

Introduction to Engineering and Program

Preamble

A committee consisting of following members was constituted by Dean (Academics) to recommend the modalities for implementation, administration and evaluation of non-graded credit to be earned under Introduction to Engineering & Program.

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The committee met multiple times to discuss and after deliberations came up with modalities for implementation, administration and evaluation.

Objectives & Contents

This course being one of the first courses to be offered to fresh entrants of bachelor's programmes, it has an important role to play in terms of orienting and exciting students in the subject of engineering in general and their respective specializations in particular. The course falls under non grade core requirement with two units to be earned through various activities with not more than two hours per week of student's involvement. The course spans over two semesters covering Introduction to Engineering (First Semester) and Introduction to Respective Programme (Second Semester). Members felt that this flagship course should address following aspects:

- Exposing students "Engineering" as a profession which creates wealth for nations, and is a vehicle for economic growth.
- Exposing students Science/Engineering as a medium through which one can address problems facing society including some of the grand challenges.
- Excite students how research in science/engineering has enormous impact our day to day lives.
- Enlighten students various career options available to them.
- Make aware of students what it means to engineer a product. Why design and innovation which leads to products and systems is both personally satisfying and professionally rewarding.
- Excite students about potential role models and successful alumni in engineering profession.
- Motivate students to take up some co-curricular activities on their own during their remaining period of stay in the institute.

Some of the activities which can be taken up to realize above objectives were identified as follows:

- Understanding engineering through product dissection & Reverse Engineering. (Many of these could be physical products given to students to dissect and some of these could be in the form of videos).
- Screening of exciting videos which bring out the strong relation between science/engineering and societal needs.
- Conducting Design & Innovation contests among students.
- Solving science/engineering puzzles in the class.
- Lectures from successful industrialists & entrepreneurs about their journey.
- Expose to successful research cases from the institute and the impact of the same.
- Expose to successful products/innovations from the institute which have reached people/industry/society.
- Some interesting demonstrations in laboratories.
- Hands on exercises in laboratories including use of breadboard circuits, legos, robot kits, balsa bridge engineering kits, Fiber optic kits, mobile apps etc.
- Industry visits
- Visits to on-going exhibitions in the city
- Do-it-yourself projects in teams
- Lectures by faculty, visitors, Alumni on some exciting topics.
- Lectures by successful entrepreneurs/incubators/alumni.

Implementation Plan

Following implementation plan is suggested for conducting this course.

First Semester (Introduction to Engineering)

- Inaugural Lecture by a professional and accomplished engineer who is also great orator and a possible role model for students (1 Class)
- For three products identified from diverse areas (such as ICT, Bio and Electromechanical) conduct following three sessions for each of the products (9 classes = 3 Classes x 3 products)
 - Lecture cum interactive session by an industry professional manufacturing the product chosen for study.
 - Presentations by institute faculty from different departments on the same product to demonstrate interconnectedness of different specializations.

- Breakout sessions among students and faculty in smaller groups to discuss more details about the same product.
- Posters/Presentations by students in teams about the same product showcasing their innovations (1 Class)
- Lecture by an institute faculty on one of the on-going cutting-edge-research being carried out in the institute and its impact. (1 classes).
- Lecture by an institute faculty on one of the products/innovations which has reached people and has made a large scale impact. (1 classes).
- Visit to an Industry/on-going science/engineering exhibition in the city. (1 visit).

Second Semester (Introduction to Programme)

- Hand-on exercises including Product Dissection Exercises in Smaller Groups (2 Classes)
- Conducting one design & innovation contest (Equivalent to 2 Classes)
- Screening of a movie/video pertaining to specialization with a preamble and post screening discussions. (2 classes).
- Visit to 2-3 important laboratories and demos (1 class).
- Lecture on “possible career options” by an accomplished alumni of the department (1 class)
- Do-it-yourself exercises either individually or in groups (2 classes)
- Lecture by a professional and accomplished engineer who is also great orator and a possible role model for students. (1 class).
- Lecture by an institute faculty on one of the on-going cutting-edge-research being carried out in the institute and its impact. (1 class).
- Lecture by an institute faculty on one of the products/innovations which has reached people and made a large scale impact. (1 class).
- Visit to an Industry/on-going science/engineering exhibition in the city. (1 visit).

Faculty Participation

Faculty participation and involvement is key to success of this course. The committee discussed the logistics and human resources required to implement the course in its new structure. For the first semester portion “Introduction to engineering” which is common to all branches, committee felt that there should be sufficient faculty members from various departments participating in the course to realize course objectives. Faculty’s participation and involvement is also essential for necessary planning to conduct the course for large number of students, to ensure that activities planned can be conducted smoothly and discipline is maintained among students. One of the models suggested for involving enough faculty members across the department could be as follows:

Departments having B.Tech. Programmes to depute one faculty member & One Teaching Assistant for every 50 students.

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Every major department/center not having B.Tech. Programmes to depute at least one faculty

For the part of course to be offered by respective departments in the second semester, it is important that inputs come from multiple faculty. Inputs from one single faculty often tend to be biased. The departments may assign one faculty for student group of 30 so that some group based laboratory exercises can be effectively conducted.

Evaluation

As the course is a non-grade mandatory in nature, It is necessary to get a satisfactory (S) grade in this course for completing degree requirements. Attendance could be one of the main criteria for evaluation. Apart from this active participation and quiz based evaluation etc. can be used as a basis to decide S or Z grade. In case student is awarded Z graded he/she may be asked to repeat the course next year with partial involvement. In the proposed model, every faculty will have about 30 students to guide/advise and hence evaluation can be done without much effort.