS 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule list topic selected. Total credit limited to 12 units. 1 to 4 lectures. Crosslisted as ERSC/SS 470.

SS 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories. Crosslisted as ERSC/SS 471.

SS 500. Individual Study in Soil Science. 1-6 units

Term Typically Offered: F,W,SPSU

Prerequisite: Consent of instructor.

Advanced independent study planned and completed under the direction of a member of the Earth and Soil Sciences faculty. Total credit limited to 6 units.

SS 522. Advanced Soil Fertility. 3 units

Term Typically Offered: W

Prerequisite: SS 221, graduate standing, or consent of instructor.

Current research frontiers in soil fertility. Evaluating soil testing philosophy, theories and interpretation. Optimizing soil conditions for maximizing crop production. Consequences of environmental pollution, trace elements and organic amendments. Use of biofertilizers, soil amendments, and enhanced efficiency fertilizers. Isotopes in soil fertility. 3 lectures.

SS 570. Selected Topics in Soil Science. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 12 units. 1 to 4 seminars.

SS 571. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

SS 582. GIS in Advanced Land Management. 3 units

Term Typically Offered: TBD

Prerequisite: Graduate standing, NR/LA 318, or consent of instructor.

Development of plans and practices for the management of crop, range, urban and wood land. 2 seminars, 1 laboratory.

SS 599. Thesis. 1-6 units

Term Typically Offered: F,W,SPSU

Prerequisite: Graduate standing and consent of instructor.

Individual research in soil science under faculty supervision, leading to a scholarly written presentation exhibiting originality, clarity, critical and independent thinking, proper analysis of data, appropriate organization and format, and accurate and thorough documentation. Six units required for the M.S. degree.

Spanish (SPAN)

undefined

SPAN Courses

SPAN 101. Elementary Spanish I. 4 units

Term Typically Offered: F, W, SP

Beginning Spanish. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context. Not open to students with credit in SPAN 104, SPAN 111, or SPAN 141. 4 lectures.

SPAN 102. Elementary Spanish II. 4 units

Term Typically Offered: F, W, SP

Prerequisite: SPAN 101, SPAN 111, SPAN 141, or appropriate score on placement exam or consent of instructor.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context. Not open to students with credit in SPAN 104 or SPAN 142. 4 lectures.

SPAN 103. Elementary Spanish III. 4 units

Term Typically Offered: F, W, SP

Prerequisite: SPAN 102, SPAN 142, or appropriate score on placement exam or consent of instructor.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context. Not open to students with credit in SPAN 104 or SPAN 143. 4 lectures.

SPAN 104. Intensive Elementary Spanish. 12 units

Term Typically Offered: TBD

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context. Offered in summer only. Not open to students with credit in SPAN 102, SPAN 103, SPAN 142, and/or SPAN 143. 9 lectures, 3 activities.

SPAN 111. Elementary Hispanic Language and Culture. 4 units

Term Typically Offered: F, W

USCP

Beginning Spanish. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation with special focus on vocabulary and culture from American agribusiness and the Hispanic cultures of the United States and Latin America. Not open to students with credit in SPAN 101 or SPAN 141. 4 lectures. Fulfills USCP.

SPAN 141. Elementary Spanish I Study Abroad. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: Acceptance into the Cal Poly Global Program.

Beginning Spanish. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in SPAN 101, 104, or SPAN 111. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

SPAN 142. Elementary Spanish II Study Abroad. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: SPAN 101, SPAN 111, SPAN 141 or appropriate score on placement exam; and acceptance into the Cal Poly Global Program.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in SPAN 102 or 104. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

SPAN 143. Elementary Spanish III Study Abroad. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: SPAN 102, SPAN 142, or appropriate score on placement exam; and acceptance into the Cal Poly Global Program.

Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and conversation. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in SPAN 103 or 104. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

SPAN 201. Intermediate Spanish I. 4 units

Term Typically Offered: F, W, SP

2019-20 or earlier catalog: GE Area C5

Prerequisite: SPAN 103, SPAN 143, or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Spanish within an intercultural context. Not open to students with credit in SPAN 204 or SPAN 241. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

SPAN 202. Intermediate Spanish II. 4 units

Term Typically Offered: F, W, SP

2019-20 or earlier catalog: GE Area C5

Prerequisite: SPAN 201, SPAN 241, or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Spanish within an intercultural context. Not open to students with credit in SPAN 204 or SPAN 242. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

SPAN 203. Intermediate Spanish III. 4 units

Term Typically Offered: F, W, SP

2019-20 or earlier catalog: GE Area C5

Prerequisite: SPAN 202, SPAN 242, or appropriate score on placement exam or consent of instructor.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Spanish within an intercultural context. Not open to students with credit in SPAN 206 or SPAN 243. 4 lectures. Fulfills GE Electives - Area C (GE Area C5 for students on the 2019-20 or earlier catalogs).

SPAN 206. Spanish for Heritage Speakers. 4 units

Term Typically Offered: SP

USCP

Prerequisite: SPAN 202, SPAN 242, or appropriate score on placement exam or consent of instructor.

Focus on the grammatical, cultural and linguistic needs of students who grew up speaking Spanish in their homes/communities, but whose schooling has been primarily in English. Emphasis on reading and writing skills, vocabulary and spelling as well as on cultural understanding. Not open to students with credit in SPAN 203 or SPAN 243. 4 lectures. Fulfills USCP.

SPAN 207. Introduction to Spanish Linguistics. 4 units

Term Typically Offered: F

Prerequisite: SPAN 203, SPAN 206, SPAN 243, or consent of instructor.

Introduction to the scientific study of the Spanish language with an overview of theoretical and applied linguistics and special emphasis on Spanish phonetics and phonology. Conducted in Spanish. 4 lectures.

SPAN 233. Introduction to Hispanic Readings. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

Prerequisite: Completion of GE Area A with grades of C- or better; and SPAN 203, SPAN 206, SPAN 243, or consent of instructor.

Selected readings from Hispanic authors that show the Hispanic literary tradition from the Middle Ages to the present in Spain, Latin America, and of Latino/a writers in the United States. May include film and other media. Conducted in Spanish. 4 lectures. Fulfills GE Area C2 (GE Area C1 or GE Area C2 for students on the 2019-20 or earlier catalogs).

SPAN 241. Intermediate Spanish I Study Abroad. 4 units

Term Typically Offered: F,W,SP,SPSU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: SPAN 103, SPAN 143, or appropriate score on placement exam; acceptance into the Cal Poly Global Program.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Spanish. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in SPAN 201. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

SPAN 242. Intermediate Spanish II Study Abroad. 4 units

Term Typically Offered: F,W,SP,SPSU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: SPAN 201, SPAN 241, or appropriate score on placement exam; acceptance into the Cal Poly Global Program.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Spanish. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in SPAN 202. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

SPAN 243. Intermediate Spanish III Study Abroad. 4 units

Term Typically Offered: F,W,SP,SPSU

2020-21 or later catalog: GE Area C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier: GE Area C1 or C2

2019-20 or earlier catalog: GE Area C5

Prerequisite: SPAN 202, SPAN 242, or appropriate score on placement exam; acceptance into the Cal Poly Global Program.

Development of presentational, interpersonal, and interpretive intermediate-level language skills in Spanish. Language taught in its intercultural context at a Cal Poly Global Program study center. Not open to students with credit in SPAN 203 or SPAN 206. 3 lectures, 1 activity. Fulfills GE Area C2 (GE Area C1, C2, or C5 for students on the 2019-20 or earlier catalogs).

SPAN 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics. Open only to undergraduate students. The Class Schedule will list topic selected. Conducted in Spanish. Total credit limited to 8 units. 1 to 4 lectures.

SPAN 301. Advanced Composition in Spanish. 4 units

Term Typically Offered: F, W, SP

Prerequisite: SPAN 203, SPAN 206, SPAN 243, or consent of instructor.

Oral and written development of structural grammar, syntax, and complex components of Spanish. Vocabulary expansion and idiomatic construction. Written compositions. May include Spanish/English translation. Conducted in Spanish. 4 lectures.

SPAN 302. Advanced Conversation and Composition in Spanish. 4 units

Term Typically Offered: F, W, SP

Prerequisite: SPAN 203, SPAN 206, SPAN 243, or consent of instructor.

Formal discussion of, and writing on selected cultural topics from the Spanish-speaking world. Focus on individual and group presentations and in-class writing and speaking assignments to enhance students' vocabulary and critical thinking skills in Spanish. Conducted in Spanish. 4 lectures.

SPAN 303. Introduction to English-Spanish Translation. 4 units

Term Typically Offered: F, W

Prerequisite: Completion of GE Area A with grades of C- or better; and SPAN 207 or SPAN 233 or SPAN 301 or SPAN 302 or consent of instructor.

Developing basic knowledge, skills, theories and techniques required for translation both from Spanish to English and from English to Spanish. Translating news articles, legal documents, commercial advertisements, formal letters, and literary works. Conducted in Spanish. 4 lectures.

SPAN 305. Significant Works in Spanish. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and SPAN 233 or consent of instructor.

Critical analysis and oral discussion of poetry, essays, novels, plays, films, and other media by selected Hispanic authors. Conducted in Spanish. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

SPAN 307. Spanish and Latin American Film. 4 units

Term Typically Offered: W, SU

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and SPAN 233 or consent of instructor.

Study, analysis, and critique of films from Spain and/or Latin America, organized around such topics as individual film directors or genres, national and international film traditions, migration, gender, ethnicity, and politics. Evaluation of works in their cultural contexts. The Class Schedule will list topic selected and language of instruction (English or Spanish). Total credit limited to 8 units. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

SPAN 340. Chicano/a Authors. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and SPAN 233 or consent of instructor.

Introduction to Chicano/a literary accomplishments to facilitate appreciation of Chicano/a literary aesthetics and increase understanding of Chicano/a cultural values and lifestyles. Conducted in Spanish. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

SPAN 350. Hispanic Literature in English Translation. 4 units

Term Typically Offered: W, SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2 (GE Area C1 for students on the 2019-20 or earlier catalogs).

Selected works to be read by students in English translation. Critical analysis, interpretation, and comparison of works by Hispanic authors. Course may include film and other media. Discussion in English. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

SPAN 351. Chicano/Latino Writers in the United States. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area C.

Analysis and exploration of the major themes of Chicano/Latino literature in the United States today. Emphasis on Chicano/a, Puerto Rican, Cuban American and other U.S. Latino/a writers. All readings and discussions in English. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

SPAN 380. Spanish for the Professions. 4 units

Term Typically Offered: F, W, SP

Prerequisite: SPAN 203, SPAN 206, or appropriate score on placement exam or consent of instructor.

Development of professional language skills, cultural competency and critical perspectives in selected professional fields in order to communicate effectively in Spanish. Conducted in Spanish. The Class Schedule will list topic selected. Total credit limited to 8 units. Course may be offered in classroom-based or online format. 4 lectures.

SPAN 390. Introduction to Creative Writing in Spanish. 4 units

Term Typically Offered: SP

Prerequisite: SPAN 301 or consent of instructor.

