Engineering Tripos Part IIB, 4M18: Present & Future Energy Systems, 2017-18

Module Leader

Dr P Palmer [1]

Lecturers

Prof J Allwood, Dr P Palmer, Dr I Lestas Dr R Choudhary and Dr S Scott

Timing and Structure

Michaelmas term. 16 lectures + 2 examples classes. Assessment: 100% exam

Aims

The aims of the course are to:

- serve as an introduction for those students who intend to follow an Energy Engineering Pathway, and will be suitable for students in other areas of engineering who think that energy issues will impact their own future careers

Objectives

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

- understand scale of energy production and consumption in the modern world.
- appreciate the systems in place to generate and distribute that energy.
- understand the operation of the existing UK National Grid and the challenges of distributed electricity generation.
- understand and quantify the potential role of alternative energy systems.
- appreciate the scale of the practical engineering challenges over the coming decades.

Content

This course has been designed to serve as an introduction for those students who intend to follow an Energy Engineering Pathway, and will be suitable for students in other areas of engineering who think that energy issues will impact their own future careers. There are major implications in civil, mechanical and electrical engineering for example. This course covers a wide sweep at an introductory level, including the scale of global, national and local energy consumption and the present systems that provide for that energy. Over the next 40 years there is a need to evolve into a lower carbon economy. At a high-level (buildings, transport, energy supplies and distribution), the scale of the challenge is explored and some of the options are introduced. In particular the constraints on deployment are outlined. There is also a particular focus on grid connected electricity, the energy sources connected to it and how this is arranged presently and how the system may change with the changing energy mix. Applications such as transport and electric vehicle charging infrastructure will be considered. A visit to a facility will be arranged if possible.

- (1) Energy in a modern society: introduction: scale (Kelly)
- (2) UK Energy Policy (Allwood)
- (3) Introduction to Interdisciplinary Systems engineering (Allwood)
- (4) The Present Electricity Grid and Mix (Kelly)
- (5) Power System Engineering: Planning, operation, losses, topology, (Palmer)…
- (6) Power System Engineering: Transmission and Stability (Palmer)
- (7) Fossil Fuel Power Sources (Div A Nondas)
- (8) Carbon Capture Technologies (A-Scott)
- (9) Renewable Power Sources (Div B)
- (10)Connecting sources of energy to the grid (Lestas)
- (11) Decentralised control and the Smart Grid (Lestas)
- (12) The Energy challenge of 2011 - 2050 (MacKay/Kelly)
- (13) Introduction to Exam Problems: Examples Class (Kelly)
- (14) The Future Built Environment: Sustainable, energy-efficient and climate resilient (Kelly)
- (15) Energy Scenarios and the European Supergrid (Palmer)
- (16) Overview of System Operation: Guest lecture (Div A/B/C to provide)

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].

Last modified: 10/10/2017 13:30

Source URL (modified on 10-10-17): http://teaching.eng.cam.ac.uk/content/engineering-tripos-part-iib-4m18-present-future-energy-systems-2017-18

Links
[1] mailto:prp11@cam.ac.uk
[2] https://www.vle.cam.ac.uk/mod/book/view.php?id=364101&chapterid=56281
[3] http://teaching.eng.cam.ac.uk/content/form-conduct-examinations