Engineering Tripos Part IIB, 4M14: Sustainable Development, 2017-18

Module Leader

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Coursework leader

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Timing and Structure

Michaelmas term. 8 x 2-hour afternoon sessions. Assessment: 100% coursework

Objectives

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

- Understand the history behind the concept of sustainable development in international and national policies.
- Recognise common frameworks for sustainable development.
- Appreciate how engineers can influence sustainable development.
- Begin to appreciate the opportunities and challenges for incorporating sustainability objectives into infrastructure planning and design.
- Argue a sustainable development case in an effective manner.

Content

This course broadens the horizons of engineering through exploring the influence of the political, social and environmental context on developing the built environment. The module will involve discussion on the ways in which engineering is employed to serve the needs of societies, considering both current issues and future impacts. Building on the concept that actions and consequences are interconnected in a global system on which we all depend, the material will involve an examination of the ethics of engineering. Students will be encouraged to draw on their own experiences and explore their personal reactions to a number of situations and issues.

This module aims to challenge students to think about the role of engineers beyond their technical expertise. It will give students the opportunity to engage in a range of perspectives. It is hoped that this will help students to address challenges they face in their professional role, where contextual issues must be considered alongside technical considerations in planning and designing infrastructure.

Each teaching session will include a mixture of a lecture format plus group discussions. Students will be expected to participate fully in all aspects related to the subject.

Introduction to sustainable development (2 lectures)

- Sustainable Development definition
- International policy
- Conceptual frameworks

Sustainability assessment (1 lecture)

- Emergence of sustainability assessment decision-support tools
- Key tool characteristics
- Benefits and limitations

Disaster risk management (1 Lecture)

- Links between sustainable development and disaster management
- Understanding risk
- Vulnerability to natural and man-made hazards
- Resilience

Thinking globally and locally (1 Lecture)

- Global energy availability and use
- Sustainable energy choices?
- Managing supply and demand
- Traditional and renewable energy - technologies and options
- Climate legacy implications

Manufacturing/supply chains (1 Lecture)

- Materials and resource impacts
- Systems analysis

Practitioner viewpoints (2 Lectures - guests)

- UK case studies of infrastructure development through a sustainability lens
- International case studies of infrastructure development through a sustainability lens

Coursework

Students are expected to complete two pieces of coursework. The first coursework will involve a short piece of writing that will respond to a topic on the theme of engineering and sustainable development. This will account for 20% of the total marks and will serve as practice for writing a longer assignment. The second coursework will require students to write an essay (maximum 2500 words), which will account for 80% of the total marks. There will be scope for students to choose a topic that interests them.

Students are expected to do additional research and investigation beyond the course content in order to complete the coursework assignments satisfactorily.

Booklists

Please see the Booklist for Group M Courses [2] for references for this module.

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.

S1

The ability to make general evaluations of commercial risks through some understanding of the basis of such risks.

S3

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

E1

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

P3

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

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: 05/10/2017 21:42

Links
[1] mailto:kam71@cam.ac.uk
[2] https://www.vle.cam.ac.uk/mod/book/view.php?id=364101&chapterid=56241
[3] https://teaching.eng.cam.ac.uk/content/form-conduct-examinations
[4] https://teaching.eng.cam.ac.uk/content/uk-spec