Directed practice with writing narrative, poetry and/or drama writing in Spanish. An examination of plot, character and theme development. Crafting of creative literature for potential publication. Conducted in Spanish. 4 lectures.

SPAN 402. Advanced Topics in Spanish Linguistics. 4 units

Term Typically Offered: W

Prerequisite: SPAN 207.

Advanced study of Spanish linguistics. Topics include bilingualism and code-switching, sounds and pronunciation, word formation, grammatical structures, meaning and intention. Introduction to research methodologies in the social sciences to discuss issues of Spanish in the US, identity, race, and migration. Conducted in Spanish. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

SPAN 410. Advanced Literature in Spanish. 4 units

Term Typically Offered: F, W

Prerequisite: SPAN 233 or consent of instructor.

In-depth study of literature in Spanish. Specific genre, literary period, authorial group, region, or country. Chicano/Latino literature, Latin American literature, and Spanish literature. Course may include film and other media. Conducted in Spanish. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

SPAN 416. Don Quixote. 4 units

Term Typically Offered: W

Prerequisite: SPAN 233 or consent of instructor.

Intensive reading of Cervantes' novel, Don Quixote (Part 1, 1605 and Part 2, 1615) in the context of Cervantes' life and the history and social context of Spanish renaissance and baroque culture. Conducted in Spanish. 4 lectures.

SPAN 470. Selected Advanced Topics. 4 units

Term Typically Offered: W, SP

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Conducted in Spanish. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures.

Special Education (SPED)

undefined

SPED Courses

SPED 420. Understanding Special Education. 4 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area D1; one course in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs); and completion of GE Area E (GE Area D4 for students on the 2017-19 or earlier catalogs).

Overview of the field of special education, including a historical perspective of special education, special education law, service delivery models, and characteristics of students with variable learning needs. 3 seminars, 1 activity.

SPED 545. Mathematics Methods for Students with Disabilities. 4 units

Term Typically Offered: W

Prerequisite: Admission to Master of Science in Special Education/ Education Specialist Credential Program.

Principles of mathematics instruction for students with disabilities. Implementation of field-based instruction, teaching, and assessing practices in mathematics for K-12 students with mild/moderate disabilities. 3 seminars, 1 activity.

SPED 547. Science and Social Studies Methods for Students with Disabilities. 4 units

Term Typically Offered: W

Prerequisite: Admission to the Integrated Master of Science in Special Education and Education Specialist Credential Program.

Principles of science and social studies instruction for students with disabilities. Implementation of field-based instruction, teaching, and assessing practices in science and social studies for K-12 students with mild/moderate disabilities. 3 seminars, 1 activity.

SPED 587. Instructional Methods for Learners with Autism. 4 units

Term Typically Offered: F

Prerequisite: Admission to the Integrated Master of Science in Special Education and Education Specialist Credential Program.

Focuses on the specific instructional approaches that are most effective for learners with autism. Meets the core competencies required for the Autism Authorization through the California Commission on Teacher Credentialing. 3 lectures, 1 activity.

SPED 588. Developing Compliant Individualized Education Plans. 4 units

Term Typically Offered: F

Prerequisite: Admission to Integrated Master of Science in Special Education and Education Specialist Credential Program.

The development and implementation of California compliant Individualized Education Plans (IEPs) for students with disabilities, including legal requirements, communication, and collaboration with all stakeholders, and IEP meeting facilitation and problem-solving. 3 lectures, 1 activity.

Statistics (STAT)

undefined

STAT Courses

STAT 130. Introduction to Statistical Reasoning. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area B4

2019-20 or earlier catalog: GE Area B1

Prerequisite: MATH 96; or MATH 115; or appropriate Math Placement Level.

Survey of statistical ideas and philosophy. Emphasis on concepts rather than in-depth coverage of statistical methods. Topics include sampling, experimentation, data exploration, chance phenomena, and methods of statistical inference. Not open to students with credit in any statistics course. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

STAT 150. Introduction to the Discipline of Statistics. 2 units

Term Typically Offered: F

Prerequisite: Statistics major.

Orientation to the statistics program, introduction to the discipline of statistics, including the development of the discipline, professional ethics, data visualization and the role of statistics in the scientific enterprise. Note: Course is intended for students in their first quarter at Cal Poly. 2 lectures.

STAT 200. Special Problems for Undergraduates. 1-2 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

STAT 217. Introduction to Statistical Concepts and Methods. 4 units

Term Typically Offered: F,W,SP,SU
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: MATH 96; or MATH 115; or appropriate Math Placement Level.

Sampling and experimentation, descriptive statistics, confidence intervals, two-sample hypothesis tests for means and proportions, Chi-square tests, linear and multiple regression, analysis of variance. Substantial use of statistical software. Not open to students with credit in STAT 218 or STAT 251. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

STAT 218. Applied Statistics for the Life Sciences. 4 units

Term Typically Offered: F,W,SP,SU
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: MATH 96; or MATH 115; or appropriate Math Placement Level.

Data collection and experimental design, descriptive statistics, confidence intervals, parametric and non parametric one and two-sample hypothesis tests, analysis of variance, correlation, simple linear regression, chi-square tests. Applications of statistics to the life sciences. Substantial use of statistical software. Course may be offered in classroom-based, online, or hybrid format. Not open to students with credit in STAT 217 or STAT 251. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

STAT 251. Statistical Inference for Management I. 4 units

Term Typically Offered: F, W, SP
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: Appropriate Math Placement Level or MATH 118.

Descriptive statistics. Probability and counting rules. Random variables and probability distributions. Sampling distributions and point estimation. Confidence intervals and tests of hypotheses for a single mean and proportion. Course may be offered classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

STAT 252. Statistical Inference for Management II. 5 units

Term Typically Offered: F,W,SP,SU
 2020-21 or later catalog: GE Area B4
 2019-20 or earlier catalog: GE Area B1
 Prerequisite: STAT 251 with a minimum grade of C- or consent of instructor.

Confidence intervals and tests of hypotheses for two means and two proportions. Introduction to ANOVA, regression, correlation, multiple regression, time series, and forecasting. Statistical quality control. Enumerative data analysis. Substantial use of statistical software. Course may be offered in classroom-based, online, or hybrid format. 5 lectures. Fulfills GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); a grade of C- or better is required in one course in this GE area.

STAT 270. Selected Topics. 1-4 units

Term Typically Offered: TBD
 Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

STAT 301. Statistics I. 4 units

Term Typically Offered: F, W
 Corequisite: MATH 141.

Introduction to statistics for mathematically inclined students, focused on process of statistical investigations. Observational studies, controlled experiments, randomization, confounding, randomization tests, hypergeometric distribution, descriptive statistics, sampling, bias, binomial distribution, significance tests, confidence intervals, normal model, t-procedures, two-sample procedures. Substantial use of statistical software. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

STAT 302. Statistics II. 4 units

Term Typically Offered: W, SP
 Prerequisite: STAT 301 with a grade of C- or better; or consent of instructor.

Continued study of the process, concepts, and methods of statistical investigations. Association, chi-square procedures, one-way ANOVA, multiple comparisons, two-way ANOVA with interaction, simple linear regression, correlation, prediction, multiple regression. Substantial use of statistical software. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

STAT 305. Introduction to Probability and Simulation. 4 units

Term Typically Offered: F, W
 Prerequisite: one of the following: BUS 392, CPE/CSC 101, CSC 232, CPE/CSC 235, ECON 395, or STAT 331; and MATH 142.

Basic probability rules, counting methods, conditional probability. Discrete and continuous random variables, expected values, variance and covariance. Properties of linear combinations of random variables with applications to statistical estimators. Simulation analysis of random phenomena using a modern computer language. Not open to students with credit in STAT 321. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

STAT 312. Statistical Methods for Engineers. 4 units

Term Typically Offered: F,W,SP,SU
 2020-21 or later: Upper-Div GE Area B
 2019-20 or earlier catalog: GE Area B5, B6, or B7
 Prerequisite: Junior standing or one of the following majors: CPE, CSC, EE, GENE, IE, MATE, MFGE, or SE; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and MATH 142.

Descriptive and graphical methods. Discrete and continuous probability distributions. One and two sample confidence intervals and hypothesis testing. Single factor analysis of variance. Quality control. Introduction to regression and to experimental design. Substantial use of statistical software. Not open to students with credit in STAT 252 or STAT 302. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

STAT 313. Applied Experimental Design and Regression Models. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing or one of the following majors: ASCI, BIO, CRP, DSCI, EESS, ENVE, ENVM, HLTH, KINE, MCRO, MSCI, POLS, PSY or SOC; completion of GE Area A with grades of C- or better; MATH 118 with a grade of C- or better, or appropriate Math Placement Level; and one of the following courses: STAT 217, STAT 218 or STAT 312 with a minimum grade of C- or better.

Applications of statistics for students not majoring in statistics or mathematics. Analysis of variance including one-way classification, randomized blocks, and factorial designs; multiple regression, model diagnostics, and model comparison. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

STAT 314. Statistical Methods for Food Science. 4 units

Term Typically Offered: F, W

Prerequisite: STAT 218.

Statistical methods for sensory analysis and food product development. Discrimination testing: paired, duo-trio, triangle. Two-way ANOVA, 2^k, fractional factorial, response surface, mixture designs. Quality and process control. Not open to students with credit in STAT 323. 4 lectures.

STAT 321. Probability and Statistics for Engineers and Scientists. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing or one of the following majors: AERO, ARCE, CSC, EE, GENE, IE, MATE, MFGE or SE; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and MATH 142.

Tabular and graphical methods for data summary, numerical summary measures, probability concepts and properties, discrete and continuous probability distributions, expected values, statistics and their sampling distributions, point estimation, confidence intervals for a mean and proportion. Use of statistical software. Not open to students with credit in STAT 301. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

STAT 323. Design and Analysis of Experiments I. 4 units

Term Typically Offered: W, SP

Prerequisite: IME 326 or STAT 252 or STAT 302 or STAT 312 or STAT 313.

Principles, construction and analysis of experimental designs. Completely randomized, randomized complete block, Latin squares, Graeco Latin squares, factorial, and nested designs. Fixed and random effects, expected mean squares, multiple comparisons, and analysis of covariance. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

STAT 324. Applied Regression Analysis. 4 units

Term Typically Offered: F, W, SP

Prerequisite: IME 326 or STAT 252 or STAT 302 or STAT 312 or STAT 313.

Linear regression including indicator variables, influence diagnostics, assumption analysis, selection of 'best subset', nonstandard regression models, logistic regression, nonlinear regression models. Not open to students with credit in STAT 334. Not open to Statistics Majors. 4 lectures.

STAT 330. Statistical Computing with SAS. 4 units

Term Typically Offered: F, W

Prerequisite: IME 326 or STAT 252 or STAT 302 or STAT 312 or STAT 313.

Data acquisition, cleaning, and management using SAS; reading data into SAS from various sources, recoding variables, subsetting and merging data, exporting results in other formats. Graphical procedures, basic descriptive and inferential statistics. Introduction to SAS macros. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

STAT 331. Statistical Computing with R. 4 units

Term Typically Offered: F,W,SP, SU

Prerequisite: IME 326, STAT 252, STAT 302, STAT 312, or STAT 313; and BUS 392, CPE/CSC 101, CSC 231, CSC 232, CSC 234, or ECON 395.

