Engineering Tripos Part IIB, 4D13: Architectural Engineering, 2025-26

Module Leader (Engineering)

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Module Leader (Architecture)

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Timing and Structure

Michaelmas term. 8 afternoons. Assessment: 100% coursework

Prerequisites

None

Aims

The aims of the course are to:

- Teach architects and engineers to work in tandem to solve design problems at the intersection of their disciplines.
- Learn to coordinate and integrate aspects of building performace such as structures, energy, embodied carbon, and human well-being.

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.
- Appreciate the principles of architectural engineering through investigation, critical appraisal and selection of appropriate structural and energy systems, materials. and construction techniques.
- Demonstrate proficiency in a specialized design subject matter which integrates with the team’s design solution, such structures, environmental design and building physics, 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 2024 project was to retrofit a derelict building on university of cambridge campus. This year's project will be likely of smaller scale, thus including opportunities to learn about fabrication and delivery.

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.

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

Course Schedule

All classes will be 2.00-5.00pm on Thursdays.

Week 1: Thursday 9th October

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

Weeks 2-5: Thursday 16th October – Thursday 6th 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 13th November

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

Week 7-8: Thursday 20th November - Thursday 27th 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	For
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 Pre non (*Na* *gro* *the*
Group Model Submission Each group will submit a scale model of their design, including fabrication drawings.	Gro Des non
Individual Report A report developing and extending one aspect of the group design.	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 [3].

UK-SPEC

This syllabus contributes to the following areas of the UK-SPEC [4] 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.

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Links
[1] mailto:rc488
[2] mailto:rc488@cam.ac.uk, ak2260@cam.ac.uk
[3] https://teaching26-27.eng.cam.ac.uk/content/form-conduct-examinations
[4] https://teaching26-27.eng.cam.ac.uk/content/uk-spec