LUDDY
ENGINEERING
Indiana University

Intelligent Systems Engineering
Graduate Degree Handbook

For the Ph.D., M.S., and Accelerated M.S. Degree

2022 – 2023
Revised March 30, 2022

Luddy Graduate Studies Office
gradvise@indiana.edu

WELCOME

On behalf of the Department of Intelligent Systems Engineering faculty, staff, and students, I sincerely welcome all incoming students to our graduate programs in Intelligent Systems Engineering.

As the first engineering program in the IU's 200 years of history, we are all excited to define and create the future of engineering. During the admission process, your past experiences and performance in your previous academic programs and sometimes full-time positions have impressed us. While you bring your talent and positive vibe to our programs, we will make sure that you receive the best care from the faculty, staff, resources, and the other environments, so that you can shape the future of engineering with us.

Our young and vibrant department is full of exciting opportunities, but it also means that you have too many options to choose from. Please read this handbook carefully, cover to cover, so that you don't miss any critical information that can lead you to an irrevocable result. While we are being flexible about some policies, e.g., choosing the right track and paradigm for you, elective courses, etc., some of the requirements are rigid, for example the compulsory introduction courses to the different tracks.

The path towards a graduate degree will not always be easy, and you may feel lost from time to time. When this happens, please be proactive and reach out so that we can help! The staff in the Luddy Graduate Studies Office is your first point of contact. They can also help direct you to the countless other resources and offices across campus. And please feel free to contact either of us directly when you have concerns, questions, suggestions, or just want to chat. We want you to succeed -- we succeed when you succeed!

Welcome once again. We can't wait to see what you'll accomplish here!

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Director of Graduate Studies
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Patty Reyes-Cooksey
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Luddy Graduate Studies Office

1 ABOUT THIS HANDBOOK

Intelligent Systems Engineering (ISE) offers the Ph.D. (Doctor of Philosophy) in ISE, the M.S. (Master of Science) in ISE and the Accelerated M.S. in ISE. The purpose of this handbook is to provide students pursuing the Ph.D. with an overview of the rules governing the program. The policies and procedures contained in this handbook are subject to change or revision at any time. In any case, where current university policy differs from the following statements, university policy takes precedence.

1.1 LUDDY GRADUATE STUDIES OFFICE CONTACTS AND STAFF

Whenever you need to contact the Luddy Graduate Studies Office, please email us at gradvise@indiana.edu. This office manages all the graduate programs in the school, including those associated with other departments besides Intelligent Systems Engineering. When you email the office, please make sure to include your University ID, your academic program (e.g., PhD in ISE), and your admit term (e.g., Fall 2020).
The office includes:

- Dr. Selma Sabanovic, Associate Dean of Graduate Studies
- Dr. Ariful Azad, Director of Graduate Studies for ISE
- Patricia (Patty) Reyes-Cooksey, Director of Graduate Administration
- Shawn Linn Davenport, Graduate Manager of Admissions & Student Services

1.2 IMPORTANT RESOURCES

Throughout this handbook, you'll see references to the following important websites, forms, and other resources:
• ACM Code of Ethics and Professional Conduct
• Graduate Forms and Resources
• Integrity in Graduate Study: A Graduate School Guide
• Indiana University Code of Student Rights, Responsibilities, and Conduct
• Indiana University Graduate School Bulletin
• Indiana Graduate Student Academic Appointees Guide
• Indiana University Office of International Studies website and contact email: ois@iu.edu
• One.iu.edu website
• University Graduate School (UGS) website

2 OVERVIEW OF GRADUATE STUDIES IN INTELLIGENT SYSTEMS ENGINEERING

The Ph.D. and M.S. in Intelligent Systems Engineering focuses on a modern set of engineering topics, namely those that involve intelligent systems, as realized with embedded computing components combined with sophisticated data interpretation. This program will train students in the practical engineering of systems with an emphasis on hands-on designing, building and simulating systems. Graduates will be prepared with this core set of workforce-aligned skills and will be in high demand for careers in industry, research and academia.

The Ph.D. and M.S. in Intelligent Systems Engineering is an integrated, multidisciplinary program that encompasses the following fundamental features:

- Focus on smaller scale, often mobile, often personal/consumer technologies and devices, as opposed to engineering that involves large-scale infrastructure and addresses massive structures, plants or systems;
- Incorporation of modern information technology approaches including big data, computational modeling, intelligent systems, and user interface design;
- Incorporation of design principles that make use of synergies in hardware and software, possibly guided by implementations observed in living systems; and
- Cross-disciplinary programming that spans science and technology, from informatics and computing, biology, chemistry, physics, psychological and brain sciences, environmental science and health, and other fields.

The Ph.D. and M.S. in Intelligent Systems Engineering follow the policies described in this document. The policies and procedures contained within this handbook are subject to change or revision at any time. In any case where current university policy differs from the following statements, university policy takes precedence.

2.1 AREAS OF STUDIES (TRACKS)

The Ph.D. and M.S. in Intelligent Systems Engineering is offered in six areas: Bioengineering; Computer Engineering; Cyber-Physical Systems; Environmental Engineering; Molecular and Nanoscale Engineering; and Neuroengineering and a general-track of Intelligent Systems.

Bioengineering is a broad field that combines scientific knowledge in the life sciences, computing, and engineering practices to solve problems spanning biology, medicine, environmental remediation, and more. Bioengineering builds on existing IU Bloomington strengths in experimental biology, gene editing, microfluidics, biotransport, biophysics, multiscale computational modeling, and informatics—in order to train the next generation of computing-driven bioengineers.

Computer Engineering relates to building computing systems of various scales or building an Internet of Things (IoT) device. It relates to hardware and low-level software, such as device drivers. Within CE, students can mix and match courses to tailor the program toward building big data or deep learning analysis systems, high performance computing systems or the engineering of specialized computing devices.

Cyber-Physical Systems focuses on systems that interact with the physical world directly in some way. CPS is about the entire system including high-level software. Since it is cyber physical, it often emphasizes small or embedded devices. This includes robotics as well as sensor-rich environments like smart homes, smart cars, and smart cities. In all of these cases, the intelligence comes from computing devices. This track could also focus on bio-sensors.

Environmental Engineering develops a strong foundation of practices and challenges by exploring how engineered systems promote better predictions about water quality, climate, and atmospheric conditions. Environmental Engineering will cover fundamental principles of these and other areas to examine unique challenges and opportunities stemming from data analytics, Internet of Things and modern computing.

Molecular and Nanoscale Engineering integrates concepts from electrical and materials engineering with nanoscience to prepare students to work with cyber-physical systems or other responsive, intelligent systems that include nanoscale building blocks. Modeling and simulation of nanostructured assemblies, functional nanoparticles, and soft nanosystems is an integral part of this emerging field. Students will take courses that train them in both experimental and computational aspects of nanoengineering and can pursue their interest in sensing technologies, energy devices, nanomedicine, materials discovery, and other areas of study.

Neuroengineering is the discipline that studies, enhances, monitors, heals and replicates the nervous system—the principal system of our body that makes us intelligent. Neuroengineers have the unique opportunity to link theories of the mind and application to build intelligent machines and software. Advances in the field will bring about parts for damaged nervous systems, new devices to read brain function, and smart machines to accomplish tasks. As well, microscale devices that couple the nervous systems with physical systems can lead to new cognitive development as well as computations that underlie memory systems.

Intelligent Systems general track focuses on systems that utilize Artificial Intelligence (AI). AI drives the microscopic sensors that make our devices and homes "smart". Intelligent systems also provide advanced health diagnostics, serve as the foundation of self-driving cars, allow facial recognition systems to function, and more. You will learn how to use the tools needed to get the most out of the AI Revolution. Practical courses in data management and large-scale systems will teach you how to engineer systems that use AI to its fullest potential. The general track covers research on any other engineering areas with special focus on applied artificial intelligence.

3 M.S. IN INTELLIGENT SYSTEMS ENGINEERING

3.1 COURSE REQUIREMENTS

The Master of Science in Intelligent Systems Engineering requires a total of 30 credits and a 3.0 GPA upon completion. Students must take 15 credits of graduate level ISE courses (including any joint listed with other university programs). Requirements can also be found in the Luddy Bulletin listed under ISE MS.