Importing, managing, and cleaning data from a variety of sources. Use of regular expressions, exploratory data analysis, functional and object-oriented programming. Graphical, descriptive, and inferential statistical methods. Methods of simulation, randomization and resampling. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

STAT 334. Applied Linear Models. 4 units

Term Typically Offered: W, SP

Prerequisite: one of the following: STAT 252, STAT 302, STAT 312, STAT 313, or IME 326; and one of the following: MATH 206, or MATH 244.

Linear models in algebraic and matrix form, diagnostics, transformations, polynomial models, categorical predictors, model selection, correlated errors, logistic regression. Course may be offered in classroom-based, online, or hybrid format. Not open to students with credit in STAT 324. 4 lectures.

STAT 350. Probability and Random Processes for Engineers. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); MATH 241; and CPE 327 or EE 228.

Random events, random variables, and random processes, with emphasis on probabilistic treatment of signals and noise. Specific topics include: sample spaces, probability, distributions, independence, moments, covariance, time/ensemble averages, stationarity, common processes, correlation and spectral functions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

STAT 365. Statistical Communication. 2 units

Term Typically Offered: SP

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs); completion of GE Area A3 with a grade of C- or better; and one of the following: STAT 252, STAT 302, or STAT 313.

Written communication of statistical ideas and content. Analyze data using appropriate methods from previous statistics courses. Writing technical reports with appropriate graphs and tables. Strategies to discern relevant and necessary information to communicate data, ideas, and results to different audiences. Course may be offered in classroom-based, online, or hybrid format. 2 lectures.

STAT 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 5 units, with a maximum of 4 units per quarter.

STAT 405. Applied Probability Models. 4 units

Term Typically Offered: SP

Prerequisite: CPE/CSC 101 or CSC 232 or CPE/CSC 235; MATH 206 or MATH 244; and STAT 305 or STAT 350 or STAT 426.

Advanced probability models, their simulation and application. Poisson processes, Markov chains, random walks, and continuous-time Markov processes. Monte Carlo integration and simulation methods, including Markov chain Monte Carlo and Gibbs sampling. 4 lectures.

STAT 410. Statistics Education: Pedagogy, Content, Technology, and Assessment. 4 units

Term Typically Offered: W

Prerequisite: one of the following: STAT 130, STAT 217, STAT 218, STAT 251, STAT 301, STAT 312, STAT 321, STAT 511, STAT 512 or STAT 542.

Topics related to content, pedagogy, technology, and assessment for teaching statistics in grades 6-16 in accordance with current standards and research for teaching statistics including the Common Core State Standards for Mathematics. 4 lectures.

STAT 414. Multilevel and Mixed Modeling. 4 units

Term Typically Offered: F

Prerequisite: STAT 324 or STAT 334 or STAT 524.

Overview of multilevel and mixed models, including hierarchical data, intraclass correlation, fixed vs. random coefficients, variance components, comparisons to traditional analyses. Use of statistical software for implementation of methods. 4 lectures.

STAT 415. Bayesian Reasoning and Methods. 4 units

Term Typically Offered: W

Prerequisite: one of the following: IME 326, STAT 252, STAT 302, STAT 312, STAT 313, or STAT 513; and one of the following: STAT 305, STAT 321, STAT 350, or STAT 425. Recommended: STAT 331.

Bayes' theorem, prior and posterior distributions, likelihood functions, Markov Chain Monte Carlo methods, hierarchical modeling. Bayesian data analysis, comparison of Bayesian and classical (frequentist) approaches. 4 lectures.

STAT 416. Statistical Analysis of Time Series. 4 units

Term Typically Offered: F

Prerequisite: STAT 324 or STAT 334 or STAT 524.

Time series components, descriptive smoothing methods, regression models for time series data, forecasting via exponential smoothing, evaluation of forecasts, autocorrelation, ARIMA models and Box-Jenkins methods, combining forecasts, frequency domain analysis, filtering. 4 lectures.

STAT 417. Survival Analysis Methods. 4 units

Term Typically Offered: W

Prerequisite: IME 326 or STAT 252 or STAT 302 or STAT 312 or STAT 313; and MATH 142.

Parametric and nonparametric methods for analyzing survival data. Topics include Kaplan-Meier and Nelson-Aalen estimates, Cox regression models, accelerated failure time models. Use of statistical software to implement methods throughout course. 4 lectures.

STAT 418. Categorical Data Analysis. 4 units

Term Typically Offered: W

Prerequisite: STAT 324 or STAT 334 or STAT 524.

Discrete multivariate statistics, including analysis of cross-classified data, log-linear models for multidimensional contingency tables, goodness of fit statistics, measures of association, model selection, and hypothesis testing. 4 lectures.

STAT 419. Applied Multivariate Statistics. 4 units

Term Typically Offered: W, SP

Prerequisite: One of the following: IME 326, STAT 252, STAT 302, STAT 312, STAT 313, STAT 513, or STAT 542; and one of the following: MATH 206, MATH 244, or graduate standing.

Continuous multivariate statistics. Multivariate linear model, principal components and factor analysis, discriminant analysis, clustering, classification, and canonical correlation. Use of statistical software throughout the course. 4 lectures.

STAT 421. Survey Sampling and Methodology. 4 units

Term Typically Offered: F

Prerequisite: IME 326 or STAT 252 or STAT 302 or STAT 312 or STAT 313 or STAT 511 or STAT 512 or STAT 513.

Survey planning, execution, and analysis. Principles of survey research, including non-sampling and sampling error topics. Survey sample designs, including simple random, systematic, stratified, cluster, and multi-stage. Estimation procedures and sample size calculations. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

STAT 423. Design and Analysis of Experiments II. 4 units

Term Typically Offered: SP

Prerequisite: STAT 323 or STAT 523.

Continuation of STAT 323. 2k factorial designs, 3k factorial designs, balanced and partially balanced incomplete block designs, nested designs, split-plot designs, response surface methodology, confounding, repeated measures, and other design approaches. 4 lectures.

STAT 425. Probability Theory. 4 units

Term Typically Offered: F
 Prerequisite: MATH 241; MATH 248 or CSC 348; and STAT 305.
 Recommended: STAT 301.

Rigorous development of probability theory. Probability axioms, combinatorial methods, conditional and marginal probability, independence, random variables, univariate and multivariate probability distributions, conditional distributions, transformations, order statistics, expectation and variance. Use of statistical simulation throughout the course. 4 lectures.

STAT 426. Estimation and Sampling Theory. 4 units

Term Typically Offered: W
 Prerequisite: STAT 425. Recommended: STAT 302.

Continuation of STAT 425. Properties of statistics obtained from samples. Sample mean properties, convergence in probability, law of large numbers, and central limit theorem. Selected probability distributions. Theory of estimation. Sampling distribution of estimators. 4 lectures.

STAT 427. Mathematical Statistics. 4 units

Term Typically Offered: SP
 Prerequisite: STAT 426.

Continuation of STAT 426. The theory of hypothesis testing and its applications. Power and uniformly most powerful tests. Categorical data and nonparametric methods. Other selected topics. 4 lectures.

STAT 431. Advanced Statistical Computing with R. 4 units

Term Typically Offered: SP
 Prerequisite: STAT 331.

Advanced techniques for efficient use of computers to perform statistical computations and to analyze large amounts of data. Includes version control systems; tools supporting reproducibility; functional programming; randomization and bootstrapping; dynamic data visualizations; and R package development. 4 lectures.

STAT 434. Statistical Learning: Methods and Applications. 4 units

Term Typically Offered: SP
 Prerequisite: one of the following: STAT 324, STAT 334, or STAT 524.
 Recommended: STAT 331 or STAT 531.

Modern methods in predictive modeling and classification. Splines, smoothing splines, ridge regression, LASSO, regression and classification trees, generalized additive models, logistic regression, and linear discriminant analysis. Model assessment and selection using cross validation, bootstrapping, AIC, and BIC. 4 lectures.

STAT 440. SAS Certification Preparation. 2 units

Term Typically Offered: W
 Prerequisite: STAT 330.

Programming, data management, and data analysis in preparation for the Certified Base Programmer Exam offered by the SAS Institute. Topics include accessing data, creating data structures, managing data, generating reports, and handling errors. 2 lectures.

STAT 441. SAS Advanced Certification Preparation. 2 units

Term Typically Offered: SP
 Prerequisite: STAT 440.

Programming topics in preparation for the Certified Advanced Programmer Exam offered by the SAS Institute. Accessing data using PROC SQL, macro processing, applications for indexes, data look-up techniques including array processing, hash objects, and combining/merging. 2 lectures.

STAT 461. Senior Project I. 1 unit

Term Typically Offered: F, W, SP
 Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time.

STAT 462. Senior Project II. 2 units

Term Typically Offered: F, W, SP
 Prerequisite: Completion of GWR.

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time.

STAT 465. Statistical Consulting. 4 units

Term Typically Offered: TBD
 Prerequisite: STAT 323; STAT 330; STAT 331; STAT 334; STAT 365; Statistics major; and senior standing.

Blending of the theoretical and practical aspects of statistical consulting. Development of tools necessary to conduct effective consulting sessions, present oral arguments and written reports, work collaboratively to solve problems, and utilize professional publications in statistics. Not open to students with credit in STAT 466. 4 lectures.

STAT 466. Senior Project - Statistical Consulting. 4 units

Term Typically Offered: SP
 Prerequisite: STAT 323; STAT 330; STAT 331; STAT 334; STAT 365; Statistics major; and senior standing.

Blending of the theoretical and practical aspects of statistical consulting. Development of tools necessary to conduct effective consulting sessions, present oral arguments and written reports. Work collaboratively to solve problems and utilize professional publications in statistics. Fulfills senior project requirement for Statistics major. Not open to students with credit in STAT 465. 2 lectures, 2 discussions.

STAT 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD
 Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

STAT 485. Cooperative Education Experience. 6 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 12 units. Credit/No Credit grading only.

STAT 495. Cooperative Education Experience. 12 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 24 units. Credit/No Credit grading only.

STAT 500. Independent Study. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and consent of instructor.

Individual research or advanced study planned and completed under the direction of a departmental faculty member. Total degree credit limited to 4 units. Total credit limited to 12 units.

STAT 511. Statistical Methods. 4 units

Term Typically Offered: F

Prerequisite: Graduate standing and intermediate algebra or equivalent.

Statistical methods in research for graduate students not majoring in mathematical sciences. Probability distributions, confidence intervals, hypothesis testing, contingency tables, linear regression and correlation, multiple regression, analysis of variance. Substantial use of statistical software. 4 lectures.

STAT 513. Applied Experimental Design and Regression Models. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing and a grade of C- or better in one of the following: STAT 217, STAT 218, STAT 252, STAT 312, STAT 511, STAT 512, or STAT 542; or consent of instructor.

Applications of statistics for graduate students not majoring in mathematics. Analysis of variance including the one-way classification, randomized blocks, and factorial designs. Introduction to multiple regression and to analysis of covariance. Substantial use of statistical software. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Not open to students with credit in STAT 313.

