Engineering Tripos Part IIB, 4D13: Architectural Engineering, 2020-21

Module Leader (Engineering)

Dr R Foster [1]

Module Leader (Architecture)

Dr M Ramage [2]

Lecturer

Dr R Foster, Dr M Ramage, Dr D Shah [3]

Timing and Structure

Michaelmas term. 8 afternoons. Assessment: 100% coursework

Prerequisites

[3D3, 3D4, 3D8] useful

Aims

The aims of the course are to:

- Teach architects and engineers to work together to solve design problems at the intersection of their disciplines.

Objectives

As specific objectives, by the end of the course students should be able to:

- Operate and communicate effectively in multidisciplinary design teams of architects and engineers, and present solutions to and derive useful, actionable feedback from various stakeholders (e.g. client, peers and co-professionals, constructors)
- By reflecting on and through improved understanding of the collaborative design process, apply appropriate management strategies to design innovative efficient solutions to a client's design brief
- Appreciate the principles of architectural engineering through investigation, critical appraisal and selection of appropriate structural systems, materials, and construction techniques relevant to architectural and engineering design , and assessing the e
- Demonstrate proficiency in specialized design subject matter which integrates with the team's design solution, such as timber engineering, resource efficient design, designing for well-being, reciprocity of context and design.

Content

This module is run in conjunction with the Department of Architecture. CUED students who elect to do this module will work together one full afternoon per week with final year students from the Department of Architecture. The

module involves an architectural engineering design exercise, with students working in mixed groups of architects and engineers.

The course focuses on integrating architecture and engineering to produce new designs. Developing an understanding of the challenges and opportunities presented by multidisciplinary teamwork is integral to the course.

Projects vary considerably from year to year. The Michaelmas 2019 project was to design a tall timber building over an underground station in London. This year's project will be quite different.

The teaching format will be unconventional. Each afternoon will usually begin with a short talk by one of the lecturers or by an external speaker. For the remaining class time, students will work in groups on developing their design project(s) with regular 'studio' style consultation sessions with teaching staff and/or guest speakers to provide feedback on design development. Depending on the covid19 restrictions prevailing at the time of the course, some, or perhaps all, of this 'class' time may be virtual. This presents us with some new challenges, but we hope that in overcoming them we may also find some new opportunities. This year's project has been carefully designed with these challenges in mind.

Towards the end of the course each group will make a presentation of its design to a review panel of architectural, structural, environmental experts.

Course Schedule

All classes will be 2.00-5.00pm on Thursdays.

Week 1: Thursday 8th October

- **Course introduction**
- Groups will be allocated and teams will be built

Weeks 2-5: Thursday 15th October – Thursday 5th November

- **Talks on key skills or elements of the design process relevant to the project at hand.**
- Group work and 'studio' time with teaching staff supporting project development.

Week 6: Thursday 12th November

- **Presentations and design review**
- Groups will present their designs to a panel of expert reviewers and receive feedback

Week 7-8: Thursday 19th November - Thursday 26th November

- **Talks on key skills or elements of the design process relevant to the project at hand.**
- Group work and 'studio' time with teaching staff to refine designs in response to reviewer feedback and progress to production of the final group design submission.

Coursework

All coursework submissions are to be uploaded to relevant folder on the course moodle page. Detailed instructions will be provided on the course moodle page. There will be no hardcopy submissions.

Coursework	Forr
Group Presentation and Design Review Each group will present their design proposal though a prepared video of 3-4 minutes, then get feedback from the jury	Gro Pres non (*Na* *grou* *the*
Group Design Submission Each group will submit a digital copy of their design, including fabrication drawings, and a short video (refinement of the previous) detailing the project and design process.	Gro Des non
Individual Report A short report developing and extending one or more aspects of the group design (40%). The report should also include a critical reflection on the collaborative, multi-disciplinary nature of the design process, and how, given your experience, you might improve the design process in the future (20%).	Indi non

Booklists

Please refer to the Booklist for Part IIB Courses for references to this module, this can be found on the associated Moodle course.

Examination Guidelines

Please refer to Form & conduct of the examinations [4].

UK-SPEC

This syllabus contributes to the following areas of the UK-SPEC [5] standard:

Toggle display of UK-SPEC areas.

GT1

Develop transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and

working with others, as well as the effective use of general IT facilities and information retrieval skills. They also include planning self-learning and improving performance, as the foundation for lifelong learning/CPD.

IA1

Apply appropriate quantitative science and engineering tools to the analysis of problems.

IA2

Demonstrate creative and innovative ability in the synthesis of solutions and in formulating designs.

KU1

Demonstrate knowledge and understanding of essential facts, concepts, theories and principles of their engineering discipline, and its underpinning science and mathematics.

KU2

Have an appreciation of the wider multidisciplinary engineering context and its underlying principles.

D1

Wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.

D2

Understand customer and user needs and the importance of considerations such as aesthetics.

D4

Ability to generate an innovative design for products, systems, components or processes to fulfil new needs.

D5

Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal.

D6

Manage the design process and evaluate outcomes.

S3

Understanding of the requirement for engineering activities to promote sustainable development.

S4

Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues.

E1

Ability to use fundamental knowledge to investigate new and emerging technologies.

E2

Ability to extract data pertinent to an unfamiliar problem, and apply its solution using computer based engineering tools when appropriate.

E3

Ability to apply mathematical and computer based models for solving problems in engineering, and the ability to assess the limitations of particular cases.

E4

Understanding of and ability to apply a systems approach to engineering problems.

P1

A thorough understanding of current practice and its limitations and some appreciation of likely new developments.

P3

Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology, development, etc).

P4

Understanding use of technical literature and other information sources.

P6

Understanding of appropriate codes of practice and industry standards.

US1

A comprehensive understanding of the scientific principles of own specialisation and related disciplines.

US3

An understanding of concepts from a range of areas including some outside engineering, and the ability to apply them effectively in engineering projects.

US4

An awareness of developing technologies related to own specialisation.

Last modified: 22/10/2020 14:25

Links
[1] mailto:rmf41@cam.ac.uk
[2] mailto:mhr29@cam.ac.uk
[3] mailto:rmf41@cam.ac.uk, mhr29@cam.ac.uk, dus20@cam.ac.uk
[4] https://teaching21-22.eng.cam.ac.uk/content/form-conduct-examinations
[5] https://teaching21-22.eng.cam.ac.uk/content/uk-spec