Pre-requisites: Students in this program need to have a solid foundation in STEM coursework; specifically, they should have experience in the following:

- Programming language (examples: C++, C, Java, Python);
- Calculus I & II; and
- Statistics

3.1.1 Core Courses (7 credit hours)

Compulsory Course (1 credit hour)
ENGR-E500 Introduction to Intelligent Systems Engineering

Track Introductions (6 credit hours)
Select two courses from the following (one from track focus and the other from track choice)

- E501 Introduction to Computer Engineering
- E502 Introduction to Cyber Physical Systems
- E503 Introduction to Intelligent Systems
- E504 Introduction to Bioengineering
- E505 Introduction to Nano-Engineering
- E506 Introduction to Neuro-Engineering
- E507 Introduction to Environmental Engineering Intelligent Systems

3.1.2 Math Methods (up to 6 credits)

Select two—or contact the GSO for a Math Methods Waiver:

- ENGR-E503 Introduction to Intelligent Systems
- MATH M511/M512 Real Variable I & II
- MATH M513/M514 Complex Variables I & II
- MATH M540/M541 PDEs I & II
- MATH M544/M545 ODEs I & II
- MATH M571/M572 Numerical Methods I & II
- MATH M671/M672 Numerical Differential and Integral Equations I & II
- MATH-M 549 Math Methods for Engineering

3.1.3 Computing Tools (up to 3 credits)

Select from the following or contact the GSO for a Computing Tools Waiver:

- ENGR-E516 Engineering Cloud Computing
- INFO-I590 Topics in Informatics (Topic: Basic Data Science On-Ramp)

- INFO-I 590 Topics in Informatics (Topic: Advanced Data Science On-Ramp)
- CSCI B673 Advanced Scientific Computing

3.1.4 Track Core (6 or more credits)

This core is different for each track and will be satisfied from courses decided upon by the student and their faculty advisor within the student's specialization: computer engineering, cyber-physical systems, bioengineering, molecular and nanoscale-engineering, neuroengineering, environmental engineering, or a generic specialization in Intelligent Systems. The lists of core classes for different tracks are shown below (this list is subject to change).

Bio-Engineering Track Core Classes	
ENGR-E 535	Image Processing for Medical Applications
ENGR-E 537	Rapid Prototyping for Engineers
ENGR-E 540	Computational Methods for 3D Biomaterials
ENGR-E 541	Simulating Cancer as an Intelligent System
ENGR-E 542	Introduction to Computational Bioengineering
ENGR-E 543	Computational Modeling Methods for Virtual Tissues
ENGR-E 544	Computational Tissue Engineering
ENGR-E 545	Wearable sensors
ENGR-E 548	Computational Modeling in Multicellular Systems Biology
ENGR-E 570	Advanced Bioengineering
ENGR-E 571	Microfluidic Devices & Systems
ENGR-E 572	Biomedical Devices & Sensors
ENGR-E 599	Topics in Intelligent Systems Engineering - Biotrack
BIOL-L 586	Cell Biology
BIOL-L 585	Genetics and Bioinformatics
BIOT-T 540	Stucture, Function and Regulation of Biomolecules
INFO-I 519	Introduction to Bioinformatics

Neuro-Engineering Track Core Classes	
ENGR E535	Image Processing for Medical Applications
ENGR-E 599	Functional Neuroimaging
NEUS N500	Neural Science I
NEUS N501	Neural Science II
NEUS N550	Seminar on Sensorimotor Neuroplasticity
NEUS N611	Neural Bases of Visual Sensation, Perception & Cognition
COGS Q551	The Brain and Cognition
COGS Q570	Behavior Based Robotics
COGS Q610	Networks of the Brain
PSY-P 544	Introduction to fMRI Measurement and Analysis
PSY-P 546	Neurophysiological Techniques: Theory and Methods
PHYS-P 582	Biological and Artificial Neural Networks
PHYS-P 583	Signal Processing and Information Theory in Biology

Environmental Engineering Track Core Classes	
ENGR-E 504	Intro to Bioengineering
ENGR-E 571	Microfluidic Devices & Systems
ENGR-E 572	Biomedical Devices & Sensors
ENGR-E 599	Autonomous Robotics
SPEA-E 515	Fundamentals of Air Pollution
SPEA-E 520	Environmental Toxicology
SPEA-E 536	Environmental Chemistry
SPEA-E 537	Environmental Chemistry Lab
SPEA-E 552	Environmental Engineering
SPEA-E 555	Topics in Environmental Sciences: Fluid Mechanics
SPEA E 574	Energy Systems

Cyber Physical Systems Track Core Classes	
ENGR-E 512	Advanced Computer Architecture
ENGR-E 513	Engineering Compilers
ENGR-E 514	Embedded Systems
ENGR-E 515	Digital Design with FPGA's
ENGR-E 522	HPC and Cloud Computing for Large Scale Image Applications
ENGR-E 523	Internet of Things
ENGR-E 525	Robotics I
ENGR-E 526	Robotics II
ENGR-E 533	Deep Learning Systems
ENGR-E 537	Rapid Prototyping for Engineers
ENGR-E 545	Wearable sensors
ENGR-E 621	Software Defined Systems
ENGR-E 623	Applied Streaming Data Systems
ENGR-E 599	Autonomous Robotics

Nano Engineering Track Core Classes	
ENGR-E 537	Rapid Prototyping for Engineers
ENGR-E 545	Wearable sensors
ENGR-E 551	Simulating Nanoscale Systems
ENGR-E 571	Microfluidic Devices & Systems
ENGR-E 572	Biomedical Devices & Sensors
CHEM-M 501	Chemical Fundamentals of Materials I
CHEM-M 502	Chemical Fundamentals of Materials II
CHEM-C 567	Chemical Statistical Mechanics
CHEM-C 616	Surface Analysis and Surface Chemistry
PHYS-P 609	Computational Physics
PHYS-P 560	Modern Optics
PHYS-P 575	Introduction to Biophysics

Computer Engineering Track Core Classes	
ENGR-E 510	Engineering Distributed Systems
ENGR-E 512	Advanced Computer Architecture
ENGR-E 513	Engineering Compilers
ENGR-E 514	Embedded Systems
ENGR-E 515	Digital Design with FPGA's
ENGR-E 516	Engineering Cloud Computing
ENGR-E 517	High Performance Computing
ENGR-E 518	Engineering Networks
ENGR-E 519	Engineering Operating Systems
ENGR-E 533	Deep Learning Systems
ENGR-E 534	Big Data Applications
ENGR-E 536	High Performance Graph Analytics
ENGR-E 599	AI Architectures
ENGR-E 621	Software Defined Systems

Intelligent Systems Track Core Classes	
ENGR-E 511	Machine Learning for Signal Processing
ENGR-E 522	HPC and Cloud Computing for Large Scale Image Applications
ENGR-E 523	Internet of Things
ENGR-E 525	Robotics I
ENGR-E 526	Robotics II
ENGR-E 531	Physical Optimization
ENGR-E 532	Systems Engineering
ENGR-E 533	Deep Learning Systems
ENGR-E 534	Big Data Applications
ENGR-E 535	Image Processing for Medical Applications
ENGR-E 536	High Performance Graph Analytics
ENGR-E 583	Information Visualization
ENGR-E 584	Scientific Visualization
ENGR-E 599	AI Architectures
ENGR-E 599	Deep Learning Application: AI-First Engineering

3.2 PARADIGMS/ENGINEERING ELECTIVES (UP TO 10 CREDITS)

Upon admission to the program, students must choose a paradigm for their studies: coursework, internship, project, and/or research.

The remaining credit hours can be selected from additional ISE course offerings. In consultation with an ISE advisor, students may choose to pursue an independent study or relevant internship opportunity to complete their paradigm.

- **Coursework:** Students may choose to complete the 30 credit degree requirement with coursework
- **Internship:** May include 1-3 credit hours of ENGR-E 591 Graduate Internship. The number of credit hours approved for this requirement is dependent on time and length of internship. The internship must be academically related to the program of study. Due to visa regulations, international students must receive approval from the Office of International Studies for off-campus internships, and restrictions on the timing of these internships apply.
- **Thesis or Project:** May include a maximum of 6 credit hours of the following:
  - ENGR-E 687 Graduate Independent Studies in Intelligent Systems Engineering
  - ENGR-E 788 Master's Thesis. Students need to work with an advisor towards their thesis.

3.3 TRANSFER OF CREDIT

A maximum of 8 graduate level credits from other universities and used to satisfy the 30 credit requirement with the permission of the advisor. These courses may not have been used to meet the requirements for another degree, and must have been completed with a grade of "B" (3.0) or better

4 ACCELERATED M.S. IN INTELLIGENT SYSTEMS ENGINEERING

The Master of Science in Intelligent Systems Engineering requires a total of 30 credits and a 3.0 GPA upon completion. Students must take 15 credits of graduate level ISE courses (including any joint listed with other university programs).
Students accepted into the accelerated program can use 12 credits of graduate courses on both their Bachelor's and their Master's plans of study. These courses must satisfy both degree requirements.

Pre-requisites: Students in this program need to have a solid foundation in STEM coursework; specifically, they should have experience in the following:

- Programming language (examples: C++, C, Java, Python);
- Calculus I & II; and
- Statistics.

The accelerated program allows you to take 12 graduate level credits that may be used towards your undergraduate requirements. With this approach, once you complete your undergraduate degree, you will only need 18 credits to earn a master's degree, which can be completed in one year. Students apply for the program during their junior year and are eligible for ISE graduate courses during their junior and senior years.

