Engineering Tripos Part IIB, 4M14: Sustainable Development, 2016-17

Module Leader

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Lecturer, guest lecturer host

Kristen MacAskill [2]

Coursework leader

Kristen MacAskill [2]

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.

Syllabus

This course broadens the horizons of engineering to explore the influence of the political, social and environmental context on developing the built environment. Students will explore 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 explore the ethics of engineering and the analysis of inter-related systems. 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 explore a wide range of topics. 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
- The social dimension
The environmental dimension
What is ‘enough’? – Key issues and debates
Consultation and decision-making
Infrastructure sustainability assessment

Disaster risk management (1 Lecture)
- Links between sustainable development and disaster management
- Understanding risk
- Vulnerability to natural and man-made hazards
- Resilience

Resources (2 Lectures)
- Global energy availability and use
- Impact of energy production and use
- Managing supply and demand
- Traditional and renewable energy - technologies and options
- Global water availability and use
- Climate legacy implications
- Food-water-energy nexus
- Sustainably-sourced materials

Manufacturing/supply chains (1 Lecture)
- Industrial ecology
- 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, each worth 50% of the course marks. The first assignment requires the students to write an essay (maximum 2000 words) on sustainable development. There will be scope for students to choose a topic that interests them.

The second assignment involves the creating a conceptual plan for a new development in a remote location. The intention is that students demonstrate their knowledge of sustainability principles, detailed knowledge of building design will not be required. This assignment will require a combination of basic calculations for energy use, writing, analytical skills and visual presentation skills.

Students will be 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 [3] for references for this module.

Assessment
Please refer to Form & conduct of the examinations [4].
UK-SPEC

The UK Standard for Professional Engineering Competence (UK-SPEC) [5] describes the requirements that have to be met in order to become a Chartered Engineer, and gives examples of ways of doing this.

UK-SPEC is published by the Engineering Council on behalf of the UK engineering profession. The standard has been developed, and is regularly updated, by panels representing professional engineering institutions, employers and engineering educators. Of particular relevance here is the ‘Accreditation of Higher Education Programmes’ (AHEP) document [6] which sets out the standard for degree accreditation.

The Output Standards Matrices [7] indicate where each of the Output Criteria as specified in the AHEP 3rd edition document is addressed within the Engineering and Manufacturing Engineering Triposes.

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