4E2B – Civil Engineering Design Group Project: Part 1
[5 credits]

Lecturer(s): Coordinators; Assoc. Prof. Brian Caulfield [brian.caulfield@tcd.ie]

Module organisation
Department of Civil, Structural and Environmental Engineering

Module description, aims and contribution to programme
In the SS Engineering Design Group Project, students work in teams on a major civil engineering design project. 4E2B comprises one quarter of the SS year; hence, attendance at the project sessions and full participation in the module is essential. Students who do not engage fully will be required to repeat the year in full.

Design Competition: During the first semester students work in project teams tasked with the scheme design of a multi-faceted engineering project. Each design team must address all aspects of the design from preliminary structural schemes and environmental impact, to transportation and construction. Students attend special lectures, given by academic staff and industry professionals, tailored to the particular project. Each project team submits a design competition entry the end of the first semester comprising a written report and an oral presentation describing their proposed engineering and assessing its environmental, social and other impacts.

Detailed Design: In the second semester students work in new project teams to complete the detailed design of the winning proposal(s) submitted to the design competition. In addition to contributing to the overall project design, students will develop detailed design skills in one of four fields; namely,

- structures engineering
- environmental engineering
- geotechnical engineering
- transportation engineering

The objective of this part of the project is to develop student’s “design office” skills and to challenge the students with realistic problems that force them to make decisions even when faced with limited information. Students will become familiar with design practice including the use of codes of practice and commercial engineering design software.

The class and design teams meet regularly at timetabled hours. During these sessions students will also partake in individual exercises designed to improve their presentation skills and their knowledge of professional ethics. This work is assessed and contributes to the students marks for the subject.

The project runs in both semesters: 5 ECTS credits are allocated to the work performed in the first semester and 10 ECTS credits for the second. The course is assessed through continuous assessment and project interviews. Students submit a combination of group and individual work.
Learning outcomes
This module was designed to satisfy certain program outcomes required for Engineers Ireland’s Masters degree accreditation: specifically aspects of outcomes b, c, e, f & g. The module concentrates on outcomes relating to communications, group work, professional and social ethics, sustainability, risk assessment and engineering design practice. The design projects are designed to challenge the students by presenting them with design problems in which some of the input information is incomplete or ill-defined, where other aspects of the problem are unfamiliar and where the students must develop knowledge and understanding of concepts from a range of areas outside engineering.
On completion of the module students will:

1. Be able to integrate knowledge, handle complexity and formulate judgements with incomplete or limited information;
2. Be able to Identify and use appropriate mathematical methods, numerical techniques and software tools for application to new and ill-defined engineering problems;
3. Have the ability to apply design methods, processes and techniques to unfamiliar, ill-defined problems, involving other disciplines;
4. Be able to design to codes of practice and industry standards; to identify limitations of codes of practice and the need for their application;
5. Have the ability to redesign products, processes or systems in order to improve productivity, quality, safety and other desired needs;
6. Have the ability to investigate and define a need and identify constraints including health, safety and legal issues and the impact of engineering solutions in a societal and environmental context;
7. Be able to make engineering judgements that take cognisance of the social, environmental, ethical, economic, financial, institutional and commercial considerations affecting the exercise of their engineering discipline;
8. Have the ability to consult and work with experts in various fields in the realisation of a product or system;
9. Have knowledge and understanding of concepts from a range of areas outside engineering;
10. Will be able, via knowledge and understanding of group dynamics, to exercise leadership;
11. Be able to select and apply appropriate communication tools and write technical papers and reports;
12. Will be able to describe succinctly, the relevant advantages and disadvantages of various technologies to a lay audience, and to communicate effectively in public.

Module content

Teaching strategies
Assessment

Required textbook

Further information
https://www.tcd.ie/Engineering/