Application Requirements
Students in the program are classified as undergraduates until the end of the first semester in which 120 or more hours of credit toward graduation have been earned. Students need to begin graduate level courses while in undergraduate status; otherwise, the program may not be completed in five years. Students should consult with their advisor regarding appropriate graduate level courses. Permission to enroll in graduate level courses must be obtained from the course instructor or your advisor.

Academic Requirements
Students in the program must complete the same 30 credit hours and courses requirements as the ISE M.S. degree.

5 OVERVIEW OF PH.D. IN INTELLIGENT SYSTEMS ENGINEERING

A total of 90 credit hours of graduate-level (500+) coursework is required. Any course listed in the ISE program in the Indiana University Graduate School Bulletin that carries graduate credit counts toward this requirement. Relevant courses from other departments can also be used toward this requirement. Only grades of C, C+, B-, B, B+, A-, A, and A+ count towards the 90 credit requirement. The distribution of credit hours is as follows:

- at least 24 credits to fulfill the requirements of the ISE major;
- at least 6-12 credits to fulfill the requirements of the University Ph.D. minor; and
- the remaining credits can be received from regular graduate courses, independent studies, and research related to the student's major.

In addition to fulfilling the course requirements, a PhD students must pass a PhD qualifying exam, propose a dissertation and defend the dissertation.

5.1 PH.D. MAJOR REQUIREMENTS

The major is to be chosen in one of the six defined ISE tracks in Bioengineering, Computer Engineering, Cyber Physical Systems, Environmental Engineering, Molecular and Nanoscale Engineering, and Neuroengineering or in general Intelligent Systems Engineering. The major requires 24 credits and includes:

- E500 (1 credits)
- One of E501-507 (3 credits)
- 9 credits of relevance to major (see the list below to select these classes). Independent studies cannot be used to fulfill this requirement.
- The remaining 11 credits may be any ISE courses at or above the 500 level. This may include independent study (E687) courses, for example.

If a student has taken graduate-level courses elsewhere, for example during an M.S. program, it is possible that some of those credits may be transferred to IU and count towards the Ph.D. requirements.

List of courses for different majors: The following list provides core classes for different ISE majors. A student needs to take at least three classes in her major tracks. If a student needs to use courses outside of this list to fulfill her major requirements of 9 credits, she will need an approval from the director of graduate studies.

Major	Courses (select at least 3 courses based on your major)
Bioengineering	BIOL-L 585, BIOL-L 586, BIOT-T 540, ENGR-E 535, ENGR-E 537, ENGR-E 540, ENGR-E 541, ENGR-E 542, ENGR-E 543, ENGR-E 545, ENGR-E 548, ENGR-E 570, ENGR-E 571, ENGR-E 572, ENGR-E 599 (related to Bioengineering), INFO-I 519
Computer Engineering	ENGR-E 510, ENGR-E 512, ENGR-E 513, ENGR-E 514, ENGR-E 515, ENGR-E 516, ENGR-E 517, ENGR-E 518, ENGR-E 519, ENGR-E 533, ENGR-E 536, ENGR-E 599 (related to Computer Engineering), ENGR-E 621
Cyber-Physical Systems	ENGR-E 512, ENGR-E 513, ENGR-E 514, ENGR-E 515, ENGR-E 522, ENGR-E 523, ENGR-E 525, ENGR-E 526, ENGR-E 533, ENGR-E 537,

	ENGR-E 545, ENGR-E 621, ENGR-E 623, ENGR-E 599 (related to Cyber-Physical Systems)
Environmental Engineering	ENGR-E 504, ENGR-E 571, ENGR-E 572, ENGR-E 599, SPEA-E 515, SPEA-E 520, SPEA-E 536, SPEA-E 537, SPEA-E 552, SPEA-E 555, SPEA E 574
Molecular and Nanoscale Engineering	ENGR-E 537, ENGR-E 545, ENGR-E 551, ENGR-E 571, ENGR-E 572, ENGR-E 599, CHEM-M 501, CHEM-M 502, CHEM-C 567, CHEM-C 616, PHYS-P 609, PHYS-P 560, PHYS-P 575
Neuroengineering	ENGR E535, ENGR-E 599, NEUS N500, NEUS N501, NEUS N550, NEUS N611, COGS Q551, COGS Q570, COGS Q610, PSY-P 544, PSY-P 546, PHYS-P 582, PHYS-P 583
General Intelligent Systems Engineering	ENGR-E 511, ENGR-E 522, ENGR-E 523, ENGR-E 525, ENGR-E 526, ENGR-E 531, ENGR-E 532, ENGR-E 533, ENGR-E 534, ENGR-E 535, ENGR-E 536, ENGR-E 583, ENGR-E 584, ENGR-E 599. Courses from other track can also be included if the courses are related to intelligent systems or artificial intelligence.

5.2 PH.D. MINOR REQUIREMENTS

The Ph.D. requires a minor, and three possible options are available to satisfy this requirement:

5.2.1 External Minor (credits vary)

An external minor is one that is awarded by another Indiana University department or graduate program. The credit hours required *vary* depending on the graduate program offering the minor. Please consult the UGS Bulletin to know the requirements of your selected minor area.

5.2.2 Internal Minor (9 credits)

A student can minor in an ISE track that is not selected as a major track. For example, a student majoring in Computer Engineering can minor in Bioengineering. An internal minor in ISE consists of 9 credits in courses other than an independent study and in an area other than the student's specialization. Please consult the UGS Bulletin to know the requirements of your selected minor. In some cases, you can substitute a class in your ISE minor area by another ISE class. An approval is required to justify such as substitution.

5.3 COURSE SUBSTITUTIONS

The Ph.D. course requirements are rigidly enforced by the University Graduate School and cannot be waived or modified by the Department. If a student would like to count a course that does not exactly match the requirements, e.g., counting a CSCI course towards an internal minor in ISE, the student must first file a Course Substitution Request via the One.IU webpage. Course Substitution Requests are reviewed by the Director of Graduate Studies and the University Graduate School, and are only approved when the content of the course is very similar to or more advanced than the content of the required course. For example, a CSCI topics course on machine learning may be sufficiently similar to an ENGR topics course on machine learning. When submitting the Course Substitution Request form, students must identify the course that they took, the ENGR course they would like that course to count as, and a justification for why the substitution is appropriate. A

justification typically consists of evidence that the two courses are or have been cross-listed in the past, a copy of the syllabus for each class, and/or emails from the ENGR course instructor indicating that they have reviewed the syllabus for the course and agree that the content is similar.

6 MILESTONES AND TIMELINES FOR PH.D. IN ISE

All Ph.D. students must accomplish specific milestones to satisfy the requirements of the degree. Each student will be evaluated by the full ISE faculty during the annual Graduate Evaluation Day (GED), typically in October or November, on their progress in terms of milestones, course grades, and Student Academic Appointment (SAA) performance. Students whose progress in the program is less than satisfactory will be required to provide an action plan to the Director of Graduate Administration addressing the problems that have caused the delay and/or unsatisfactory performance.

6.1 FORM THE ADVISORY COMMITTEE

Each doctoral student is responsible for forming an Advisory Committee (AC) by the end of their first year. This committee will administer the Qualifying Examination and must consist of three faculty members: one from the major area to serve as Chair, one from the minor area, and one additional member from an area related to the major. Typically, the advisory committee is chaired by the student's advisor. At least two members must be members of the graduate faculty, and at least one member must be in ISE.

To form your Advisory Committee:

- Identify a faculty member that will serve as the chair of the Advisory Committee. Usually, the chair is from ISE. However, if your advisor is in another department within the Luddy School of Informatics, Computing, and Engineering, he or she can server as the chair of the Advisory Committee.
- Identify two additional faculty members to serve on the Advisory Committee, one from the minor area and one from an area related to your major area.
- At least one member must be ISE.
- Contact each member with a request to serve on the committee; and
- Submit completed Advisory Committee Form e-form to the Luddy Graduate Studies Office.

6.1.1 Changing the Advisory Committee

Sometimes an AC member needs to be replaced. A committee change can be requested by submitting a new Advisory Committee Form to the Luddy Graduate Studies Office. All members of the new committee must consent to this change. Although approval of the old committee is not needed, the faculty members leaving the committee should be consulted as a professional courtesy.

6.2 QUALIFYING EXAMINATION

The qualifying exam is a milestone in a student's Ph.D. studies. The qualifying exam is an opportunity for a student to demonstrate grounded, original thinking, thereby demonstrating their readiness and aptitude for Ph.D.-level research. The exam will consist of a written and an oral component.

The qualifying exam is generally taken by end of the second year or during the third year of a student's Ph.D. studies, though an earlier undertaking is possible with approval from the student's Ph.D. Advisory Committee. The Ph.D. Advisory Committee should consist of at least three members of the

IU Graduate Faculty, and be chaired by the student's advisor. At least one faculty in the advisory committee must be from ISE, and a member should represent the minor. Other members of the advisory committee can be any IU Graduate Faculty within or outside of ISE. The exam will be taken after all required coursework has been completed, or during the final semester of a student's completion of their coursework subject to approval by the Ph.D. Advisory Committee. Only students in good standing (grade point average of 3.0 or above and grade of B- or better in research-related coursework) are allowed to take the exam. A student must have attempted the qualifying exam by the first semester of their 4th year of Ph.D. studies to remain in good standing in the program.

