Engineering Tripos Part IIB, 4D13: Architectural Engineering, 2019-20

Module Leader (Engineering)

Dr R Foster [1]

Module Leader (Architecture)

Dr M Ramage [2]

Lecturers

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

Lab Leader

Dr R Foster [1]

Timing and Structure

Michaelmas term. 8 afternoons. Assessment: 100% coursework

Prerequisites

[3D3, 3D4, 3D8] useful

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 buildings 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
- Understand and assess the environmental impact of design choices
- 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 urban context and building 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 building designs. Developing an understanding of the challenges and opportunities presented by multidisciplinary teamwork is integral to the course.

Projects vary from year to year. The Michaelmas 2018 project was to design a tall timber building in London.

The teaching format will be unconventional. Each afternoon will probably 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 environmental, structural and other strategies for their design project.

On week 6 of the course, each group will make a presentation of its design (including a physical model) to an assembled group of architectural, structural, environmental experts. Weeks 7-8 will provide an opportunity to incorporate the feedback from week 6 into the overall design and to develop aspects of the design in further detail.

Course Schedule

All classes will be in LR3, Inglis Building, Engineering Dept., 2.00-5.00pm Thursdays.

1. Thursday 10th October

Course Introduction

- **Talk 1: Supertall Timber (Michael Ramage)**
- Groups will be allocated
- Teams will be built

2. Thursday 17th October

- **Talk 2: Engineering**
- Group work

3. Thursday 24th October

- **Talk 3: Client**
- Group work

4. Thursday 31st October

- **Talk 4: Architecture**
- Group work

5. Thursday 07th November

- **Talk 5: Fire safety**
- Group Work

6. Thursday14th November

- **Design Review (25% mark)** Critics from a range of disciplines and backgrounds

7. Thursday 21st November

- **Talk 6: Impacts**

8. Thursday 28th November

- **Feedforward session**
- Group work

Coursework

Coursework:

- 25% for the group presentation of the design and the model on week 6

- 15% for technical manual on 02/12/2019

- 60% for an individually authored report on developing an aspect of the design and analysis, to be submitted digitally on Moodle by each student by 4.00pm on the first day of the Lent Term.

Task		
Design Review (25% mark)	Each group will orally present their design proposal, with 2 posters (A1 size) and a model of their bu and/or visual materials to present their design. Designs will be judged on presentation, integration, creativity and feasibility of the proposal.	
Technical Manual (15% mark)	Each group will submit a report of 4 A4 size pages describing technical elements of their building de brochure" – it has to cover the necessary ground both briefly and in sufficient detail. The technical manual will be judgesd on presentation, design rationale, technical content and creativ	
Individual Report (60% mark)	A report of 4-6 A4 size pages showing detailed analysis and outcomes of one selected element of th should clearly explain all relevant assumptions, numerical results, technical figures, with appropriate on the experience of project work in a team. The individual report will be assessed on presentation, design rational and analytical content, integra the design process. The 4-6 page report should be complete in itself. Secondary but relevant material may be included i supplementary and will not be marked. Think of this report as the detail to accompany the previous "brochure" – if you put all of your group's describe your proposal in detail.	

Booklists

Please see the **Booklist for Group D Courses** [4] for references for this module.

Examination Guidelines

Please refer to Form & conduct of the examinations [5].

UK-SPEC

This syllabus contributes to the following areas of the UK-SPEC [6] 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: 23/09/2019 15:49

Links
[1] mailto:rmf41@cam.ac.uk
[2] mailto:mhr29@cam.ac.uk
[3] mailto: ss855@cam.ac.uk, dus20@cam.ac.uk, rmf41@cam.ac.uk, mhr29@cam.ac.uk
[4] https://www.vle.cam.ac.uk/mod/book/view.php?id=364101&chapterid=52231
[5] http://teaching.eng.cam.ac.uk/content/form-conduct-examinations
[6] http://teaching.eng.cam.ac.uk/content/uk-spec