STAT 523. Design and Analysis of Experiments I. 4 units

Term Typically Offered: W, SP

Prerequisite: one of the following: IME 326, STAT 252, STAT 302, STAT 312, STAT 313, STAT 513, or STAT 542; and graduate standing.

Principles, construction and analysis of experimental designs. Completely randomized, randomized complete block, Latin squares, Graeco-Latin squares, factorial, and nested designs. Fixed and random effects, expected mean squares, multiple comparisons, and analysis of covariance. Not open to students with credit in STAT 323. Course may be offered in classroom-based, online, or hybrid format. 4 lectures.

STAT 524. Applied Regression Analysis. 4 units

Term Typically Offered: F, W, SP

Prerequisite: one of the following: IME 326, STAT 252, STAT 302, STAT 312, STAT 313, STAT 513, or STAT 542; and graduate standing.

Linear regression including indicator variables, influence diagnostics, assumption analysis, selection of 'best subset', nonstandard regression models, logistic regression, nonlinear regression models. Not open to students with credit in STAT 324 or STAT 334. 4 lectures.

STAT 530. Statistical Computing with SAS. 4 units

Term Typically Offered: F, W

Prerequisite: STAT 511 or STAT 512 or STAT 513 or STAT 542.

Techniques available to the statistician for efficient use of computers to perform statistical computations and to analyze large amounts of data. Use of the SAS software system. Includes data preparation, report writing, basic statistical methods, and a research project. Course may be offered in classroom-based, online, or hybrid format. Not open to students with credit in STAT 330. 4 lectures.

STAT 531. Statistical Computing with R. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Graduate standing; STAT 513 or STAT 542; and one computer programming course; or consent of instructor.

Import, manage, and clean data. Use of regular expressions, exploratory data analysis, functional and object-oriented programming. Graphical, descriptive, and inferential statistical methods. Methods of simulation, randomization and resampling. Course may be offered in classroom-based, online, or hybrid format. Not open to students with credit in STAT 331. 4 lectures.

STAT 541. Advanced Statistical Computing with R. 4 units

Term Typically Offered: TBD

Prerequisite: STAT 331 or STAT 531; STAT 334; and STAT 426; and graduate standing; or consent of instructor.

Advanced techniques for efficient use of R software to perform statistical computations, analyze large amounts of data, and develop new software. Includes version control systems; code design, documentation, and unit testing; modern data and database software; dynamic data visualizations; special data types; efficient processing of big data; functional programming and recursion; and numerical integration and optimization. 4 lectures.

STAT 542. Statistical Methods for Engineers. 4 units

Term Typically Offered: TBD

Prerequisite: MATH 142 and graduate standing.

Descriptive and graphical methods. Discrete and continuous probability distributions. One and two sample confidence intervals and hypothesis testing. Single factor analysis of variance. Quality control. Introduction to regression and to experimental design. Substantial use of statistical software. Course may be offered in classroom-based, online, or hybrid format. Not open to students with credit in STAT 312. 4 lectures.

STAT 543. Advanced Design and Analysis of Experiments. 4 units

Term Typically Offered: TBD

Prerequisites: STAT 323 or STAT 523; STAT 334; and graduate standing; or consent of instructor.

2^k and 3^k factorial and fractional factorial designs, balanced and partially balanced incomplete block designs, nested designs, split-plot designs, response surfaces, repeated measures, and other design approaches. Design matrices. Analysis and interpretation of fixed, random, and mixed effects models, analysis of covariance, and different parameterizations. 4 lectures.

STAT 545. Applied Stochastic Processes. 4 units

Term Typically Offered: TBD

Prerequisite: MATH 206 or MATH 244; and STAT 426; and graduate standing; or consent of instructor.

Properties, simulation, and application of stochastic processes. Discrete-time and continuous-time Markov chains, hidden Markov models, Poisson processes, Gaussian processes, continuous-state Markov processes. Markov chain Monte Carlo (MCMC) simulation methods and applications. Estimation methods for stochastic processes. 4 lectures.

STAT 550. Generalized Linear Models. 4 units

Term Typically Offered: TBD

Prerequisite: STAT 334 and STAT 427; and graduate standing; or consent of instructor.

Theory and application of linear and generalized linear models (GLMs). Logistic regression, nominal and ordinal responses, Poisson GLMs, correlated responses, random and mixed effects models, Bayesian GLMs, model selection and model checking. 4 lectures.

STAT 551. Statistical Learning with R. 4 units

Term Typically Offered: TBD

Prerequisite: STAT 305 or STAT 350; STAT 331 or STAT 531; STAT 334; and graduate standing; or consent of instructor.

Modern methods in predictive modeling. Supervised and unsupervised learning. Regression, classification, and clustering methods, including SVM, LASSO, splines, trees, and random forests. Model assessment and selection using cross validation, bootstrapping, and information criteria. Use of the R programming language. 4 lectures.

STAT 566. Graduate Consulting Practicum. 2 units

Term Typically Offered: TBD

Prerequisite: STAT 466 and graduate standing.

Practice in statistical consulting. Observing faculty-led consulting sessions. Organizing and leading consulting projects with faculty supervision. Discussion of statistical consulting cases in a seminar format. 2 seminars.

STAT 570. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

STAT 590. Graduate Seminar in Statistics. 1 unit

Term Typically Offered: TBD

Prerequisite: Graduate standing in Statistics.

Topics in advanced statistics selected by the faculty. Discussion of current research papers in statistics and implementation of methods. Total credit limited to 3 units. 1 seminar.

STAT 599. Thesis. 1-4 units

Term Typically Offered: TBD

Prerequisite: Graduate standing and consent of instructor.

Individual research under faculty supervision, leading to a graduate thesis. Total credit limited to 8 units.

Theatre (TH)

undefined

TH Courses

TH 201. First Year Theatre Experience. 4 units

Term Typically Offered: F

Development of methods and skills for Theatre Arts majors. Focus on the various roles involved in theatre-making through collaboration and experimentation. Introduction to the study and appreciation of Theatre; additional emphasis on practical and professional expectations, and career planning. Attendance at theatre performance(s) required. Not open to students with credit in TH 101. 4 lectures.

TH 210. Introduction to Theatre. 4 units

Term Typically Offered: F, W, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Overview of theatre principles and production practices, including terminology and conventions, methods, dramatic literature and performance, aesthetic appreciation, and technology. Emphasis on theatre as an integral cultural, social, and artistic entity. Attendance at theatre performance(s) required. Course may be offered in classroom-based, online, or hybrid format. Not open to students with credit in TH 201. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

TH 215. Verbatim Theatre. 4 units

Term Typically Offered: SP

Prerequisite: TH 220.

Focus on creation and performance of original devised work. Development of skills to research, collect, and produce content for use in performance. Emphasis on theatre to promote social change and awareness within a community about a particular topic or event. 3 lectures, 1 activity.

TH 220. Acting I. 4 units

Term Typically Offered: W

Prerequisite: TH 201 or TH 210.

Contemporary acting techniques focused on character building, objectives and tactics, with a focus on the development and implementation of various interactive methods of vocal work, images and actor resources. 3 lectures, 1 activity.

TH 225. Costume Construction I. 4 units

Term Typically Offered: F, W, SP

Basic costume construction techniques used in entertainment industry. Building of costumes and craft projects for mainstage theater productions. Students required to participate in rehearsals and productions as costume run crew. May not be taken concurrently with TH 230 or TH 330. 4 laboratories.

TH 227. Theatre History I. 4 units

Term Typically Offered: F, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Examine the traditions of theater, primarily Western, from its origins to the European Renaissance, within the context of wider cultural and political developments. Production methods, acting styles, playwriting theories and representative plays. Course may be offered in classroom-based or hybrid format. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs).

TH 228. Theatre History II. 4 units

Term Typically Offered: F, W

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Highlights of European and North American theatrical history from the 18th to 21st century. Production methods, acting styles, playwriting theories and representative plays. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area C1 (GE Area C3 for students on the 2019-21 or earlier catalogs).

TH 230. Stagecraft I. 4 units

Term Typically Offered: F, W, SP

Basic stagecraft technique used in the entertainment industry. Construction and painting of scenery, building and gathering properties, hanging and focusing lighting instruments, and acting as running crew for department production each term. May not be taken concurrently with TH 225 or TH 325. 4 laboratories.

TH 235. Acting II. 4 units

Term Typically Offered: SP

Prerequisite: TH 220.

Examination and application of key styles of acting, with specific attention paid toward the comparison and development of performance techniques and/or theories via scene work. Enhancement of foundational skills related to character, given circumstances, tactics, and objectives. 3 lectures, 1 activity.

TH 240. Improvisational Theatre. 4 units

Term Typically Offered: TBD

Objectives and techniques of improvisational theatre. Participation in a series of exercises designed to develop skills in dramatic structure formatting, interactive problem solving, spontaneous scripting, dynamic communications, and applied performance styles. 2 lectures, 2 activities.

TH 245. Introduction to Stage Management. 4 units

Term Typically Offered: TBD

Basic stage managerial skills for organizing, preparing, and fulfilling theatrical productions from the inception through rehearsal and performance. 4 lectures.

TH 255. Technical Theatre Production. 4 units

Term Typically Offered: TBD

Prerequisite: TH 230.

Introduction to theatre production techniques and terminology, including tools and processes required to analyze, interpret, and construct scenery; concepts of lighting system and console programming; rigging practices. 3 lectures, 1 activity.

TH 256. Technology in Theatrical Design. 4 units

Term Typically Offered: TBD

Prerequisite: TH 230.

Introduction to various technologies and current software used in theatrical stage design, including graphics editors; computer-aided design; visualizers and mapping; projection creation. Mixed digital media preparation and presentation. Individual and group assignments. 3 lectures, 1 activity.

TH 260. Voice and Diction for the Stage. 4 units

Term Typically Offered: F

Prerequisite: TH 220.

Theory and practice in developing command of oral techniques for the stage including breath support, resonance and articulation. 4 lectures.

TH 265. Scenic Painting. 4 units

Term Typically Offered: W

Prerequisite: TH 230.

Introduction to scenic painting techniques used in theatre, including color mixing and media preparation, surface sizing and preparation, finishes, pattern or stencil work, and scaled transfer. Paint shop operations and functions. 3 lectures, 1 activity.

TH 270. Stage Make-Up. 4 units

Term Typically Offered: F

Introduction to the art of theatrical make-up design and application. Techniques for producing character, old age, fantasy and special effects make-up. Demonstration and discussion of various design and application styles. 3 lectures, 1 activity.

TH 275. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

TH 280. Body Awareness and Expression. 4 units

Term Typically Offered: TBD

Directed group study of movement techniques and exercises to facilitate expressive physical performance. Body effectiveness, alignment and conditioning practice integrated with creative exploration and movement analysis of effort, spatial awareness and detailed body usage. 4 lectures. Crosslisted as DANC/TH 280.

TH 285. Internship. 1-4 units

Term Typically Offered: F, W, SP
CR/NC

Prerequisite: TH 101; TH 210; and consent of instructor.