The terms outlined here apply to students entering the ISE Ph.D. program Fall 2020 and is in effect until superceded. Students admitted to the ISE Ph.D. program before Fall 2020 can be assessed under this policy by notifying their advisor and the ISE Director of Graduate Studies (DGS) in writing.

6.2.1 Written Examination

The written portion of the exam shall be undertaken only after the student's Ph.D. Advisory Committee approves the undertaking. The student shall contact the committee to request information about the specific subject area, research questions, the format of the expected document, and the specifics. The committee shall provide this information within two weeks of a request, and no fewer than three months before the expected exam date.

There are two types of written exam styles under this policy, the Survey Report Style and the Research Paper Style. It is wholy the committee's discretion as to which of the two styles best suits the student. The styles include:

- Survey Report Style: The written document should be a detailed report of the student's own literature review on the subject area defined by the committee. The literature review includes the act of synthesizing knowledge across a set of readings. The report will demonstrate in writing a student's knowledge and intellectual comprehension of the subject area, its goals and challenges, and rigorously draw upon related literature in their field. The committee should discuss the length and the style of the report and inform the student of the format requirements. The committee can also require that important materials in the literature be included in this survey.
- Research Paper Style: This option is for students who have already demonstrated rigorous intellectually-innovative thinking through being a lead or (co-lead) author on a published article in a peer reviewed conference proceeding or journal article, or a submission-ready manuscript for a journal. In this option, the written document should be a report that summarizes the research work. The committee may require the report to additionally address specific research questions posed by the advisory committee. The report should also contain a literature review that explicitly contrasts the student's own research against the literature.

Other exam types are possible under special circumstances, and require pre-approval from DGS and the Department Chair. Students are advised to communicate with their advisor and the committee, so that they can prepare for the exam properly and timely. The advisor will work with the student to ensure all relevant academic norms are followed prior to submitting the written portion to the remainder of the committee. If the student is doing a Dual Major, they must fulfill the requirements of both majors.

6.2.2 Oral Examination

The oral portion of the examination cannot be scheduled until at least two weeks after the submission of the written portion. For the oral exam, the student will prepare a scholarly talk covering the written document. The student shall present this talk to the student's PhD Advisory Committee; the talk duration is at the discretion of the committee. The committee then asks questions relevant to the details of the scholarly work or the area of study in question (such a presentation may be open to the public, who can also ask questions as time and committee allows).

6.2.3 Possible Outcomes of The Exam

At each step of the process (announcement of topic and research questions, written exam, oral exam), the student's PhD Advisory Committee may require changes. After the oral examination, the committee will evaluate the student, and grade them as PASS, FAIL, or CONDITIONAL PASS. CONDITIONAL PASS is appropriate when certain defects need to be fixed, but the overall results were otherwise satisfactory. Some of these fixes may be proforma and need to be certified only by the advisor, and some may require a resubmission to the full committee, as required by the committee.

6.2.4 Failure Policy

If the student fails to pass the written or oral qualifier exam, they may have the opportunity to exit the program with an M.S. in ISE.

A student failing the QE will receive detailed feedback from the student's PhD Advisory Committee at a level of detail sufficient to allow the student to assess the work that would be required to pass so that they can determine if they wish to sit for a second examination at a later date. The committee may change the topics and style of the exam for the second attempt if it is deemed necessary.

A student can sit for at most two qualifying exams. In extraordinary cases, a student who fails twice can petition the DGS for the chance to sit for a third and final exam. This written petition must include a letter of explanation from both the student and advisor, and it must be unanimously approved by the student's PhD Advisory Committee, and forwarded to the DGS and chair of the Department for approval.

6.2.5 Scheduling the Exam

When the written exam is given, the student is required to submit the Qualifying Exam Scheduling Form clearly indicating the date on which the student received the exam questions and the date before which the student is scheduled to submit the written answers. This form must be signed by the Chair of the Advisory Committee and submitted to the Luddy Graduate Studies Office. If the exact date of the oral exam cannot be determined at the time when the written exam is given, leave the "Scheduled Date of The Exam" field blank. The student is responsible for submitting Luddy Graduate Studies Office with the date of the oral exam.

6.2.6 The Post Exam Form

After the exam is complete, the student submits the Post Qualifying Examination form to Luddy Graduate Studies Office. The form should clearly indicate the exam outcome with "pass" or "fail". The members of the advisory committee will approve the form after it is submitted by the student. The outcome of the exam becomes official once the Director of Graduate Studies has reviewed the exam to ensure that the qualifying exam requirements have been satisfied.

6.2.7 Summary of Steps to Take the Qualifying Exam

- Discuss the exam with your Advisory Committee Chair. Your Chair will consult with the rest of the Advisory Committee and prepare your exam.
- Complete the Qualifying Exam Scheduling Form and submit it to the Luddy Graduate Studies Office.
- Take the exam.
- Submit the Post Qualifying Examination Form after the oral exam.
- If you fail the exam, discuss the outcome and how to re-take the exam with your committee and/or the DGS.

6.3 NOMINATION TO CANDIDACY (NTC)

After passing the Qualifying Examination and completing all coursework required by the ISE program (including the core courses and the minor), the student should apply for Candidacy by submitting the Nomination of Candidacy e-doc via the One.IU webpage. Granting Candidacy is an important step in the progress of Ph.D. studies, and so the Candidacy application is checked thoroughly by multiple offices including the Luddy Graduate Studies Office, the DGS, the Advisory Committee, and the University Graduate School. These checks ensure that the course requirements have been satisfied, that the GPA requirements are met, and that the qualifying exam has been given and passed properly. **This process often takes several weeks, and students should monitor the status of the e-doc, and remind faculty on the Committee to approve it, until receiving final approval from UGS.** It is important that the Candidacy application is properly filled out; mistakes can lead to delays of weeks or months because the e-doc will have to be returned to you for correction and then re-approved by all the offices. Students can find a reference guide on the Nomination of Candidacy on the UGS website.

The e-doc requires students to attach a document indicating which courses they have completed and how those courses satisfy the Major and Minor requirements. Note that these requirements are rigidly enforced by UGS; deviations are typically only permitted if a Course Substitution Request has been already filed and approved (see Course Substitutions, above).

Follow the steps to file for candidacy:

- Consult the reference guide on the Nomination of Candidacy on the UGS website.
- Check your transcript to make sure you have received grades for all courses. If you have any grades of incomplete (I) or deferred (R), contact the instructor to determine how to complete the course requirements and receive a grade.
- Make sure you have completed the Major and Minor course requirements. Submit the Course Substitution Request form, if needed. You must wait for the substitution to be approved before submitting the Nomination of Candidacy form.
- Prepare the Course List document, indicating which courses you have taken and how they satisfy the requirements of the Major and Minor). You should list **all** courses you have taken that you plan to count towards the 90-credit Ph.D. requirements, not just the ones that satisfy Major and Minor requirements.
- Fill out and submit Nomination of Candidacy e-doc via the One.IU webpage. Make sure to follow the instructions very carefully.

- After submission, make sure to monitor the routing history of the e-doc. If you notice that it has been waiting for approval with a particular faculty member for a while (e.g., more than a week), remind them to review your application.

The Ph.D. Advisory Committee should consist of at least three members of the IU Graduate Faculty, and be chaired by the student's advisor. At least one faculty in the advisory committee must be from ISE, and a member should represent the minor. Other members of the advisory committee can be any IU Graduate Faculty within or outside of ISE.

6.4 NOMINATION OF RESEARCH COMMITTEE (NOR)

After the Nomination to Candidacy Committee e-doc is approved, and at least six months *before* the Defense of the Dissertation, the student should form the Research Committee. Typically, the Research Committee consists of the Advisory Committee plus one additional faculty member. The membership of the Committee must satisfy a number of requirements.

- There must be at least four members: the Committee Chair, a representative of each minor, and two or more additional faculty members.
- At least one member of the committee must be in ISE
- Typically, the Chair and the two additional faculty members are from ISE, but other graduate faculty are eligible.
- At least four members must be on the University Graduate School faculty. Typically, this means faculty with the titles Assistant Professor, Associate Professor, or Professor.
- The Chair and at least half of the committee members must be endorsed members of the Graduate School faculty; a list of endorsed members is published on the UGS website.
- External members (e.g., faculty at other universities or researchers in industry) may serve as additional members of the committee, but there still must be four IU faculty satisfying the requirements above.

