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

1-5 July, 2019

Technical Program

Day 1: 1 July, 2019

8:30-9:00	**Registration**
9:00-9:30	**Inauguration**
9:30-9:45	High Tea
9:45-11:15	**Chair: Prof. Sunil Khijwania, (Head CET) Department of Physics** **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: Prof. Sunil Khijwania, (Head CET), Department of Physics** **Session 2: 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.
12:45-01:45	Lunch
01:45-03:15	**Chair: Prof. Sunil Khijwania, (Head CET) Department of Physics** **Session 3: Prof. A. Srinivasan, (Dean Faculty Affairs) Department of Physics** **Title:** Undergraduate class room teaching **Abstract:** Introducing new & reiterating known concepts, balance between writing & displaying, connecting with technology
03:15-03:30	Tea Break
03:30-05:00	**Chair: Prof. A. Srinivasan, (Dean Faculty Affairs) Department of Physics** **Session 4: Dr. Siddhartha Singha, Centre for Rural Technology** **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.
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: 2 July, 2019

9:30-11:00	**Chair: Prof. Sunil Khijwania, (Head CET) Department of Physics** **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.
11:00-11:15	Tea Break
11:15-12:45	**Chair: Prof. Sunil Khijwania, (Head CET) Department of Physics** **Session 2: 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.
12:45-01:45	Lunch
01:45-03:15	**Chair: Prof. U. S. Dixit, Department of Mechanical 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: Prof. U. S. Dixit, Department of Mechanical Engineering** **Session 4: Dr. Siddhartha Pratim Chakrabarty, Department of Mathematics** **Title:** Inclusiveness in classroom: Empowering students with disabilities **Abstract:** Inclusiveness in education is the first step towards empowering our differentially abled fellow citizens. Ensuring that we adopt the right strategies for their complete participation in learning is essential for the progress of the society. We will

	discuss about such strategies in the paradigm of understanding the specific needs both for visible as well as invisible impairdness, addressing the accommodation requirements and adoption of technological learning aid in a traditional classroom setup.
05:00-06:30	**Chair: Prof. U. S. Dixit, Department of Mechanical Engineering** **Session 5: Prof. Chandan Mahanta, (Head) Department of Civil Engineering** **Title:** Pedagogy of sustainability in engineering education **Abstract:** TBA

Day 3: 3 July, 2019

9:30-11:00	**Chair: Dr. Moumita Patra, Department of Computer Science & Engineering** **Session 1: Prof. U. S. Dixit, Prof. Kanagraj & Dr. Sajan Kapil, Department of Mechanical Engineering** **Title: TBA** **Abstract: TBA**
11:00-11:15	Tea Break
11:15-12:45	**Chair: Dr. Moumita Patra, Department of Computer Science & Engineering** **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: Prof. Sunil Khijwania, (Head CET) Department of Physics** **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: Prof. Sunil Khijwania, (Head CET) Department of Physics** **Session 4: 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.

Day 4: 4 July, 2019

9:30-11:00	**Chair: Prof. J. K. Deka, Department of Computer Science & Engineering** **Session 1: Prof. Pradip K. Das, Department of Computer Science & Engineering** **Title:** Essentials and desirables to excel as a good teacher 1 **Abstract:** Planning a lecture: Subject of the talk, details including the matter to be covered, timelines; Setting a pace: How to gauge the audience and set a pace for the talk, fixing up gaze points in the room; Articulation: How to make the talk interesting and ensure the audience is with you; Class Activity: Possibility of including a small section of the class to participate in the talk itself; Feedback: Methods of collecting feedback and sharing the same with the audience, answering questions and summarization.
11:00-11:15	Tea Break
11:15-12:45	**Chair: Prof. Prof. J. K. Deka, Department of Computer Science & Engineering** **Session 2: Prof. Pradip K. Das, Department of Computer Science & Engineering** **Title:** Essentials and desirables to excel as a good teacher 2 **Abstract:** Planning a lecture: Subject of the talk, details including the matter to be covered, timelines; Setting a pace: How to gauge the audience and set a pace for the talk, fixing up gaze points in the room; Articulation: How to make the talk interesting and ensure the audience is with you; Class Activity: Possibility of including a small section of the class to participate in the talk itself; Feedback: Methods of collecting feedback and sharing the same with the audience, answering questions and summarization.
12:45-01:45	Lunch
01:45-03:15	**Chair: Prof. Prof. Pradip K. Das, Department of Computer Science & Engineering** **Session 3: Prof. U. S. Dixit, Prof. Kanagraj & Dr Sajan Kapil** **Title: TBA** **Abstract: TBA**
03:15-03:30	Tea Break
03:30-05:00	**Session 4: Participating Faculty Session** **Chair: Prof. Sunil Khijwania, Prof. Ratnajit Bhattachrjee, Dr. Moumita Patra** **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: 5 July, 2019

9:30-11:00	**Chair: Prof. Ratnajit Bhattachrjee, Department of Electronics & Electrical Engineering** **Session 1: Dr. Amit Kumar, Department of Chemical Engineering** **Title:** Polymerization: From Monomers to Polymers **Abstract:** The lecture will discuss topics in polymer science with a focus on polymerization processes and reactions. Chalkboard/whiteboard teaching will be complemented with digital presentation to convey the subject matter in a more visual and effective way. Further, the use of software packages to build and visualize different types of polymers as well as to solve polymerization-related equations will be demonstrated.
11:00-11:15	Tea Break
11:15-12:45	**Chair: Prof. Ratnajit Bhattachrjee, Department of Electronics & Electrical Engineering** **Session 2: Prof. U. S. Dixit, Prof. Kanagraj & Dr Sajan Kapil** **Title: TBA** **Abstract: TBA**
12:45-01:45	Lunch
01:45-03:15	**Session 3: Prof. Sunil Khijwania** **Title:** Sensitivity, Sustainability & Selfless Evolution **Abstract: TBA**
03:15-05:00	**Session 4: Group discussion (Lesson learnt and takeaways)** **Chair: Prof. Sunil Khijwania, 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