Part-time, supervised internship experience for Freshmen & Sophomore students in theatre or equivalent professionally related industry. Ability to work independently; strong verbal and written skills. Faculty approval of internship position required. Evaluations by supervisor and written reports by student required. 30 - 120 hours of work experience. Total credit limited to 4 units. Credit/ No credit grading only.

TH 290. Script Analysis. 4 units

Term Typically Offered: W
Prerequisite: TH 201 or TH 210.

Script analysis taught as an essential applied skill for actors, designers and directors. Students read a variety of plays and learn how to examine their structure, theme and context. 4 seminars.

TH 295. Foundations in Theatrical Design. 4 units

Term Typically Offered: SP
Prerequisite: TH 210 or TH 201.

Exploration of the fundamental principles and practices of designing for the stage. Emphasis placed upon the creative and collaborative process of theatre; development of the visual world of the play via language, color, drawing, analysis, and peer evaluation. 3 lectures, 1 activity.

TH 305. Topics in Diversity on the American Stage. 4 units

Term Typically Offered: W
2020-21 or later: Upper-Div GE Area C
2019-20 or earlier catalog: GE Area C4
USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and TH 201, TH 227, or TH 228 for Theatre majors or completion of GE Area C1 for all other majors (GE Area C3 for students on the 2019-20 or earlier catalogs).

Critical analysis of traditionally underrepresented groups in the American theatre, as writers, practitioners, story subjects. Investigation of dramatic literature and performance trends related to special interest topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

TH 315. Physical Theatre. 4 units

Term Typically Offered: SP
Prerequisite: TH 220.

Development of physical expression for the purpose of creating content for the stage; exploration of modern theatrical movement modalities to develop physical impulse, spatial awareness, ensemble work, and storytelling. Course culminates with an original student devised performance. 3 lectures, 1 activity.

TH 325. Costume Construction II. 4 units

Term Typically Offered: F, W, SP
Prerequisite: TH 225.

Specialized and advanced costume construction techniques used in entertainment industry. Building of costumes and craft projects for mainstage theater productions. Students required to participate in rehearsals and productions as costume run crew. Total credit limited to 8 units. May not be taken concurrently with TH 230 or TH 330. 4 laboratories.

TH 330. Stagecraft II. 4 units

Term Typically Offered: F, W, SP
Prerequisite: TH 230.

Basic stagecraft technique used in the entertainment industry. Students construct and paint scenery, build and gather properties, hang and focus lighting instruments, and act as running crew for department production each term. Total credit limited to 8 units. May not be taken concurrently with TH 225 or TH 325. 4 laboratories.

TH 345. Mainstage Rehearsal and Performance. 4 units

Term Typically Offered: F, W, SP
Prerequisite: By audition only.

Preparation of a play for quarterly public presentation, including acting, stage management, publicity, or serving as a key member of the artistic team. Total credit limited to 12 units. Major credit limited to 4 units; repeated units are free electives. 4 laboratories.

TH 350. Seminar in Playwriting. 4 units

Term Typically Offered: W
Prerequisite: Completion of GE Area A with grades of C- or better; TH 201 or 210; and TH 290.

Examines dramatic structure, techniques of dialogue, and means of characterization in variety of plays. Relates dramatic writing to technical, design, directorial and acting demands. Compositions of monologues, scenes and one-act play; works read and critiqued in class. 4 seminars.

TH 355. Mainstage Production. 1-4 units

Term Typically Offered: F, W, SP
Prerequisite: TH 225 or TH 230; and consent of instructor.

Preparation of a play for quarterly public presentation. Assignments and projects may center around any technical area of theatre, including, but not limited to, the following: Designers, Assistant Designers, Technicians, Crews and Crew Heads. Total credit limited to 8 units. 1 to 4 laboratories.

TH 370. Costume History. 4 units

Term Typically Offered: TBD
Prerequisite: TH 201 or TH 210.

Dress worn in Western society from Ancient Egypt through AD 2000. Silhouette; how, when, and why particular garments were worn; emphasis on social, political, and economic context. 4 lectures.

TH 380. Theatre for Young Audiences. 4 units

Term Typically Offered: SP

Prerequisite: TH 201 or 210, or one upper-division Liberal Studies, Child Development or Psychology course.

Practice of educational drama as applied to multidisciplinary curricula. Collaborate on story-based improvisation in areas that include language arts, social studies, geography and science with additional focus on examining emotional development and creativity. 3 lectures, 1 activity.

TH 390. Global Theatre and Performance. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and TH 201, TH 210, TH 227, or TH 228 for Theatre majors or completion of GE Area C1 for all other majors (GE Area C3 for students on the 2019-20 or earlier catalogs). Recommended: TH 210 for all other majors.

Investigation of non-American theatre and dramatic performance; emphasis on plays, playwrights, and movements as portraits of philosophical/national make-up. Topical emphasis focuses on the definition and development of a cultural identity via the context of historical and contemporary theatre practices. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

TH 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department head.

Individual investigation, research, or project centering around theatre. Total credit limited to 8 units.

TH 425. Acting III. 4 units

Term Typically Offered: F

Prerequisite: Consent of Instructor.

Advanced performance methodology. Focus on actor training in the theatre; analysis and professional skills; development approaches to material for the stage and auditioning. Enhancement of techniques related to monologues, scene study, and auditions. The Class Schedule will list topic selected. Total credit limited to 8 units. 3 lectures, 1 activity.

TH 430. Scenic Design. 4 units

Term Typically Offered: F

Prerequisite: TH 290 and TH 295.

Scenic design process used in the entertainment industry, including collaboration, concept development, research, sketching, drafting, color rendering using a variety of media, 3D model building, and the presentation of design material. 3 lectures, 1 activity.

TH 432. Costume Design. 4 units

Term Typically Offered: W

Prerequisite: TH 290 and TH 295.

Costume design process used in the entertainment industry, including collaboration, concept development, research, sketching, color rendering using a variety of media, and the presentation of design material. 3 lectures, 1 activity.

TH 434. Lighting Design. 4 units

Term Typically Offered: F

Prerequisite: TH 290 and TH 295.

Lighting design process used in the entertainment industry, including collaboration, concept development, research, functional aspects of lighting equipment, CAD drafting, the development of production paperwork and presentation of design material. 3 lectures, 1 activity.

TH 450. Directing. 4 units

Term Typically Offered: SP

Prerequisite: TH 290 and consent of instructor.

Principles, philosophies, analytical methods, business practices, organizational techniques and interpersonal strategies of directing for the stage. Experiential work includes hands-on, in-class exercises, as well as intensive outside class rehearsals. Culmination in a public production of student-directed one-act plays. 3 lectures, 1 activity.

TH 461. Senior Project Seminar. 4 units

Term Typically Offered: F

Prerequisite: Senior standing and Theatre majors only.

Focus on post-graduate career planning options in theatre arts, including resume and portfolio building, preparation for professional work, graduate school and internships. A structure by which students design and submit their senior projects. 4 seminars.

TH 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: SP

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

TH 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for theatre students. The Class Schedule will list topics selected. Total credit limited to 12 units. 1-4 laboratories.

TH 480. Advanced Internship. 4 units

Term Typically Offered: F, W, SP

CR/NC

Prerequisite: Junior standing with a minimum 3.0 GPA and consent of instructor.

Part-time, supervised internship experience in the entertainment or equivalent professional industry. Ability to work independently; strong verbal and written skills. Faculty approval required. Evaluations by internship supervisor and written reports by student required. 120 hours of work experience. Total credit limited to 8 units. Credit/No Credit grading.

University Studies (UNIV)

undefined

UNIV Courses

UNIV 100. University Studies. 1 unit

Term Typically Offered: F
CR/NC

Course supports the successful student transition to Cal Poly. Establishes links between student needs and campus resources. Covers goal setting, degree planning, campus and academic policies, time management, college and campus culture, growth mindset and effective learning strategies. Not open to students with credit in EDUC/UNIV 125. Credit/No Credit grading only. 1 lecture.

UNIV 111. First Generation College Students Group Dialogue. 1 unit

Term Typically Offered: F, W, SP
CR/NC

Issues related to first generation college students' experiences. Students engage in dialogue and exploration of their experiences in the context of their intersecting identities. Students are encouraged to discover new strengths and potentials. Students also learn about resources. Credit/No Credit grading only. Course may be offered in classroom-based or online format. 1 activity.

UNIV 125. First Year Seminar. 2 units

Term Typically Offered: TBD
CR/NC

Issues associated with the successful transition from high school or community college to Cal Poly. Links fostered between student needs and campus resources. Coverage of academic policies and procedures, university study skills, goal setting, career planning, wellness and other topics relevant to student success. Not open to students with credit in UNIV 100. Credit/No Credit grading only. 1 lecture, 1 activity. Crosslisted as EDUC/UNIV 125.

UNIV 321. Undergraduate Research Methods and Practice. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and consent of instructor.

Research methods and tools for sciences and humanities, including formulating a research question, designing a study, using the scientific method to conduct and analyze surveys, and analyzing data. Emphasis on working in interdisciplinary research teams. Total credit limited to 8 units. 2 lectures, 2 activities. Crosslisted as HNRS/UNIV 321.

UNIV 330. Cal Poly Land: Nature, Technology, and Society. 4 units

Term Typically Offered: SP
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7
Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course from GE Area B1 (GE Area B4 for students on the 2019-20 or earlier catalogs); one course from GE Area B2; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Scientific investigation of the natural features of the Cal Poly landscape and their transformations by land management technology. Environmental, economic, social, and political effects of agriculture, resource extraction, construction technology. Educational, land-use, long term planning issues. 4 lectures. Crosslisted as AG/ISLA/SCM/UNIV 330. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

UNIV 350. The Global Environment. 4 units

Term Typically Offered: F, SU
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7
Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/historical/political perspectives. Use of remote sensing maps. Sustainable solutions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as AG/EDES/ENGR/GEOG/ISLA/SCM/UNIV 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

UNIV 391. Appropriate Technology for the World's People: Development. 4 units

Term Typically Offered: F
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5
Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D.

A broad overview of international development and appropriate design for sustainability. Besides traditional classroom work, students work in teams to address problems with technical solutions. Collaboration with mentors from the university, private sector, and nonprofits serves to provide diverse background and project mentorship. 4 lectures. Crosslisted as HNRS/PSC/UNIV 391. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

UNIV 392. Appropriate Technology for the World's People: Design. 4 units

Term Typically Offered: SP
2020-21 or later: Upper-Div GE Area B
2019-20 or earlier catalog: GE Area B5, B6, or B7
Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: UNIV 391 and completion of GE Area D2.

Addresses the needs of international impoverished communities with technological solutions, which are inexpensive, ecologically sustainable, and socially appropriate. Group study of target communities, and design and construction of an appropriate technology prototype. Not open to students with credit in PSC/UNIV/HNRS 492. 3 lectures, 1 laboratory. Crosslisted as HNRS/PSC/UNIV 392. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

UNIV 401. Graduation Writing Requirement Portfolio. 0 unit

Term Typically Offered: F,W,SP,SU

CR/NC

GWR

Prerequisite: Junior standing and completion of GE Area A with grades of C- or better; or graduate standing.

Completion of the Graduation Writing Requirement (GWR) through submission and assessment of a writing portfolio. Course offered online only. Credit/No Credit grading only. Fulfills GWR.