The Nomination of Research Committee (NoR) e-doc is submitted online via the One.IU webpage. This form must be electronically approved by each of the Research Committee members, as well as by the Graduate School. **This process often takes several weeks, and students should monitor the status of the e-doc, including reminding faculty on the Committee to approve it, until receiving final approval from UGS. Note that the Defense may not take place until the NoR form is approved by UGS (not when it is submitted).**

Follow the steps to create your Research Committee:

- Discuss Research Committee membership with your advisor. Ensure that the Committee would satisfy the requirements above.
- Contact each potential Committee member to ask if they are willing to serve.
- Prepare the Dissertation Prospectus that is required by the NoR form. This is typically a 1-2 page draft abstract of your dissertation research. Request feedback on your prospectus from your advisor.
- Submit the Nomination of Research Committee (NoR) e-doc via the One.IU webpage.

- After submission, make sure to monitor the routing history of the e-doc. If you notice that it has been waiting for approval with a particular faculty member for a while (e.g., more than a week), remind them to review your application.

6.5 THESIS PROPOSAL

The thesis proposal is submitted and defended *after* the completion of the Qualifying Examination, after Nomination to Candidacy, and after the Nomination of Research Committee. It consists of a written research plan for the Dissertation, followed by an oral presentation to the Research Committee. Students should consult with their Research Committee Chair about the exact form of the proposal document and presentation. Typically, the thesis proposal is a detailed document that describes the student's proposed dissertation research, including introducing the topic, motivating why it is important, describing existing work and how the research would be different, summarizing the student's research progress so far, and describing the plan for the remainder of the dissertation research. Typically, the oral exam is a 45-minute presentation to the Research Committee that summarizes the proposal document, followed by questioning and discussion with the Committee.

Upon finishing the Thesis Proposal, the completed Dissertation Proposal form, with "pass" or "fail" clearly marked must be submitted by the student to the Luddy Graduate Studies Office. If failed, the Thesis Proposal may be attempted again with the consent of the Research Committee.

To prepare and defend your Thesis Proposal:

- Discuss the format and expectations of the proposal document and oral exam with your Research Committee Chair.
- Prepare the Thesis Proposal written document.
- Submit your written document to the Research Committee, and arrange a time with them for the oral exam. Typically, committees will require your written document to be submitted several weeks before the oral exam.
- Immediately after the oral exam, complete the Dissertation Proposal form, and then submit it to the Luddy Graduate Studies Office.

6.6 DISSERTATION AND FINAL DEFENSE

The culmination of the Ph.D. program is the writing of the dissertation, which is required of all doctoral students. The dissertation must be an original contribution to knowledge and of high scholarly merit. The candidate's research must reveal critical ability and powers of imagination and synthesis. The dissertation is written under the supervision of the student's research committee.

6.6.1 Scheduling the Final Dissertation Defense

At least 40 days before the planned date of the Dissertation Defense, the student must submit the Ph.D. Announcement form via the One.IU webpage. Students should monitor the status of this e-doc, including reminding faculty on the Committee to approve it, until final approval from UGS. UGS approval must be obtained at least 30 days before the Dissertation Defense. The Luddy Graduate Studies Office will then formally announce the Defense to the entire School via email. The announcement contains, among other things, a summary of the dissertation (not less than 150 words) which is informative and contains a brief statement of the principal results and conclusions. The

announcement must be approved by the research committee chairperson. If the candidate has published any scholarly articles relevant to the topic of the dissertation, bibliographical references should be included in the summary. A copy of such announcements will be sent to any member of the graduate faculty upon request.

Once the final examination has been scheduled, the announced time and place of the defense **must not be changed without the approval of the dean.** Any member of the graduate faculty who wishes to attend the final examination is encouraged to do so; it is requested, however, that the faculty member notify the chairperson of the research committee in advance so that space can be arranged. With the approval of the research committee and the consent of the candidate, other graduate students may attend the defense of the dissertation; normally such students will act as observers, not as participants.

It is extremely important that the Announcement form is approved by UGS and the Defense is announced at least 30 days before the Defense. A Defense may not be considered valid by the University if it is not conducted according to this policy.

To schedule your Final Dissertation Defense:

- Discuss with your Research Committee Chair about an appropriate timing for the Defense. Typically, students do not schedule their Defense until they have a mature draft of their Dissertation. Many Committees require a final written draft of the Dissertation to be submitted for their review at least one month before the Defense.
- At least 40 days before the planned Defense date, submit the Ph.D. Announcement form via the One.IU webpage.
- Make sure to monitor the routing history of the e-doc. If you notice that it has been waiting for approval with a particular faculty member for a while, remind them to review it because the form must be approved by the Committee and UGS at least 30 days before your Defense. **It is your responsibility to make sure this happens.**

6.6.2 Dissertation Defense

A written elaboration of significant original research must be successfully presented to the Research Committee in a Defense of Dissertation as described in the Graduate School Bulletin. An Oral Defense meeting, open to the public, is required. Any member of the Graduate Faculty may attend the Defense. The Defense must be at least 30 days after the formal Announcement of Final Dissertation Defense is approved by UGS, and at least six months after the date that the Nomination of Research Committee is *approved* by the Graduate School (not when the NoR form is submitted). Students should discuss the expectations for the Defense with their Committee and Committee Chair. Typically, the Defense is a 45-60 minute presentation, followed by questions from the public, and then followed by a closed session in which the Committee questions the student.

All members of the committee are expected to patriciate in the student defense. If a member of the committee is unable to participate in person, an email from the member must be sent to the DGS and University Graduate School. The email should explain how the committee member will participate in the defense off-site (typically via videoconference) and why he or she is unable to participate in person. Upon finishing the Oral Defense, submit the Defence Signature edoc via the One.IU webpage.

To Defend your Dissertation:

- Discuss the expectations for the Defense presentation with your Committee Chair.
- Send a complete draft of your Dissertation to the Research Committee far ahead of the Defense, typically at least one month.
- Prepare and present the Defense.
- Ask the Research Committee to complete the submit the Defence Signature edoc via the One.IU webpage.

6.6.3 Submit Dissertation

Following a successful Defense, the student should revise the Dissertation following the instructions of the Research Committee and receive approval from the committee before submitting the Dissertation to the UGS. Typically, the Dissertation is completed and submitted within about two months, but it **must** be submitted within 6 months of the Defense and within 7 years from the date of passing the Oral Qualifying Examination. **These are hard deadlines. It is important to submit the Dissertation as early as possible so that unforeseen delays do not cause students to miss these deadlines.** Students must maintain active student status (e.g., by enrolling in G901 or ENGR-E890) until the Dissertation is submitted. For more information, please review the UGS website.

Note that UGS currently requires two copies of the Dissertation signature page **and** two copies of the Dissertation Abstract to be signed by all committee members **in original pen (not electronically).** Students should plan ahead about how to obtain these signatures, since the forms will likely have to be sent via physical mail to Committee members who are not in town.

6.7 APPLICATION FOR GRADUATION

The Ph.D. degree is conferred by the University Graduate School (UGS). The Dissertation in its final form and the Abstract must be submitted to UGS at least 30 days *before* the expected date of degree conferral. Students who intend to participate in the Commencement are required to fill out a graduation application e-doc, which is available at the University Graduate School webpage. Diplomas are mailed by the Office of the Registrar two to three months *after* the degree is conferred. It is the student's responsibility to verify that the Office of the Registrar has the proper mailing address on file. For more information, please review the UGS website.

6.8 DOUBLE MAJORING

Students may pursue two majors in two departments simultaneously, if so recommended by each department and approved by the Dean. Two general requirements pertain to double majors: (1) there must be a substantive relationship between the two major fields, particularly with respect to the topic of the student's Dissertation; and (2) all degree requirements for each major must be fulfilled, including the passing of two sets of Qualifying Examinations. In some instances, it may be possible to count the same work toward requirements in both departments (e.g., a specific foreign language acceptable in both programs). The exact courses of study and examinations required are to be determined by members of the Research Committee from each of the majors. Any area of substantial overlap in the two courses of study or in the examinations is to be negotiated by the committee as a whole and approved by the Dean.

There must be at least four faculty members on both the Advisory and Research Committees for a double major, with two from each of the majors. If other minor fields are involved, a representative must also be present from each of these areas.

A total of 90 credit hours is required for the Ph.D. degree with a double major. While judicious program planning may permit completion of some double majors within the 90 credit hours, other students may accrue additional hours due to the program of study required for each major. In recognition of such a possibility, students in the program will be allowed one additional year before they must take the Qualifying Examination. For a complete set of rules relating to Double Majors, students should consult the Luddy Graduate Studies Office.

6.9 REVALIDATION

Normally, no course may be counted toward degree requirements if it was completed more than seven years prior to the passing of the Qualifying Examination. However, the student's advisor, after consultation with the Advisory Committee, may recommend to the DGS that coursework taken prior to the above deadline be revalidated if it can be demonstrated that the knowledge of the course(s) remains current. Knowledge of coursework may be demonstrated by: (a) passing an examination specifically on the material covered by the course; (b) passing a more advanced course in the same subject area; (c) passing a comprehensive examination in which the student demonstrates substantial knowledge of the content of the course; (d) teaching a comparable course; or (e) publishing scholarly research demonstrating substantial knowledge of the content and fundamental principles of the course.
Each course for which consideration for revalidation is being requested should be justified separately. If the Qualifying Examination is used for the purpose of revalidation, the number of courses to be revalidated by this method should be limited to two in order to avoid compromising the integrity of the Qualifying Examination process.

