5 Day Hands-on Workshop on "Advanced Pedagogies: Active Learning and Digital Tools"

24-28 June, 2019 (Conference Center: Hall 1)

Technical Program

Day 1: 24 June, 2019

8:30-9:00	**Registration**
9:00-9:30	**Inauguration**
9:30-9:45	High Tea
9:45-11:15	**Chair: HoC, CET** **Session 1: Prof. Pradeep Yammiyavar, Department of Design** **Title:** Creativity in Teaching Learning processes **Abstract:** Case examples using advanced pedagogy techniques ranging from Flipped class room to Project based learning in imparting interdisciplinary courses at IITG's Design department will be presented. These techniques incorporate creativity and Design Thinking with emphasis on Innovation. Possible future trends in curriculum design and pedagogy in engineering education will be projected based on curriculum design experimentation over three decades by the speaker.
11:15-12:45	**Chair: HoC, CET** **Session 2: Prof. Ramgopal Uppaluri, Department of Chemical Engineering** **Title:** Bloom's taxonomy for effective teaching **Abstract:** The conventional teaching methodology does not emphasize upon learning objectives and learning outcomes. The quantification of these requires specifying several minor objectives that eventually correlate to the major objectives of the taught subject. In the workshop lecture that also includes hands on session, the significant of blooms taxonomy is being emphasized along with top to bottom and bottom to top approaches to synchronize the way to effective teach through practices and puzzles in any subject of engineering education. The participants will be divided into groups and problems are to be solved by each group. The puzzles involved refer to utilization of keywords presented in Blooms taxonomy to construct simple to moderate and complex puzzles in day to day learning of a subject.
12:45-01:45	Lunch
01:45-03:15	**Chair: HoC, CET** **Session 3: Prof. U. S. Dixit, Department of Mechanical Engineering** **Title:** Role of educational toys, models and simulation tools in learning **Abstract:** A good lecture is very effective in imparting knowledge; however, if it is supplement with activity, its effectiveness can increase manifold. Deceptively simple looking toys can help in teaching the principles of engineering. Similarly models and simulation tools can also be very useful. There are two ways to use toys, models and simulation in teaching-learning process. One way is to make available these educational tools to students, who can use them for understanding the subject. The other way is to involve students in developing these educational tools. A judicious mix of both the ways should be adopted. In this

	talk, the advantages of using these tools are highlighted with case studies. Challenges and possible solutions in implementing this method in pedagogy are also discussed.
03:15-03:30	Tea Break
03:30-05:00	**Chair: HoC, CET** **Session 4: Dr. Samit Bhattacharya, Department of Computer Science & Engineering** **Title:** Use of ICT Systems and technologies for effective teaching **Abstract:** There are many systems and technologies that can aid a teacher in delivering content to the students and get their feedback, both inside and outside the classroom. These include systems such as Moodle, AView and technologies such as the interactive white boards. These systems and technologies can be utilized to make the teaching more interesting, interactive and effective. The talk will introduce those systems and technologies and discuss the popular ones in details.
05:00-05:30	**Session 5: Prof. Sunil Khijwania, Head CET & Department of Physics** Emphasis on flip learning, active learning; faculty group formation, group mentor identification

Day 2: 25 June, 2019

9:30-11:00	**Chair: Prof Sunil Khijwania, Head CET & Department of Physics** **Session 1: Prof. Ratnajit Bhattachrjee, Department of Electronics & Electrical Engineering** **Title:** Pedagogy in Engineering Education **Abstract:** Pedagogy is essentially a combination of knowledge and skills required for effective teaching. Engineering education is a professional education where the students are required to be trained in such a manner so that they become globally competitive. For such education system a student need to study courses not only from their stream of specialization, but also from a variety of disciplines. Students need to be given exposure in solving problems relevant to industry. Since the students need to understand and process information from different domains in such courses, the learning styles of students play important role. Effective teaching strategies that take care of multiple learning styles are very important so that all students have a chance to succeed. This talk will discuss various pedagogical issues related to engineering education and how teaching could be made more effective.
11:00-11:15	Tea Break
11:15-12:45	**Chair: Prof. Sunil Khijwania, Head CET & Department of Physics** **Session 2: Prof. Dipankar Bandyopadhyay, Head Center for Nano Technology & Department of Chemical Engineering** **Title:** Learning while doing **Abstract:** In this talk, you may come-across some absurd examples, which may incinerate your inherent scientific-intuitive urges before harnessing the knowledge-information extracted from the same to address some of the burning issues of modern life. We shall start with a birds-eye view before delving into magnified details to connect the ends. In the joyride, we shall come across some silly details of mesoscale science and technology.
12:45-01:45	Lunch