UNIV 421. Summer Undergraduate Research Experience. 0 unit

Term Typically Offered: SU

CR/NC

Completion of Summer Undergraduate Research Experience. Students must be participating in a mentored summer undergraduate research experience at Cal Poly during the Summer term. Course offered online only. Credit/No Credit grading only.

UNIV 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

UNIV 491. Appropriate Technology for the World's People: Development. 4 units

Term Typically Offered: F

Prerequisite: Consent of instructor, and senior or graduate standing.

Corequisite: GE Area D5.

A broad overview of international development and appropriate design for sustainability. Besides traditional classroom work, students work in teams to address problems with technical solutions. Collaboration with mentors from the university, private sector, and nonprofits serves to provide diverse background and mentorship. Seminar paper required. Not open to students with credit in PSC/UNIV/HNRS 391. 4 lectures. Crosslisted as PSC/UNIV 491.

UNIV 492. Appropriate Technology for the World's People: Design. 4 units

Term Typically Offered: SP

Prerequisite: Junior standing and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs); or graduate standing. Recommended: UNIV 391 and two lower-division courses in GE Area D2 (or in GE Area D3 for students on the 2019-20 or earlier catalogs).

Addresses the needs of international impoverished communities with technological solutions, which are inexpensive, ecologically sustainable, and socially appropriate. Group study of target communities, and design and construction of an appropriate technology prototype. Seminar paper required. Not open to students with credit in PSC/UNIV/HNRS 392. 3 lectures, 1 laboratory. Crosslisted as PSC/UNIV 492.

Wine and Viticulture (WVIT)

undefined

WVIT Courses

WVIT 101. Orientation to Wine and Viticulture. 1 unit

Term Typically Offered: TBD

CR/NC

Introduction to the wine and viticulture program. Emphasis on curriculum and career planning. Credit/No Credit grading only. 1 lecture.

WVIT 102. Global Wine and Viticulture. 4 units

Term Typically Offered: F, SP

Introduction to wine grape growing, winemaking, and wine business. Brief history and overview of major global wine regions, including growing conditions, grape varieties, winemaking styles, and wine business practices. 4 lectures.

WVIT 202. Fundamentals of Enology. 4 units

Term Typically Offered: F, SP

Prerequisite: CHEM 111 or CHEM 127.

Introduction to the science of winemaking: development of wine components in grapes, grape maturation, harvesting, pre-fermentation wine-making methods, alcoholic fermentation, malolactic fermentation, wine maturation and post fermentation practices, wine spoilage, maintenance of wine integrity. 4 lectures.

WVIT 233. Basic Viticulture. 4 units

Term Typically Offered: F, W

Prerequisite: PLSC 120 or BOT 121; CHEM 127; and SS 120.

Fundamentals of grape growing, with emphasis on wine grapes. Fundamentals of vine anatomy and physiology, development and phenology, trellising systems, soils, climatic factors, vineyard establishment, grafting, irrigation, fertility, harvest practices, pruning, major pests, and major varieties and rootstocks. Not open to students with credit in WVIT 231. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as PLSC 232/WVIT 233. Formerly AEPS 232/WVIT 233.

WVIT 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

WVIT 300. Survey of Grape Growing and Winemaking. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course from GE Area B1; one course from GE Area B2; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs).

Fundamentals of viticulture and enology. Overview of grapevine physiology, major varieties, soils, climatic factors, management practices and wine regions of the world. Exploration of wine fermentation, finishing, aging, bottling and wine chemistry. Compare red, white, sparkling and fortified wine production. Not open to students with credit in WVIT 202 or WVIT 233. 4 lectures. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

WVIT 301. Wine Microbiology. 4 units

Term Typically Offered: SP

Prerequisite: MCRO majors must have MCRO 224; WVIT majors must have MCRO 221 or MCRO 224; and WVIT 202; open to MCRO or WVIT majors only.

Wine yeasts, bacteria, and molds: morphology and methods of identification; successful alcoholic and malolactic fermentations; management and prevention of unwanted microbial growth; microorganisms and flavor development. 3 lectures, 1 laboratory. Crosslisted as MCRO/WVIT 301.

WVIT 302. Wine Fermentation Laboratory. 2 units

Term Typically Offered: SP

Prerequisite: WVIT 202; WVIT major; and at least 18 years in age.

Alcoholic and malolactic fermentation, maturation, stabilization and bottling of finished wines. Not open to students with credit in WVIT 404, WVIT 405 or WVIT 406. 1 lecture, 1 laboratory.

WVIT 331. Advanced Viticulture - Fall. 4 units

Term Typically Offered: F

Prerequisite: PLSC 232 or WVIT 233.

Advanced viticulture theory and practice, with an emphasis on fall season activities. Identification of rootstocks, wine and table grapes, species taxonomy and diversity, and breeding for grapevine improvement. Field trips may be required. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Crosslisted as PLSC/WVIT 331. Formerly AEPS/WVIT 331.

WVIT 332. Advanced Viticulture - Winter. 4 units

Term Typically Offered: W

Prerequisite: PLSC 232 or WVIT 233; and PLSC/WVIT 331.

Advanced viticulture theory and practice with emphasis on winter season activities. Pruning to influence vine balance, productivity, training and trellising systems, vineyard establishment, cover cropping and weed management. Field trips required. 3 lectures, 1 laboratory. Crosslisted as PLSC 336/WVIT 332. Formerly AEPS 336/WVIT 332.

WVIT 333. Advanced Viticulture - Spring. 4 units

Term Typically Offered: SP

Prerequisite: PLSC 232 or WVIT 233; and PLSC/WVIT 331.

Advanced viticulture theory and practices with emphasis on spring activities. Vine source/sink relations, factors impacting yield and berry composition, the role environmental conditions on vine physiology, and canopy management. Field trips required. Course may be offered in classroom-based or online format. 3 lectures, 1 laboratory. Crosslisted as PLSC 337/WVIT 333. Formerly AEPS 337/WVIT 333.

WVIT 339. Internship Wine and Viticulture. 1-12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: WVIT 202; AEPS/WVIT 231 or WVIT 232 or WVIT 233; junior standing; and consent of internship instructor.

One or two quarters spent with an approved wine industry employer engaged in wine production or related agribusiness and viticulture activities. Applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Total Major credit limited to 6 units. Total credit limited to 12 units. Credit/No Credit grading only.

WVIT 343. Branded Wine Marketing. 4 units

Term Typically Offered: F, W, SP

Prerequisite: AGB 212 or ECON 201 or ECON 221 or ECON 222.

Wine pricing as it relates to quality, packaging, and service. Distribution options with emphasis on the three tier system, promotional strategies, including public relations, mass media advertising, personal selling, and direct marketing. Domestic and international marketplaces. 4 lectures.

WVIT 344. Direct to Consumer Wine Sales. 4 units

Term Typically Offered: SP

Prerequisite: WVIT or RPTA major. Co-requisite: AGB 212 or ECON 201 or ECON 221 or ECON 222.

Factors driving direct-to-consumer initiatives in the US wine business: tasting rooms, wine clubs/mailling lists, eCommerce, telemarketing, and events. Using current research and case studies to explore features of a direct-to-consumer approach, while facilitating compliance. Topics include: experiential marketing, social media, brand differentiation. 4 lectures.

WVIT 345. Wine Marketing Research and Market Analysis. 4 units

Term Typically Offered: W

Prerequisite: STAT 217 or STAT 218; and WVIT 343.

Application of statistical theory to design research to examine the wine and grape markets. Research examining the evaluation of appropriate data collection methods, quantitative analyses, and interpretation of primary and secondary wine and grape industry data. 4 lectures. Formerly WVIT 444.

WVIT 346. Winery Digital Media Marketing and Data Analytics. 4 units

Term Typically Offered: SP

Prerequisite: AGB 260 and WVIT 343.

Development of digital marketing skills (audio and video) and techniques to produce content for wineries and evaluate results. Emphasis on regulatory restrictions in wine marketing, return on investment strategy, optimization and analytic metrics and customer acquisition costs. Course may be offered in classroom-based or online format. 4 lectures.

WVIT 365. Wine Analysis and Amelioration. 4 units

Term Typically Offered: SP

Prerequisite: WVIT 202 and CHEM 312; for WVIT majors only. Corequisite: CHEM 313.

Winery laboratory practices. Basic principles, techniques, and interpretation of common analyses for sugars, acidity, nitrogen, alcohol, volatile acidity, sulfur dioxide, phenols and color; wine and must amelioration, amendment effects, usage, calculations and procedures of addition. 3 lectures, 1 laboratory.

WVIT 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 4 units per quarter.

WVIT 404. Winemaking I. 4 units

Term Typically Offered: F

Prerequisite: WVIT 202; WVIT 365; WVIT major; and at least 18 years in age.

Planning, managing and implementing harvest in the pilot winery; sanitation practices; monitoring grape maturity; handling juices and musts; alcoholic and malolactic fermentation, general cellar practices; sensory and laboratory analyses. 3 lectures, 1 laboratory.

WVIT 405. Winemaking II. 4 units

Term Typically Offered: W

Prerequisite: WVIT 404; WVIT major; and at least 18 years in age.

Planning, managing and implementing harvest in the pilot winery; sanitation practices; monitoring and maintaining wine integrity; planning for bottling; blending trials; general cellar practices; sensory and laboratory analyses. 3 lectures, 1 laboratory.

WVIT 406. Winemaking III. 4 units

Term Typically Offered: SP

Prerequisite: WVIT 405; WVIT major; and at least 18 years in age.

Planning, managing and implementing the preparation of wine for bottling; blending; fining; filtration; bottling; conducting general cellar practices; sensory and laboratory analyses. 3 lectures, 1 laboratory.

WVIT 414. Grape Pest Management. 4 units

Term Typically Offered: F

Prerequisite: PLSC 232 or WVIT 233; PLSC 313; BOT/PLSC 323.

Comprehensive survey of major grape pests including diseases, insects, weeds, vertebrates, and nematodes. Identification and biology of grape pests and natural enemies, monitoring, and integrated pest management (IPM) strategies, including cultural, biological, and chemical controls. Guest lectures. 3 lectures, 1 activity. Crosslisted as PLSC/WVIT 414. Formerly AEPS/WVIT 414.

WVIT 423. Wine Law and Compliance. 4 units

Term Typically Offered: W, SP

Prerequisite: WVIT 343.

Legal aspects of wine making/marketing. Emphasis of both Federal (Tax and Trade Bureau) and State business requirements as well as State and Federal regulations impacting winery and viticultural practices in California. 4 lectures.

WVIT 428. Winegrape Vineyard Management. 4 units

Term Typically Offered: SP

Prerequisite: AGB 214, SS 221 and WVIT 233. Recommended: WVIT 331, WVIT 332, and WVIT 333.

Winegrape vineyard management practices including: financial projections and budgeting, contracting and supervision of labor, trellis installation and repair, irrigation systems maintenance, fertilization and spray scheduling. Field trips required. 3 lectures, 1 laboratory.

WVIT 433. Wine Sales and E-Commerce. 4 units

Term Typically Offered: SP

Prerequisite: WVIT 343.

