

IUCEE MISSION NEP Update (Feb 7, 2022)

During 2021 discussions among leaders of IUCEE Institutions, we had agreement that Implementation of NEP 2020, required emphasis on the following guidelines which are consistent with the IUCEE Vision of improving the quality and global relevance of engineering education in India.

- Holistic and Multidisciplinary Education
- Creative and Innovative Thinking
- Optimal Learning Environments and Support for Students
- Motivated, Energized and Capable Faculty

This transformation has to start with first year engineering students. We are, therefore focussing on a Pilot batch of First Year Students entering in Semester 1 of 2021-22 (started late in January 2022 due to COVID).

1. We started with 16 IUCEE member institutions. The Pilot Batch for each institution is 60 FY students.
2. IUCEE global experts conducted workshops on how we teach using student centred teaching, case studies, real world examples and project/problem based learning. Faculty teaching FY students from all these colleges participated.
3. We identified 6 mini courses to be taken by the selected Pilot Batch of FY students and taught by IUCEE Experts. 10 students from each institution were assigned for each mini-course. Faculty familiar with the topics were identified and were given orientation by the expert instructors. The role of these assistant faculty is to mentor the students from their institution and grade their work.
4. 20 more IUCEE colleges showed interest in being part of piloting the 6 Mini Courses to their FY students. 30 students from FY were identified from these college (6 per mini-course).
5. One institution requested to pilot all 300 first year students in their program.
6. Faculty from all 36 IUCEE colleges were recruited to mentor the first year students during these courses.
7. A Mini Symposium was held to ensure that everyone understood the plan.
8. In addition to the 6 Mini Courses, a series of webinars are being offered to ALL students once every two week on the history of technology and relevance of basic sciences taught in the first year to the evolution of these technologies..

Important aspects of the delivery:

- Webinars are offered on Zoom and GoTo Meeting
- LMS Canvas is used for Course Materials
- Recordings are available on Canvas
- Assignments are submitted by students and graded by faculty on Canvas
- Small projects will be assigned in all minicourses: Projects need to done in teams

- Certificates for Students and modest honorariums for faculty will be available

As of the date of this update, the program is in its third week for each course. Roughly 1600 students and 400 faculty from 36 institutions are part of this Pilot.

Assessment of the Pilot is very critical and is being planned using following criteria:.

- How suitable was the content ?
- Was the level of participation of assistant faculty adequate ?
- Was the level of participation of students adequate ?
- Was holistic and multidisciplinary aspect was suitable ?
- Did students learn innovative and creative thinking ?
- Should we offer these cours for credit ?
- Can we scale to more students ?
- Should we offer these courses every year ?
- Should we offer these courses to upper classes ?
- Was the faculty training and incentives adequate ?
- How can we follow up the projects initiated in the courses ?
- Can we expect the institutional faculty to offer these courses in future ?

Below is brief description of the 6 mini courses for our IUCEE Mission NEP id given below.

The schedule of the 6 mini-courses is here:

- Design Thinking: Mon 6 pm: alt weeks (8)
- Jan 10, 24, Feb 7, 21, Mar 7, 21, Apr 4, 18
- Clean and Green Campus: Tue 7 pm: alt weeks (8)
- Jan 11, 25, Feb 8, 22, Mar 8, 22, Apr 5, 19
- Entrepreneurial Thinking: Wed 8 pm: alt weeks (7)
- Jan 12, Feb 9, 23, Mar 9, 23, Apr 6, 20
- Social Emotional Learning: Mon 4 pm: alt weeks (8)
- Jan 17, 31, Feb 14, 28, Mar 14, 28, Apr 11, 25
- Artificial Intelligence for All: Tue 8 pm: alt weeks (7)
- Jan 18, Feb 1, 15, Mar 15, 29, Apr 12, 26
- Leadership and Sustainability: Wed 8 pm: alt weeks (8)
- Jan 19. Feb 2, 16, Mar 2, 16, 30, Apr 13, 27

At the bottom is list of 36 participating institutions.

Brief description of the 6 mini-course

1. Leadership and Sustainability

The objective is to have students work in teams and develop leadership skills while addressing a real world problem relevant to a sustainability theme. Students develop lifelong learning skills when they do research on different sustainability themes with guidance by experts. Students appreciate the multidisciplinary dimensions of these problems as well as the need for clarity in basic concepts of mathematics and science. Defining a specific problem and working in teams to develop and, if possible, implement a possible solution to the problem, will enhance their professional skills. Following sessions will be offered by global experts in the form of webinars. Students will work in teams and participate in discussions and assignments on an online platform (Canvas). Assistant faculty will guide, mentor and assess the work by the students.

- NAE Grand Challenges and UN Sustainability Goals
- Affordable Housing: Dr. S.D. Rajan, Arizona State University
- Clean Water: Dr. Raj Rajaram, Clean Water, Chicago
- Sustainable Energy: Dr. Agami Reddy, Sustainable Energy, Arizona State University
- Waste Management: Dr. Prakasam Tata, Waste Management, Chicago
- Education Augmentation: Dr. Aditya Bhatnagar, Education Augmentation, Chandigarh
- Select one theme, identify specific problem in a community
- Explore potential solutions and select most promising

2. Clean and Green Campus

This course is similar to the Leadership and Sustainability Course but with emphasis on projects relevant to making the Campus Clean and Green. Students work in teams and develop professional and problem solving skills while addressing a specific aspect of improving the Clean and Green dimension of their campus. Students develop lifelong learning skills when they do research on different themes with guidance by experts. Students appreciate the multidisciplinary dimensions of these problems as well as the need for clarity in basic concepts of mathematics and science. Following sessions will be offered by global experts in the form of webinars. Students will work in teams and participate in discussions and assignments on an online platform (Canvas). Assistant faculty will guide, mentor and assess the work by the students.