6.10 GRADUATE EVALUATION DAY (GED)

The full ISE faculty meet each Fall to review and evaluate the progress of each Ph.D. student, during Graduate Evaluation Day. In preparation, the DGS and Luddy Graduate Studies Office evaluate the academic records of all students in the ISE Ph.D. program. As part of the evaluation process, students are required to complete and submit an online student self-evaluation. The form asks students to indicate:

- Completed academic milestones;
- Research progress, including results, writing, thesis proposal, independent study courses, conference papers and presentations, journal papers, etc.;
- Progress on program requirements, including courses taken, performance in courses, qualifying exams, thesis proposal, minor, etc.;
- Teaching, including course responsibilities, performance, student evaluations, course development, the independent teaching of courses, etc.; and
- Public service, including helping to organize events, activity in student organizations, help in departmental administration, etc.

In addition, the Luddy Graduate Studies Office collects evaluations from faculty members about the students they have advised, supervised, taught, or otherwise interacted with. During GED, the entire

ISE faculty review and discuss the progress of each Ph.D. student. After review, students will receive a letter from the Luddy Graduate Studies Office with faculty assessment, recommendations, and/or requirements. It is very important that you read this letter carefully. The letter may contain specific, time-sensitive requirements that you must complete in order to maintain your funding and/or standing in the program.

6.11 OBTAINING AN MS WHILE PURSING THE ISE PH.D.

ISE usually does not allow Ph.D. students to obtain the M.S. degree "along the way". This is only approved case-by-case basis. If a Ph.D. student decides to leave the problem, he or she may apply for an MS degree.

7 ACADEMIC POLICIES & PROCEDURES

7.1 STUDENT SERVICES

The Luddy Graduate Studies Office is the point of contact for graduate student services. Please email gradvise@indiana.edu for assistance. Make sure to include your full name, program, and admit year in the body of the email.

7.2 REGISTERING FOR, ADDING, AND DROPPING COURSES

Newly admitted students will receive information about course registration during orientation. The timetable for course registration, as well as for adding and dropping courses, is set by the University and published in the Official Academic Calendar. All students are responsible for becoming familiar with the policies, procedures, and deadlines of the Office of the Registrar and the Office of the Bursar. The Office of the Registrar assists students with a variety of services relating to registration, immunization, residency and more. Students should become familiar with calendars, schedules, policies, and other student-related information that the Registrar maintains.

7.3 REGISTRATION REQUIREMENTS DURING PROGRAM OF STUDIES

Unless permission has been granted through the Leave of Absence policy below, any student who does not enroll in classes for a period of two years is considered to have left the program and must apply for re-admission if they wish to continue the program. They must meet current admission criteria, and if re-admitted, fulfill current program requirements.

7.4 REGISTRATION REQUIREMENTS DURING PH.D. STUDENT CANDIDACY (PH.D. STUDENTS ONLY)

For Ph.D. students, unless permission has been granted through the Leave of Absence policy below, during the Dissertation portion of the program (after the student has passed the Oral Qualifying Examination), students must enroll in at least 1 credit hour per term in order to maintain active student status. Students do not need to register for Dissertation credit during the summers unless they plan to graduate or defend the Dissertation in the summer. Students who fail to register for any semester must back-enroll for all semesters missed in order to graduate. There is a charge per semester (plus tuition) for back-enrollment.

7.5 COURSE PERMISSIONS

Some courses require course permission prior to enrollment. Please follow the instructions listed on the Indiana University Schedule of Classes for permission. If the course is listed as requiring permission from the instructor, please contact the instructor listed for the course, via email, to obtain permission. Some courses require department permission for enrollment. Please contact the Luddy Graduate Studies Office for department permission via email at gradvise@indiana.edu.

7.6 INDEPENDENT STUDY (ENGR-E 687)

Independent study courses allow students to conduct individualized projects under the supervision of a faculty member. These credits are usually used for students to conduct research or to explore specific areas of ISE that are not well covered by any specific formal course. The first step in arranging a ENGR-E 687 is to identify and contact a faculty member who is willing to supervise the independent study. Once they have given their permission, you can sign up for their section of ENGR-E 687 through the One.iu website and register up to the allowed number of credits per the outlined program requirements. If the faculty member does not have a ENGR-E 687 section assigned to them, contact the Luddy Graduate Studies Office for permission to enroll in the section under the Director of Graduate Studies. It is important to note that students are required to register via the One.iu website for all classes during the registration period. Please refer to the Office of the Registrar website for all registration timelines. If you have difficulties registering for ENGR-E 687, email the Luddy Graduate Studies Office: gradvise@indiana.edu.

To enroll in an independent study course, consider the following steps:

- Formulate Independent Study plans, and identify a faculty member with whom you would like to work;
- Contact and discuss your Independent Study with the faculty member;
- Obtain approval from faculty member to register for ENGR-E 687 under their supervision;
- Register for ENGR-E 687 via the One.iu website;
- Successfully complete ENGR-E 687.

7.7 PH.D. RESEARCH COURSES (ENGR-E890 AND ENGR-G901) (PH.D. STUDENTS ONLY)

ENGR-E890's are only taken by Ph.D. students after candidacy has been approved and are for Dissertation Research. Students should request department permission by emailing the Luddy Graduate Studies Office at gradvise@indiana.edu. Please provide your advisor for the course, full name, and admit year. Ph.D. Candidates may register for ENGR-G901 after competing 90 graduate credits. The advantage to taking G901 is that it requires only modest tuition, which is advantageous for students who are supporting their own education. Students may take up to 6 semesters of G901; students must register for ENGR-E890 after reaching the 6-semester limit. Please make sure you are eligible for ENGR-G901 registration before requesting permission from the Luddy Graduate Studies Office at gradvise@indiana.edu.

7.8 FULL-TIME STATUS

To be considered a full-time student, a student must register for at least 8 credit hours, according to IU policy. Typically, a student does this by choosing three 3-credit courses (totaling 9 credits) that count towards the intended degree. Students must enroll in three courses even if they are making up incompletes from a previous semester; students must maintain full-time enrollment as they make up incompletes.

Tip: "Add and drop" instead of "drop and add:" When replacing courses, be sure to add the new course first and then drop the old, in order to always be above the minimum number of credits for status.

7.9 ONLINE COURSES

SICE offers a variety of online courses. While these are primarily designed for online students who are not physically in Bloomington, they generally may be taken by residential students. However, international students should consult with the Office of International Studies before registering for online courses because of visa regulations requiring a minimum number of residential credits per semester. For most international students, our understanding is that only 3 online credits per semester count towards a student's full-time residency requirement, so a typical student who must register for at least 8 credits to maintain visa status could take online courses as long as at least 5 residential credits are also taken. In a typical student's final semester in the program, at least 1 residential course would have to be taken. Again, these regulations are complex and differ depending on the visa and other variables, so students should consult with OIS before registering.

7.10 WAITLIST

If a course is full, a student may add themselves to the waitlist – the queue of students wanting to add the course. If students who are enrolled in the course drop, or if the enrollment capacity is increased, students on the waitlist are automatically admitted into the course in the order in which they were added. This waitlist process is controlled and conducted by the University Registrar; to ensure fairness, the Registrar does not permit faculty or departments to add or prioritize students outside of this first-come-first-served process. The waitlists expire on the fourth day of the semester; after that, students must submit eAdd requests via the One.iu website, which are considered and approved by the instructor of the course (and assuming that the course is no longer full).

7.11 DROP AND REFUNDS

Students should finalize their schedule promptly; failing to do so may have significant financial implications. For course drops in the first week, IU refunds the full tuition for the course. After that, IU refunds 75%, 50%, and 25% when a course is dropped in the second, third, or fourth week, respectively. Later drops receive no refunds. We strongly encourage you to become familiar with the Office of the Bursar policies and fee payment information. It is the student's responsibility to know the policy and deadlines govern by the IU Office of the Bursar and Office of the Registrar.

7.12 WITHDRAWALS FROM COURSES

During the automatic withdrawal period, students who withdraw will be assigned an automatic grade of W; see the Registrar's official calendar for exact dates. After that period, withdrawals are only possible with approval from the Dean, which is normally given only for urgent reasons such as illness.

7.13 LEAVE OF ABSENCE

We realize that some life circumstances may interefere with a student's ability to make progress in the program, such as serious long-term illness, care of a newborn child, death of a close family member, or long-term illness of a close family member requiring the student's care. To request a Leave of Absence from the program, a student should discuss the nature and length of the leave with the Director of Graduate Administration and/or Director of Graduate Studies. The student will then need to complete a Leave of Absence Form signed by their Advisor and the DGS. Students should then submit the form to the Luddy Graduate Studies Office for review.