01:45-03:15	**Chair: Dr. R. Resmi, Department of Chemical Engineering** **Session 3: Dr. Moumita Patra, Department of Computer Science & Engineering** **Title:** Problem Based Learning in Computer Science Engineering: Ideas for a Self-reflective and Planned Teacher **Abstract:** Problem based learning is a pedagogical method where students work as a team to solve complicated, ill-structured problems. The role of the teacher here is to act as a manager and a facilitator while considering the students' ability to work collaboratively and think critically. Every instructor in computer science endeavors to engage their students in deep problem solving and critical thinking. Courses such as programming language and software engineering are designed to teach problem solving. In this talk, the focus will be on the role of a teacher for introducing and enhancing problem based learning skills in computer science students with examples/ case studies related to computer science subjects.
03:15-03:30	Tea Break
03:30-05:00	**Chair: Dr. R. Resmi, Department of Chemical Engineering** **Session 4: Prof. Hemangee K. Kapoor, Department of Computer Science & Engineering** **Title:** Assessment methods and reforms **Abstract:** Globalization and world economy are driving profound changes in engineering education system. For the engineering graduates to be employed internationally, the curriculum should be accredited as per global standards. Therefore, reforms are happening in terms of what to teach, how to teach and how to assess. Examinations or assessments play an important role in deciding quality of education. To improve the quality of assessments, it is required to align assessment with desired student learning outcome. There is a need to design question papers to test higher order ability and skills. Application of Blooms taxonomy framework will help in creating quality question papers. Designing methods to assess the students' ability for social awareness and professional skills are still open to discussion.

Day 3: 26 June, 2019

9:30-11:00	**Chair: Prof. Sunil Khijwania, Head CET & Department of Physics** **Session 1: Prof A. Srinivasan, Department of Physics** **Title:** Undergraduate class room teaching **Abstract:** Introducing new & reiterating known concepts, balance between writing & displaying, connecting with technology
11:00-11:15	Tea Break
11:15-12:45	**Chair: Prof. Sunil Khijwania, Head CET & Department of Physics** **Session 2: Dr. Prakash Kotecha, Department of Chemical Engineering** **Title:** Hands on practice sessions in numerical methods **Abstract:** This talk would focus on how we incorporate lab with numerical methods and how it helps students to actually see things working. This lecture would illustrate how quickly faculty members can adopt these techniques in their course.
12:45-01:45	Lunch
01:45-03:15	**Chair: Dr. Moumita Patra, Department of Computer Science & Engineering**

	Session 3: Prof. J. K. Deka, Department of Computer Science & Engineering **Title:** Outcome based learning **Abstract**: The conventional method of teaching is mainly teacher centric, but outcome based learning is learner centric. The outcome of the subject is listed by the course objective and the learning strategy along with study materials are announced at the beginning of the course. All the stack holders aware about the planning of the course. Also most of the roles are reversed or flipped. Instructor of the course formulates several test items of different difficulty levels to meet the course objectives. The participants will be divided into groups and problems will be solved by a group.
03:15-03:30	Tea Break
03:30-05:00	**Chair: Dr. Moumita Patra, Department of Computer Science & Engineering** **Session 4: Dr. Deepak Sharma, Department of Mechanical Engineering** **Title:** Genetic Algorithm and its applications **Abstract:**
05:00-06:30	**Chair: Dr. Moumita Patra, Department of Computer Science & Engineering** **Session 5: Dr. Manas Khatua, Department of Computer Science & Engineering** **Title:** Internet of Things **Abstract:**

Day 4: 27 June, 2019

9:30-11:00	**Chair: Chair: Dr. R. Resmi, Department of Chemical Engineering** **Session 1: Prof. Shyamanta M. Hazarika, Department of Mechanical Engineering** **Title:** Machine Learning for Cognitive Capabilities in Rehabilitation Robotics **Abstract:** Conventional methods to model cognitive capabilities in robots cannot deal with the uncertainty inevitable in human-robot interaction. State-of-the-art machine learning methods are providing us with new possibilities to model sensory-motor and cognitive capabilities. Biosignals driven man-machine interaction has become within reach. In this talk, a brief presentation of the technical intricacies of machine learning would be followed by highlight of the recent trends. The talk shall discuss work being undertaken within the Biomimetic and Cognitive Robotics Lab in this direction with a special emphasis on adaptive and collaborative control.
11:00-11:15	Tea Break
11:15-12:45	**Chair: Chair: Dr. R. Resmi, Department of Chemical Engineering** **Session 2: Dr. Anandalakshmi, Department of Chemical Engineering** **Title:** Modern learning pedagogies in heat transfer **Abstract:** This talk discusses the effects of learning with lecture and hands-on learning modules in heat transfer. The hands-on implementation included the use of worksheets and few open source softwares. Talk is supplanted with a combined hands-on and problem based learning pedagogy. The talk also emphasizes about the concept that lecture should first be used to elucidate