Professional selling in the wine industry. Selling wine through the seven avenues of wine distribution in the 3-tier system. Exploration of aspects of wine selling, from customer relation management to cultural and legal differences among states. How strategies for selling differ for various sized wineries. 4 lectures.

WVIT 442. Sensory Evaluation of Wine. 4 units

Term Typically Offered: F, W, SU

Prerequisite: WVIT 202; STAT 218; WVIT major; and at least 18 years in age.

Evaluation of wines using the techniques in sensory evaluation. Difference and rating tests; descriptive analysis and pairing of wine and food. 3 lectures, 1 laboratory.

WVIT 447. Logistics for the Global Wine Industry. 4 units

Term Typically Offered: SP

Prerequisite: WVIT 102; WVIT 343; and STAT 218.

Scope and elements of the international wine logistics system including supply and distribution channels, transportation, inventory, warehousing, packaging and order processing. 4 lectures.

WVIT 450. Wine Business Plan Development. 4 units

Term Typically Offered: W

Prerequisite: AGB 214 or BUS 214; and BUS 301 or WVIT 343.

The strategic planning process for wine businesses. Development of a complete business plan with careful adherence to the unique and complex regulations that apply to wine businesses. The business plan will include specification of the product, distribution, finance, and marketing. 4 lectures.

WVIT 460. Senior Project - Wine Business. 4 units

Term Typically Offered: F, SP

Prerequisite: Senior standing; WVIT Major; WVIT 343; and one of the following: WVIT 345 or WVIT 450.

Selection and analysis of wine and viticulture business problems and opportunities in directed group-based projects. Problems typical to those that graduates may encounter in marketing and management in the wine and viticulture industry. Formal report and presentation required. 4 lectures.

WVIT 463. Issues, Trends and Careers in the Wine Industry. 2 units

Term Typically Offered: W, SP

Prerequisite: Senior standing; WVIT majors only.

Current issues and trends in viticulture, enology and wine business. Career opportunities and planning for WVIT majors nearing graduation. 2 seminars.

WVIT 464. Senior Project - Enology and Viticulture. 4 units

Term Typically Offered: F, W, SP

Prerequisite: Senior standing; and STAT 218.

Completion of a research proposal and comprehensive literature review, including analysis of experimental results from published peer-reviewed articles in enology and/or viticulture. Written and oral presentations. 4 lectures.

WVIT 465. Senior Project - Research Experience in Enology or Viticulture. 2 units

Term Typically Offered: TBD

Prerequisite: Senior standing; STAT 218; and consent of instructor.

Involvement in the experimental design, execution, data analysis and reporting of research under the direct supervision of faculty. Completion of several critiques of current peer-reviewed journal articles in enology and/or viticulture. Total credit limited to 4 units.

WVIT 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

WVIT 471. Selected Advanced Laboratory. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

WVIT 477. Advanced Wine Sensory Analysis. 4 units

Term Typically Offered: TBD

Prerequisite: WVIT 301; WVIT 442; and at least 18 years in age.

Advanced sensory evaluation of wines. Human physiology and wine chemistry in the interphase of wine sensory analysis. Wine varieties and styles, including selected appellations of Spain, France, Germany, Italy, Chile, Argentina, South Africa, Australia, New Zealand, Canada, and United States. 3 lectures, 1 laboratory.

Women's, Gender and Queer Studies (WGQS)

undefined

WGQS Courses

WGQS 145. Reasoning, Argumentation, and Writing on Gender and Sexuality. 4 units

Term Typically Offered: F, SP, SU

2020-21 or later catalog: GE Area A3

Prerequisite: Completion of GE Area A2 with a grade of C- or better (GE Area A1 for students on the 2019-20 or earlier catalogs). Recommended: Completion of GE Area A1 with a grade of C- or better (GE Area A2 for students on the 2019-20 or earlier catalogs).

Principles of reasoning in argumentation; examination of rhetorical principles and responsible rhetorical behavior; application of these principles to written and oral communication; and effective use of research methods and sources, all in relation to WGQS topics. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Area A3 with a grade of C- or better. Formerly WGS 145.

WGQS 201. Gender and Sexuality in US Society and Politics. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: GE Area D1

2019-20 or earlier catalog: GE Area D1

USCP

Survey and exploration, via intersectional frameworks, of the ways that gender and sexuality have impacted, and been impacted by, US society and politics, from the formation of the US as a settler colonial nation-state into the present day. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as HNRS 204/WGS 201. Fulfills GE Area D1 and USCP.

WGQS 210. Gender and Sexuality in Visual and Popular Culture. 4 units

Term Typically Offered: F, SP

2020-21 or later catalog: GE Area C1

2019-20 or earlier catalog: GE Area C3

Survey and exploration of key developments in visual and popular culture, considered through the lenses of intersectional approaches to gender and sexuality, and examined across multiple mediums and practices including: visual art, film, television, performance, mass media and material culture. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as HNRS/WGQS 210. Fulfills GE Area C1 (GE Area C3 for students on the 2019-20 or earlier catalogs). Formerly WGS 210.

WGQS 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures. Formerly WGS 270.

WGQS 301. Contemporary Issues in Women's and Gender Studies. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and two lower-division courses in GE Area D. Recommended: WGQS 201 (GE Area D1).

Exploration of contemporary issues in local, national, and comparative transnational contexts as addressed within the interdisciplinary field of Women's & Gender Studies, with an emphasis on the complex intersections of gender and sexuality with race, class, and other social factors. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP. Formerly WGS 301.

WGQS 302. Contemporary Issues in Queer Studies. 4 units

Term Typically Offered: W
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5
USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Exploration of contemporary issues as addressed within the interdisciplinary field of Queer Studies, with an emphasis on the relationships between constructions, experiences and expressions of sexuality and interlocking systems of race, ethnicity, religion, class, nation, age, dis/ability and gender in local, national, and transnational contexts. The Class Schedule will list topic selected. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP. Formerly WGS 302.

WGQS 305. Feminist Methodologies. 4 units

Term Typically Offered: TBD
Prerequisite: One course in Women's & Gender Studies; and junior standing.

Examination of feminist critiques of established methodologies in humanities, social sciences, and natural sciences disciplines and exploration and use of feminist methodologies developed both across disciplines and within Women's & Gender Studies. 4 seminars. Formerly WGS 305.

WGQS 311. Sociology of Genders and Sexualities. 4 units

Term Typically Offered: F,W,S,PSU
Prerequisite: Junior standing.

Analysis of social constructions of sex, genders, and sexualities. Explores how gender stereotypes are created and reproduced. Focus on media representations; intersections of gender, race, class, sexuality; and effects on individuals and structures of work, education, family, and abusive relationships. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as SOC/WGQS 311. Formerly WGS 311.

WGQS 320. Women, Gender and Sexuality in Global Perspective. 4 units

Term Typically Offered: TBD
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Examination of women's lives, genders and sexualities in relation to intersecting systems of class, race/ethnicity, religion and nation in comparative cross-cultural contexts. Includes study of global and transnational feminisms, reproductive rights, women's labor, women in development, women's politics. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs). Formerly WGS 320.

WGQS 324. Psychology of Gender. 4 units

Term Typically Offered: W
Prerequisite: PSY 201 or PSY 202.

Investigation of psychological genders and sexualities beyond ideas associated with biological sex. Exploration of sex/gender/sexuality differences from a social psychological (e.g., socialization) perspective. Implications of gender roles (including masculinity, femininity, non-binary) and sexual identities for relationships and health. 4 lectures. Crosslisted as PSY/WGQS 324. Formerly WGS 324.

WGQS 325. Masculinity Studies. 4 units

Term Typically Offered: F, SP, SU
2020-21 or later: Upper-Div GE Area D
2019-20 or earlier catalog: GE Area D5
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Analysis of hegemonic and counter-hegemonic masculinities through a critical, interdisciplinary, and intersectional examination of the social construction of manhood in the U.S. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs). Formerly WGS 325.

WGQS 335. Feminist Studies of Popular Culture and Whiteness. 4 units

Term Typically Offered: W
2020-21 or later: Upper-Div GE Area C
2019-20 or earlier catalog: GE Area C4
Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area C.

Feminist approaches to the analysis of representations of whiteness in contemporary media, and considerations of the U.S. cultural values these images illuminate. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ISLA/WGQS 335. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs). Formerly WGS 335.

WGQS 336. Feminist Ethics, Gender, Sexuality and Society. 4 units

Term Typically Offered: F,W,S,PSU
2020-21 or later: Upper-Div GE Area C
2019-20 or earlier catalog: GE Area C4
USCP
Prerequisite: Junior standing or Philosophy major; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Critical examination of the relations between gender, sexuality, ethnicity, society and ethics from feminist perspectives, with special attention paid to problems in contemporary applied ethics. Joint focus on theory and application. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as PHIL/WGQS 336. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP. Formerly WGS 336.

WGQS 340. Sexuality Studies. 4 units

Term Typically Offered: F, W, SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Sexuality in a cultural and historical context. Changing definitions of human subjectivity. The cultural and social regimes that control and create sexuality (including the 'invention' of homo/heterosexuality and the social, legal and political systems that define sexual ab/normality). Contemporary issues of sexual orientation and topics of sexuality in relation to gender and race. Course may be offered in classroom-based, online, or hybrid format. 4 seminars. Crosslisted as WGQS/HNRS 340. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs). Formerly WGS 340.

WGQS 345. Queer Ethnic Studies. 4 units

Term Typically Offered: F

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Theories, research and methods focused on the interlocking systems of sexuality, race, racialization, and ethnicity in local, national and comparative global/transnational contexts. Relationships between racialization and heteronormativity; queer of color critique; queer migration; decolonizing queer organizing, theory, and knowledge production. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ES/WGQS 345. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs); and USCP. Formerly WGS 345.

WGQS 350. Gender, Race, Culture, Science & Technology. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; completion of GE Area B2; and one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs). Recommended: STAT 130, 217, 218, 251, 301, 312, or 321.

Examines the complex relationships between gender, race, culture, science, and technology via intersectional quantitative and qualitative inquiry, centering the perspectives/contributions of historically marginalized people in the U.S. Explores, evaluates, and develops proposals to create more diverse, equitable, ethical, humane science/technology. Course may be offered in classroom-base, online, or hybrid format. 3 lectures, 1 activity. Crosslisted as ES 350/HNRS 353/WGQS 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog); and USCP. Formerly WGS 350.

WGQS 351. Gender, Race, Class, Nation in Global Engineering, Technology & International Development. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Cross-cultural exploration of the intersections of gender, race, class, nation in the global engineering workforce, small- and large-scale technological systems, and international development programs; special attention to 21st century challenges and efforts to create more socially responsible engineering and technology. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ES/WGQS 351. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs). Formerly WGS 351.

WGQS 370. Religion, Gender, and Society. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2.

Critical examination of religious ideas and institutions in the United States. Focus on interlocking systems of sex, gender, race, class and religion; individual and group experiences at the intersection of religion, politics and culture. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as RELS/WGQS 370. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP. Formerly WGS 370.

WGQS 375. Intersectional Feminist Art Histories. 4 units

Term Typically Offered: TBD

USCP

Prerequisite: Junior standing; and one of the following: ART 112, ART 212, ART 213, or WGQS 201.