7.14 TRANSFER CREDITS

Some graduate coursework completed at other accredited universities may be transferred into the ISE Ph.D. or M.S. program. All coursework transferred must be from an accredited college or university, and no transfer credit will be given for any courses with a grade lower than a B. The student must receive approval from an IU faculty member associated with each course for which credit is transferred. Transferred courses must be relevant to the student's program of studies and must be submitted to the Luddy Graduate Studies Office using the Transfer of Graduate Credit form for final approval by the Director of Graduate Studies and the university.

M.S. students may transfer a maximum of 8 credits, while Ph.D. students may transfer a maximum of 30 credits. For M.S. students, courses completed more than 5 years prior to the student's (from IU) may not be counted towards the degree. For Ph.D. students, courses taken more than seven years before the passing of the qualifying exam must be revalidated (see the Revalidation section) in addition to being transferred. Steps for transferring courses:

- Identify the course at IU that may be considered equivalent to the course to be transferred;
- Contact a faculty member who teaches the equivalent course at IU;
- Provide the faculty member with the course description, syllabus, sample homework assignments, projects, and exams, and/or other documentation requested by the faculty member;
- Complete the Transfer of Graduate Credit Form;
- Submit the completed form to the Luddy Graduate Studies Office for review and final approval; and
- Allow 3-5 business days for credit(s) to be reflected on the transcript.

8 FINANCIAL SUPPORT

Indiana University and the Department of Intelligent Systems Engineering offer a variety of types of financial support to graduate students, including fellowships, research assistantships, associate instructorships, and part-time (hourly) jobs. Applicants for admission into the ISE Ph.D. program are automatically considered for financial support. M.S. students are typically not offered support at admission, but most M.S. students find partial support (typically in the form of part-time work) after they arrive.

8.1 REQUIREMENTS FOR FINANCIAL SUPPORT

Most financial support packages require that the student makes satisfactory progress toward completing a degree of study. The Department's criteria for satisfactory academic progress include: course credits completed per semester, the nature of these courses, the grades received, and for Ph.D. students, successful completion of the qualifying examination and progress in completing the dissertation research.

In addition to satisfactory progress toward completing the degree, continuation of graduate support depends on: the recipient performing assigned duties satisfactorily, past level of support and total number of semesters of support, the availability of funds to continue the current level of financial assistance, and the needs of the Department for the particular services for which the recipient is qualified to perform. When resources for financial support are limited, and the demand for support exceeds the funds available, a continuation of financial support for an individual student will depend upon merit relative to others requesting aid and the needs of the Department.

The Department attempts to provide financial aid to all continuing Ph.D. students in their second through fifth year who are making satisfactory progress toward the Ph.D. degree, whose overall performance in the program is strong, and who are able to serve as an Associate Instructor or Research Assistant.

8.2 STUDENT ACADEMIC APPOINTMENTS (TYPICALLY PH.D. STUDENTS ONLY)

Student Academic Appointments (SAAs) provide a monthly stipend and a tuition waiver (up to 12 credits in the fall term, 12 credits in the spring, and 6 credits in the summer term). Most Ph.D. students are supported on SAAs; occasionally, M.S. students working on research are also supported as SAAs. An SAA can be in the form of an Associate Instructor (AI) or Research Assistant (RA). All students with an SAA are required to sign an employment contract known as the Application and Agreement for Student Academic Appointee form with the ISE Payroll / HR Associate. In addition, the student will need to supply the documentation required for the hiring process.

Students offered an SAA typically have a ten-month appointment and a workload that is a 50% FTE appointment (20 hours per week). Students with a 20 hour per week SAA are required to enroll in 6 credit hours each term on appointment. Failure to comply with enrollment requirements may result in the termination of the SAA contract.

All students with an SAA are required to attend the Student Academic Appointment Orientation offered in the fall term. They are also required to successfully complete two online tutorials: Family Educational Rights and Privacy Act (FERPA) and Data Protection & Privacy. SAA appointees are responsible for following all policies outlined in IU’s Handbook for Student Academic Appointees.

8.2.1 SAA Associate Instructorships (typically Ph.D. students only)

An Associate Instructor (AI) assists faculty with the teaching mission of the department. Responsibilities vary depending on the faculty and the course but often include leading discussion sections and labs, grading assignments and exams, holding office hours, and designing course materials. Since AIs share similar teaching duties as faculty, they are required to follow the faculty Code of Academic Ethics. Note: Students whose native language is not English cannot be AIs until they pass the Test of English Proficiency for Associate Instructor Candidates (TEPAIC).

8.2.2 SAA Research Assistantships (typically Ph.D. students only)

Research Assistantships are funded by individual faculty members to work on their research projects. As with Associate Instructorships, RA positions include a stipend, tuition remission, and fees for graduate students hired to work on funded research projects. The availability of research assistantships varies each year among faculty. The awards are not made by ISE, but directly with the funding faculty. Faculty members generally select research assistants from the graduate student body and qualified applicants. Research assistants are often selected to work on a specific research project or projects for which the faculty member has funding. Often, but not always, the work is related to the thesis of the student. Renewal of research assistantships is based on satisfactory performance and availability of funds.

8.2.3 Student Academic Stipends and Fee Remissions (typically Ph.D. students only)

The stipends attached to AI and RA appointments are considered graduate student financial support and compensation for assigned academic duties, and as such are taxable income. It is our understanding that fee remissions and fee scholarships are not taxable. Summer fee remission and fee scholarship awards are restricted to a maximum of six hours. Fee remissions and fee scholarships are restricted to a maximum of 30 hours in any academic year (fall, spring, and summer term).

Students who have accumulated 90 credit hours or more and who have completed all course requirements are not eligible for fee remissions but must still meet the registration requirements mentioned above (e.g., at least 6 credits for a 20-hour/week SAA). Such students may enroll in ENGR-G901 (Advanced Research), which carries a value of 6 credit hours, and has a flat rate fee of $150 and no mandatory fees.

8.2.4 Summer Appointments (typically Ph.D. students only)

A limited number of summer AI appointments are available and are allocated on the basis of scholarly, research, and/or teaching performance. Individual faculty may also offer Research Assistantships during the summer to work on their funded research projects.

8.2.5 Part-time (hourly) positions (typically M.S. students only)

Part-time Associate Instructor positions are sometimes available, typically requiring up to 10 hours per week. Most part-time AI positions are offered to M.S. students. Unlike SAA appointments, these positions do not receive tuition waivers and students must record their time in the university's human resources systems. Hourly Research Assistantships may also be available; these are arranged directly with a faculty member for work on a specific research project.

8.2.6 University Graduate School Fellowships

We encourage students to become familiar with other funding opportunities available at Indiana University. For an updated listing of awards and deadline, visit the IU Grad Grants Center website.

9 Information for International Students

9.1 The Office of International Services (OIS)

OIS is your comprehensive resource for all matters related to international study. OIS offers services including advising on and facilitating compliance with U.S. visa and immigration regulations, assisting with financial matters and planning, and offering ongoing orientation and other educational, cultural, and social programming. Students can find detailed information about OIS and their services on their website. Many OIS services and approvals, including OPT and CPT requests and I-20 extensions, are requested through an online system called Atlas. When the system asks for contact information for your department or advisor, please use gradvise@indiana.edu.

9.2 Test of English Proficiency for Associate Instructor Candidates

Students whose native language is not English and who would like to compete for teaching positions are required to take the Test of English Proficiency for AI Candidates. Students must pass this exam before they can be appointed to engage in the direct instruction of students at IU. If you have questions about the TEPAIC, please check the website and/or contact the Luddy Graduate Studies Office.

9.3 Full-time Status

International students should note that SEVIS regulations are stringent about having a full course load, and that it is essential to check with International Services well in advance of any event that might affect visa status (e.g., dropping a course) to avoid the risk of deportation for being out of status. Check OIS for links to information on staying in status, to be sure that you are aware of the current policies.

9.4 Completion dates for Visa Purposes

International students are considered to have completed their degrees as soon as they have completed the degree requirements, regardless of whether they have filed for the degree. Consequently, it is essential to make sure that post-graduation visa arrangements are in place before completing the requirements. Please contact International Services for details; they are experts on these rules.

9.5 Optional Practical Training (OPT)

Optional Practical Training (OPT) is employment related to a student's major field of study prior to or shortly after graduating. The date of graduation is normally the end of the semester in which they take the last courses needed for the degree, regardless of whether the student will receive a grade of Incomplete in one of these courses. Even if the student has an Incomplete that prevents receiving the degree, they should expect the OPT to be processed using the normal completion date for their last courses (the last day of finals). Refer to the OIS website for detailed information regarding OPT. When asked for department or advisor contact information, please use gradvise@indiana.edu.

