The University Of Sheffield.

Electronic & Electrical Engineering

EEE124 ENERGY IN THE HOME

Credits: 10

Course Description including Aims

This module introduces the concepts of electricity and energy in the home. It is aimed at a wide audience and answers those questions that many people have about energy, electricity and 'renewables' but don't know who or how to ask. The module will use only basic arithmetic maths - multiplication, division, addition and subtraction. Renewable energy sources such as solar PV panels, small wind turbines and heat pumps will be described. What savings can you really make? Petrol vs diesel cars, how does electric fit into the picture? It also covers the generation and distribution of electricity.

Outline Syllabus

Energy Physics and Chemistry (carbon, nuclear, sustainable); ***Energy*** units and simple energy calculations; ***Energy generation***– coal, gas, oil, nuclear fission and fusion power stations; Electric energy generation – steam turbine, electromagnetic induction; ***Sustainable energy generation*** – solar, wind hydro, geothermal; Sheffield Direct Energy Network; ***Electrical energy distribution*** from power station to home - the power grid; Electrical energy distribution in the home; ***Electrical safety***; ***Energy use at home*** - space heating, insulation, water heating, lighting, raw materials, 'white goods'; ***Transport*** – electric vs petrol car; ***Domestic energy consumption calculations***.

Time Allocation

The module will comprise a series of 20 formal lectures plus problem classes.

Recommended Previous Courses

Degree entry requirements.

Assessment

The course will be assessed by a single computerized multiple choice examination.

Recommended Books

'*Sustainable energy without the hot air*' DJC MacKay, UIT Cambridge, 2009 Book downloadable *for free* from: www.withouthotair.com

'*Energy Systems and Sustainability'* G Boyle, B Everett and J Ramage, Oxford Press, 2003.

Learning Outcomes

By the end of the unit, a student will be able to:

1) outline the reasons that led to the present forms of domestic energy delivery.

2) perform simple power consumption calculations
3) appreciate the vital function of fuses
4) demonstrate the ability to distinguish between forms of energy usage within a home
5) describe the differences between various renewable energy generation options available to the householder.
6) appreciate the differences between the various electric vehicle configurations.

UK-SPEC/IET Learning Outcomes

Outcome Code	Supporting Statement
SM1p/SM1m	Basic chemistry and physics behind heat generation (combustion, nuclear fusion/fission). Thermodynamics.
SM2i	Simple maths only (+-*/).
SM3p/SM3m	Introduction to mechanical and chemical aspects of electricity generation. Basics of atmospheric science relating to global warming.
EA1p/EA1m	Power station design and electricity generation (electromagnetic induction).
D2p / **D2m**	CO_2 reduction targets. Safety of electricity distribution and use.
ET2p / **ET2m**	Cost implications of various power generation strategies.
ET4p / **ET4m**	Discussion of sustainable energy generation – solar, wind, hydro, etc.
ET5p / **ET5m**	Mention of climate legislation/agreements (Kyoto, etc).
D3i / D3p	Calculating domestic energy demands requires many assumptions and approximations to be made
D6i / D6p	The main assessment for this module is by way of a group presentation.
ET2fl / ET2p	Awareness of commercial and social context: energy generation is fraught with political, social and environmental considerations. These are explored in this module.
ET4fl / ET4p	'Green' energy is discussed in this module.