	concepts and provides a good substratum that can then be further established through the use of modern learning pedagogies.
12:45-01:45	Lunch
01:45-03:15	**Chair: Dr. Sougata Karmarkar, Department of Design** **Session 3: Prof. Ratnajit Bhattachrjee, Department of Electronics & Electrical Engineering** **Title: Outcome** Based Education (OBE) in Engineering; An Overview **Abstract:** OBE is an education theory in which the curriculum, course delivery and assessment are planned to achieve stated objectives and outcomes. In an OBE setup, by the end of an academic program, each student should have achieved the stated objectives and goals. In India, National Board of Accreditation mandates establishing the OBE culture in institutes offering engineering program for getting its recognition. The objective of this talk is to provide an overview of OBE and discuss various issues related to implementation of such practices in Engineering Curricula of different institutions within India.
03:15-03:30	Tea Break
03:30-05:00	**Session 4: Participating Faculty Session** **Chair: Prof. Ratnajit Bhattachrjee, Dr. Moumita Patra, Dr. R. Resmi,……??** **Activity:** • Group of participating faculties will be formed for this session one day 1. • Peer of every group will be identified on day 1. • Peer of every group will select one participating faculty from his/her group to conduct his/her own session: Explain his/her own passionate subject in an engaging fashion using techniques of active learning. • Faculty session will be evaluated on the basis of pre-decided and shared rubric on essential criteria.

Day 5: 28 June, 2019

9:30-11:00	**Chair:** **Session 1: Dr. Sougata Karmarkar, Department of Design** **Title:** Class-room presentation technique **Abstract:** Many a time, students report that they dislike or non-interested in attending classes and mention various reasons which include boring/ monotonous teaching methods, backdated contents, personal disliking for the teacher, not comfortable in the classroom environment, online availability of study materials/ virtual classrooms and so on. In contrary, teachers report that they are upset with the behavior and performance of the students due to inattentiveness, unacceptable attitude and activities (e.g. gossiping, gossiping, sleeping, playing with mobile, disturbing, etc.) in the class. The most serious concern is the absenteeism which has spread like an epidemic in all higher education institutes in India. In this scenario, it is the need of the hour for the teachers to relook into the teaching practices followed by them in the classroom. The current lecture/ talk has been planned to address the aforesaid issues by demonstrating what should be the pedagogy to make classroom teaching more interesting, non-monotonous and holding sustained attention of the students. The lecture would also highlight the various

	initiatives to be taken by the teachers during pre-presentation, presentation and post-presentation session to revive our traditional 'teacher-student physical interaction' based pedagogical method.
11:00-11:15	Tea Break
11:15-12:45	**Chair:** **Session 2: Prof. Shyamanta M. Hazarika, Department of Mechanical Engineering** **Title:** KPLS-mRMR: A Kernel Partial Least Square based Feature Selection Method **Abstract:** Feature selection is one of the core concepts in machine learning which hugely impacts the performance of the model. This is particularly true in high-dimensional feature space, where feature dimensionality reduction through selection of highly predictive features play an indispensable role. The aim of feature selection is to identify the most informative features that optimally characterizes the class. Maximum relevance and minimum redundancy (mRMR) has been well recognized as one of the best feature selection methods. This talk would introduce a Kernel Partial Least Square (KPLS) based mRMR method aimed at ease of computation and improving classification accuracy for high-dimensional data. The proposed method makes use of KPLS regression coefficients to identify an optimal set of features, thus avoiding non-linear optimization.
12:45-01:45	Lunch
01:45-03:15	**Chair:** **Session 3: Dr. Siddhartha Singha** **Title:** Innovative laboratory courses for 360 degree learning of process engineers **Abstract:** Process engineering (PE) is a branch of study deals with the design, operation, control, optimization and intensification of chemical, physical, and biological processes. The professional trained in PE caters for variety of sectors, such as agriculture, automotive, biotechnical, chemical, food, material development, mining, nuclear, petrochemical, pharmaceutical, and software development. The challenge in teaching this courses is correct mix of theory and practical. Since the width of the subject is very high it is impossible logistically to demonstrate diverse range of concepts in labs. Hence it is essential to design lab courses for PE innovatively mixing multiple tools.
03:15-05:00	**Session 4: Group discussion (Lesson learnt and takeaways)** **Chair: Prof. Ratnajit Bhattachrjee, Dr. Moumita Patra, ????** **Activity:** • Sharing best practices. • Lesson learnt and takeaways. • Task and possible roadmap for the future
05:00-05:30	Valedictory
05:30-05:45	High Tea