9.6 Internship and Curricular Practical Training (CPT)

Curricular Practical Training (CPT) is a work authorization that allows students with an F-1 visa to engage in an off-campus academic internship that is an *integral part* of their academic curriculum. CPT requirements can be found on the Office of International Services website.

9.6.1 CPT Policies and Requirements

U.S. Immigration regulations are extremely complicated, change often, and differ depending on each student's specific situation. Please consult with the Office of International Studies for the most up-to-date policies and requirements. Our understanding of current immigration regulations for F-1 students include:

- A student must have been in full-time, F-1 status for at least one full academic year – 30 weeks of instruction -- to be eligible for CPT.
- Employment must not begin until the date authorized in the I-20 issued by OIS.

In addition, we have several additional policies to ensure that internships are considered an *integral part* of the academic curriculum and thus eligible for CPT. It may be possible to waive these requirements in extenuating circumstances.

- Students are typically not permitted to have CPT during their last semester in the program.
- **For M.S. students,** internships during the Fall and Spring semesters must be either conducted in Bloomington or conducted remotely while the student is physically in Bloomington. For this reason, the majority of internships take place during the summer after the first year in the program.
- **For Ph.D. students,** internships must be approved by their faculty advisor (or the DGS if they do not have an advisor).

9.6.2 CPT Application Process

The CPT application process can take several weeks so it is very important to begin as early as possible. This is especially true during the Spring semester, when the Luddy Graduate Studies Office and OIS must process hundreds of applications.

The CPT application begins after you have received an offer(s) from employer(s) and have decided to accept one of them. Then follow the following steps:

1. Review and follow the SICE Career Services Recruiting Guidelines.

2. Accept only one offer from one employer. Withdraw all pending applications, cancel all scheduled interviews, and cease seeking employment or internships elsewhere. It is not ethical to continue searching for a job after you have already accepted an offer.

3. Obtain an offer letter listing the following details:

    - Name of the Company
    - Physical address – No P.O. box
    - Contact phone number
    - Email of employer/supervisor
    - Your job title
    - A full job description, with job duties listed

• Start date and end date of employment. Please ask the employer to include the specific phrase "or date of authorization" when giving the start date. For example, "The candidate will begin the training opportunity on October 1, 2020, or date of authorization, whichever is later." (This helps prevent additional delays if CPT is not approved by the original date.)

• Total hours you will be working

4. Upload the offer letter to the Luddy CPT Application,

5. Wait for Luddy Graduate Studies Office to review your CPT application. You will need to enroll in an IU course during the CPT period, typically ENGR-E 591. We will advise you which course to enroll in, depending on your particular circumstances. The enrollment must be completed before OIS will be able to approve your CPT request.

6. Upload Offer Letter in Atlas. Follow the instructions carefully and upload your offer letter into Atlas for OIS Approval. When OIS approves the offer letter, they will notify you by email with instructions for completing the Academic Advisor Form.

7. Complete the Academic Advisor Form. Indicate Joshua Wayne Kemp as the Academic Advisor (Josh is the point of contact for this process). Use gradvise@indiana.edu as the email address on the Academic Advisor form (and on any other OIS-related communication).

8. Wait for OIS to review the CPT application. CPT approval typically takes about two weeks after the request has been *approved by the department,* which is typically several days after you complete the Academic Advisor Form.

9. Watch for and complete surveys from Career Services about your internship. These surveys are important because they help IU attract top employers, including helping to find future internships and full-time positions for you.

10. Upon completion of the Internship, provide the Luddy Graduate Studies Office with an Exit Letter, a formal letter from the employer stating that the terms of employment or internship were satisfactorily completed. For M.S. students, a Summary Report by the student, detailing the internship experience in relation to their program of studies, is also required. This letter is used to assign a grade for the IU course. The exit letter (and report) should be emailed to the Luddy Graduate Studies Office (gradvise@indiana.edu) for review. If an exit letter (and report for M.S. students) are not both submitted, a grade of Incomplete will be posted; unless these materials are submitted, the Incomplete grade will automatically turn to an F after 1 year.

9.6.3 CPT Points to Remember

- The approval process cannot be rushed or completed out of order.
- It is important that you give the address gradvise@indiana.edu on any OIS forms that ask for an advisor or department contact.
- Use ois@iu.edu to contact OIS directly.
- Employment must not begin until the date authorized in the I-20 issued by OIS.

10 STUDENT RIGHTS AND RESOURCES

10.1 STUDENT DISABILITIES

The Luddy Graduate Studies Office works closely with the office of Disability Services for Students (DSS) to provide accommodations to students with learning and/or physical disabilities. If seeking accommodations, a student must register for services with DSS, provide appropriate documentation to verify his/her disability, and then meet with a DSS staff member. DSS will then prepare an Academic Accommodation Memo, which the student should take to a face-to-face meeting with each professor. In order for professors to make appropriate and adequate accommodations, they must receive such requests by the end of the first week of classes.

10.2 RELIGIOUS HOLIDAYS

Indiana University respects the right of all students to observe religious holidays and will make reasonable accommodation, upon request, for such observances. Each year, instructors are provided with the dates of major religious holidays for which students may request accommodation. Students must submit written requests for accommodation in writing by the end of the second week of the semester. Instructors are expected to give students the opportunity to do appropriate make-up work that is intrinsically no more difficult than the original exam or assignment.

10.3 TITLE IX

Our responsibility is to create a positive learning environment for all students. Federal law (Title IX) and IU's Sexual Misconduct Policy prohibit sexual misconduct in any form, including sexual harassment, sexual assault, stalking, and dating and domestic violence. If you have experienced sexual misconduct, or know someone who has, the University can help. If you are seeking help and would like to speak to someone confidentially, you can make an appointment with Sexual Assault Crisis Services (SACS) at (812) 855-8900 (for counseling services), Confidential Victim Advocates (CVA) at (812) 856-2469 (for advocacy and advice services), or IU Health Center at (812) 855-4011 (for health and medical services). Title IX and University policy require us to share any information brought to our attention about potential sexual misconduct with the campus Deputy Title IX Coordinator or IU's Title IX Coordinator. In that event, those individuals work to ensure that appropriate measures are taken and resources are made available. Protecting student privacy is of utmost concern, and information will only be shared with those that need to know to ensure the University can respond and assist. Visit stopsexualviolence.iu.edu to learn more.

10.4 BIAS-BASED INCIDENTS

Bias incidents (events or comments that target an individual or group based on age, color, religion, disability, race, ethnicity, national origin, sex, gender, gender identity, sexual orientation, marital status or veteran status) are not appropriate in our classroom or on campus. What should you do if you experience, witness, see, or hear a bias incident? Report it by submitting a report online (biasincident.indiana.edu) or calling the Dean of Students Office (812-855-8187).

10.5 EMERGENCY PREPAREDNESS

Although rare, emergencies can and do occur, and it's important that you know how to handle them. Below is a brief summary from Protect IU.

- Tornado: Seek shelter. Move to an interior room on the lowest level. Stay away from windows and exterior doors. Listen to a weather radio for updates. Stay away from hazardous materials.
- Fire: Evacuate. Pull the fire alarm. Call 911. Leave the building, closing doors behind you. If unable to exit go to the nearest stairwell or place of refuge, d_o_n_'t_ _use elevators. Assemble in designated area.
- Medical emergency: Call 911. Do not move the victim unless in immediate danger. If trained, administer first aid, CPR/AED.
- Suspicious activity, e.g. object is out of the ordinary, person is behaving strangely, gut feeling that something is wrong: If you see something suspicious, call 911.
- Hazardous materials: Stay back. If life-threatening, pull the fire alarm, evacuate and call 911. If non-life-threatening, call 911 and provide information on type of incident and location.
- Bomb threat: Remain calm. Get as much information as possible from the caller: location of device, what it looks like, what will cause it to explode. Note background sounds, gender of caller, other notable characteristics of the caller's voice. Call 911.
- Active shooter: Call 911. Leave the building, if possible, otherwise hide in a concealed place. Lock and barricade door, turn off lights. Wait for law enforcement. As a last resort, overpower the shooter.

10.6 Counseling and Psychological Services (CAPS)

CAPS provides support for students who are looking for an opportunity to discuss problems with someone they can trust, including but not limited to serious mental health crises. Contact CAPS at the IU Health Center, 4th floor, or by phone at 812-855-5711.

10.7 Writing Tutorial Services (WTS)

WTS offers free help at any phase of the writing process, from brainstorming to polishing the final draft. When you visit WTS, you will find a tutor who is a sympathetic and helpful reader of your prose. Contact WTS at the Herman B. Wells Library 1st floor (West Tower), Learning Commons Area, or by phone at 812-855-6738.

10.8 Other resources

Indiana University and the ISE Department are committed to helping you succeed. When you have academic problems or concerns that you do not know how to face, please contact the Luddy Graduate Studies Office, the Director of Graduate Administration, or the Director of Graduate Studies. If they cannot help or are not available, or if the problem involves one of them, it is appropriate to contact the Chair of the Department or the Associate Dean of Graduate Studies.