- Introduction to Clean and Green : Mr. Deepak Gadhia, Chairman at Sunrise CSP India Pvt. Ltd
- Renewable Energy: Dr. Deepak Waikar, Tacstra Solutions Pte Ltd, Singapore, Managing Partner for EduEnergy Singapore
- Waste Management: Dr. Gaurav Kedia, Chairman, India Biogas Association
- Energy Basics, Energy Conservation : Dr. Ajay Chandak, Certified Energy Auditor & Renewable Energy Expert

3. Artificial Intelligence for All:

The objective of this course is to introduce the students to a tool and methodology which is expected to dominate their professional careers, whatever discipline they may be in. The webinars give an introduction to Artificial Intelligence, exploring the various facets of AI and its impact on modern life, and also talk about some problem-solving techniques. This will nurture the creative and problem solving abilities of the students. The list of topics covered are:

- Pictorial Intro to AI and the AI Eco System;
- Intelligence from Data and Search Engines;
- Excel Tutorial and Clustering with Excel;
- Perceptron and Excel;
- Use Cases in Machine Learning;
- Building Intelligent Machines and Deep Learning

The course is taught by Prof. Vemuri Rao (UC Davis, Retired)

4. Introduction to Entrepreneurial Thinking

The objective of this course is to promote an entrepreneurship mindset and to mentor students (along with faculty) in using a “Lean Launchpad” method and customer discovery process. Teams of faculty and students will go through this Course and learn the process of entrepreneurship.

0. Entrepreneurial Mindset (are you an entrepreneur ? ..exercises)
1. Pitch an idea – Identify the problem to be solved
2. Circular Design thinking
3. Understanding how to get effective customer feedback (using Lean Launchpad method)
4. Iterate using lean startup
5. Create the minimum value product (MVP) and prototype
6. Create the Business Model Canvas
7. Start selling the idea and negotiation exercises

The course is taught by Prof Shalini Gopalakrishnan (Entrepreneur, USA) and Professor Ranji Vaidyanathan (Oklahoma State University).

5. Design Thinking and Community-Based Design

This course builds on several years partnership between IUCEE and EPICS at Purdue University, USA. Design thinking as part of EPICS is focused on identifying community needs and finding solutions to problems associated with these needs. Following topics will be covered with teams of students and faculty identifying community partners and problems.

1. Introduction to Design Thinking
2. Case study for design thinking success
3. Users and community partners
4. Prototyping: Requirements and specifications
5. Ideation and concept generation
6. Teaming concepts in design
7. Testing and design to prevent failures
8. Detailed design and delivery

This course is taught by Dr. William (Bill) Oakes, Director of the EPICS Program, Professor of Engineering Education at Purdue University, and a registered professional engineer.

6. Social Emotional Learning

This course will provide participants with the fundamental knowledge of Social and Emotional Learning (SEL), a process through which individuals acquire and effectively apply the knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions. Social and emotional skills are critical to being a good student, citizen, and worker, and many risky behaviors (e.g., drug use, violence, bullying, and dropping out) can be prevented or reduced when integrated efforts are used to develop students' social and emotional skills.

This course is designed to accomplish the following goals:

- To familiarize the students to social emotional learning
- To enable the students to make responsible decisions, as good students and citizens based on social emotional learning principles.

Course will be taught by Dr. Prathiba Nagabhushan of Australian Catholic University.

List of 36 participating institutions.

1. AISSMS College of Engineering, MH

2. Anurag University, TS
3. Atria Institute of Technology, KN
4. BH Gardi College of Engineering and Technology, GJ
5. BML Munjal University, HR
6. BMS College of Engineering, KN
7. BVR Institute of Technology, TS
8. BVRITH College of Engineering for Women, TS
9. Chitkara University, PJ
10. CMR College of Engineering and Technology, TS
11. Hindustan University, TN
12. Hyderabad Institute of Technology And Management, TS
13. Kalasalingam University, TN
14. KGR College of Engineering and Technology, TS
15. KKW Institute of Engineering Education and Research, MH
16. KLE Technological University, KN
17. KSRM College of Engineering, AP
18. Malnad College of Engineering, KN
19. MLR Institute of Technology, TS
20. Marwadi University, GJ
21. MIT Academy Of Engineering, MH
22. Nalla Malla Reddy Engineering College, TS
23. Pune Institute of Computer Technology, MH
24. RK University, GJ
25. Rajarambapu Institute of Technology, MH
26. Ramco Institute of Technology, TN
27. RV College of Engineering, KN
28. Saveetha Engineering College, TN
29. Sphoorthy Engineering College, TS
30. Sree Vidyanikethan Engineering College, AP
31. St. Joseph Engineering College, KN
32. Thiagarajar College of Engineering, TN
33. Vidya Jyothi Institute of Technology, TS
34. Vidyavardhaka College of Engineering, KN
35. Vasireddy Venkatadri Institute of Technology, AP
36. Vishwakarma University, MH