Intersectional feminist exploration of the role of women, gender, and sexuality in the visual arts and art history. In-depth focus on intersectional feminisms as they impact the study of the visual arts and art history. Not open to students with credit in ART 316. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as ART/WGQS 375. Fulfills USCP. Formerly WGS 375.

WGQS 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: WGQS 201 or consent of Women's and Gender Studies Chair.

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Formerly WGS 400.

WGQS 401. Seminar in Women's and Gender Studies. 4 units

Term Typically Offered: TBD

Prerequisite: One course in Women's & Gender Studies. Recommended: Junior standing.

Intensive study of a selected topic in Women's and Gender Studies (such as gender and work, gender and the law, sexuality and the arts). The Class Schedule will list topic selected. Field experience may be required as appropriate. May be repeated for up to 8 units. 3 seminars and a supervised research project. Formerly WGS 401.

WGQS 417. Feminist Legal Theory. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Different approaches to US feminist legal theory and topics in gender and US law. Topics covered include employment, domestic violence, sexual harassment, reproductive justice, sex work, rape, and welfare reform. 4 seminars. Crosslisted as POLS/WGQS 417. Formerly WGS 417.

WGQS 421. The History of Prostitution. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Comparative history of prostitution from antiquity to present. Analysis of prostitution from social, cultural, political, gendered and economic perspectives. 4 lectures. Crosslisted as HIST/WGQS 421. Formerly WGS 421.

WGQS 423. Gender and Work. 4 units

Term Typically Offered: F

USCP

Sustainability Focused

Prerequisite: Junior standing; and completion of GE Area A with grades of C- or better.

Extent, causes, and intersectional nature of workplace gender inequality. Strategies aimed at creating more egalitarian organizations. Topics include job segregation, tokenism, sexual harassment, work/family balance, gendered jobs, inequality regimes, personnel policies, workplace democracy, and social/labor movement activism. 4 lectures. Crosslisted as SOC/WGQS 423. Fulfills USCP. Formerly WGS 423.

WGQS 434. American Women's History to 1870. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Female ideology and experience from the colonial period through the American Civil War. Use of a variety of sources, including women's own writing, in order to understand the history of women as it both reflects and shapes American culture and society. 3 lectures and research project. Crosslisted as HIST/WGQS 434. Formerly WGS 434.

WGQS 435. American Women's History from 1870. 4 units

Term Typically Offered: TBD

USCP

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

The female past in the modern period of U.S. history. Considers how transformations in gender roles are reflective of other significant changes in American culture and society. Emphasis on class, race, and ethnic variations in women's experience. 3 lectures and research project. Crosslisted as HIST/WGQS 435. Fulfills USCP. Formerly WGS 435.

WGQS 450. Feminist Theory. 4 units

Term Typically Offered: W

USCP

Prerequisite: WGQS 201.

Advanced critical examination of the history and evolution of ideas in feminist theory. Focus on genders and sexualities in relation to race/ethnicity, religion, class, nation, age, dis/ability, with special attention to relationships between theory and praxis/application. 3 lectures, 1 activity. Fulfills USCP. Formerly WGS 450.

WGQS 455. Queer Theory. 4 units

Term Typically Offered: SP

Prerequisite: One course in Women's & Gender Studies; and junior standing.

Philosophical foundations, intellectual history, and current directions of queer theory, understood as the critical study of sexuality. Intersections among sexuality and other material and discursive systems, including race, ethnicity, class, dis/ability, and nationality. 4 seminars. Formerly WGS 455.

WGQS 457. U.S. Reproductive Politics. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area D1. Recommended: POLS 112.

Multi-disciplinary approach to the study of the law and politics of reproduction in the United States. Topics studied include histories of reproductive regulation, abortion law and politics, technology and fertility, and social policy and reproductive control. 4 seminars. Crosslisted as POLS/WGQS 457. Formerly WGS 457.

WGQS 458. Gender and Sexuality in Modern Europe. 4 units

Term Typically Offered: TBD

Prerequisite: HIST 303 or one upper-division course in GE Area D or graduate standing.

Social, economic, political, and cultural effects of changing gender systems in modern Europe, particularly but not exclusively with regard to sex and sexuality. 3 lectures and research project. Crosslisted as HIST/WGQS 458. Formerly WGS 458.

WGQS 467. Women's and Gender Studies / Queer Studies Internship. 4 units

Term Typically Offered: F,W,SP,SU
CR/NC

Prerequisite: WGQS 201 and consent of WGS/QS Internship Director.

Supervised work experience in approved agency. Intern subject to of the duties/responsibilities of employees engaged in comparable work. Focus on genders, sexualities, independent utilization of WGS/QS concepts.

30 hours of internship experience per unit of credit. Minimum of 4 units (120 hours). Total credit limited to 8 units. Credit/No Credit grading only. Formerly WGS 467.

WGQS 470. Selected Advanced Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures. Formerly WGS 470.

World Languages and Cultures (WLC)

undefined

WLC Courses

WLC 200. Special Problems for Undergraduates. 1 unit

Term Typically Offered: F, W, SP

Prerequisite: Consent of instructor.

Individual investigation, research, studies, or surveys of selected problems at the lower-division level. Total credit limited to 8 units.

WLC 202. Intermediate World Language II. 4 units

Term Typically Offered: W

Prerequisite: WLC 201.

Development of presentational, interpersonal, and interpretive intermediate-level language skills within an intercultural context in a language other than English indicated by subtitle. To be taken in numerical sequence. 4 lectures.

WLC 270. Language Study Abroad. 4 units

Term Typically Offered: F, SU

Prerequisite: Consent of department chair.

Acquisition of language and cultural competencies while studying abroad. Total credit limited to 12 units, with a maximum of 12 units per quarter. 3 lectures, 1 activity.

WLC 290. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics. Open to undergraduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

WLC 307. World Cultures through Film. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2 (GE Area C1 for students on the 2019-20 or earlier catalogs).

Survey and analysis of aesthetic, historical, political, and social themes in twentieth and twenty-first-century cultures as represented in world cinema. Historical, literary, and theoretical readings. The Class Schedule will list topic selected and language of instruction (English or another language). Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

WLC 310. Humanities in World Cultures. 4 units

Term Typically Offered: F,W,SP,SU

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area C.

Interdisciplinary examination of the humanities in a selected culture. Special focus on the arts, literature, philosophy and language in that culture. The Class Schedule will list topic selected. Total credit limited to 12 units with different subtopic. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

WLC 312. Humanities in Chicano/a Culture. 4 units

Term Typically Offered: SP

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

USCP

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one course in GE Area C.

Interdisciplinary examination of humanities in Chicano culture. Special focus on the arts, literature, social situations, and the monolingual and bilingual language aspects in Chicano culture. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs); and USCP.

WLC 315. Critical Issues in Latin American Studies. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

An interdisciplinary approach to selected topics and issues that address how social, economic, political, and cultural forces have shaped the challenges that face contemporary Latin America. Descriptive subtitles assigned to each course. Field trips required. The Class Schedule will list topic selected. Total credit limited to 12 units. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs). Formerly ISLA 315.

WLC 318. Culture of Spain: Activities. 2 units

Term Typically Offered: F, SU

CR/NC

Prerequisite: Limited to Valladolid, Spain Fall program. Corequisite: WLC 310.

Examination and experience of Spanish culture via participant observation in Spain. An introductory exploration of the development of Spanish architecture, art, literature, music, theatre and popular culture as experienced in Valladolid, Spain. Credit/No Credit grading only. 2 activities.

WLC 350. Literatures in World Cultures. 4 units

Term Typically Offered: W

2020-21 or later: Upper-Div GE Area C

2019-20 or earlier catalog: GE Area C4

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and completion of GE Area C2 (GE Area C1 for students on the 2019-20 or earlier catalogs).

Selected works to be read by students in English translation. Critical analysis, interpretation, and comparison of works by authors from diverse world regions taught in their cultural contexts. Course may include film and other media. Discussion in English. The Class Schedule will list topic selected. Course may be offered in classroom-based or online format. Total credit limited to 8 units. 4 lectures. Fulfills GE Upper-Division C (GE Area C4 for students on the 2019-20 or earlier catalogs).

WLC 360. Research Methods in World Languages and Cultures. 4 units

Term Typically Offered: W

Prerequisite: Junior standing; Modern Languages and Literatures major or Spanish major. Recommended: SPAN 233 and SPAN 301.

Methods and techniques of doing research. Critical thinking and library research in languages other than English. Introduction to different senior project formats: scholarly essays, lesson planning, translations, creative works, community-based projects. 4 lectures.

WLC 370. Language, Technology and Society. 4 units

Term Typically Offered: SU

2020-21 or later: Upper-Div GE Area D

2019-20 or earlier catalog: GE Area D5

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; one course in GE Area B4 with a grade of C- or better (GE Area B1 for students on the 2019-20 or earlier catalogs); and one lower-division course in GE Area D.

Focus on ways in which technology impacts language use. Characteristics of social media interactions (texting, Facebook) in different languages (e.g., Spanish, French, German, Chinese) are compared. Special attention given to linguistic diversity and the emergence of multilingual identities on digital platforms. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Upper-Division D (GE Area D5 for students on the 2019-20 or earlier catalogs).

WLC 400. Special Problems for Advanced Undergraduates. 1-4 units

Term Typically Offered: F, W, SP

Prerequisite: Consent of department chair.

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units.

WLC 424. Methods in Teaching Languages Other Than English. 4 units

Term Typically Offered: F

Prerequisite: Admission to the Single Subject Credential Program in World Languages.

The development of objectives, curriculum, material and assessment tools for teaching world languages to a diverse student body in secondary schools. Theoretical and hands-on practice based on the California Standards for the Teaching Profession and state curriculum frameworks. 4 lectures.

WLC 425. World Languages Clinical Experience Seminar. 2 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: Admission to the Single Subject Credential Program in World Languages. Corequisite: Concurrent enrollment in EDUC 469 or EDUC 479.

Principles and practices in effective teaching of world languages at the middle and high school level, learning theories, curriculum content and structure, classroom issues, and the teaching profession. Total credit limited to 4 units. Credit/No Credit grading only. 2 seminars.

WLC 451. Latin American Studies Internship. 4-12 units

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Junior standing.

Supervised work experience in a private, governmental, or non-governmental organization working in Latin America or on a critical issue related to Latin America. Student engagement in all duties and responsibilities of employees and interns engaged in comparable work. 30 hours of work experience per unit of credit. Total credit limited to 12 units. Credit/No Credit grading only.

WLC 460. Senior Project. 4 units

Term Typically Offered: F, W, SP

Prerequisite: WLC 360, advanced composition in primary and/or secondary language, senior standing and consent of instructor.

Selection and completion of a project under faculty mentorship. Projects represent individual, well-defined problems and potential solutions that reflect pertinent scholarly activity in the field of modern languages and literatures, with special emphasis in one of the languages/cultures taught in the department. Total credit limited to 4 units.

WLC 470. Selected Advanced Topics. 4 units

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected and language of instruction. Total credit limited to 8 units. 4 lectures.

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