Liverpool John Moores University

Title:	Engineering Principles for Energy Systems
Status:	Definitive
Code:	**5510ENGSBC** (119421)
Version Start Date:	01-08-2016
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	The Sino-British College

Team	Leader
Russell English	Y

Academic Level:	FHEQ5	**Credit Value:**	12	**Total Delivered Hours:**	37
Total Learning Hours:	120	**Private Study:**	83		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	20
Tutorial	15

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	Investigat		40	
Exam	exam		60	2

Aims

This module will provide students with the necessary engineering and economic principles to understand the operation and selection of technologies for energy generation and distribution.

Learning Outcomes

After completing the module the student should be able to:

1 Demonstrate understanding of the engineering principles underpinning thermodynamic power-plant
2 Demonstrate understanding of the engineering principles underpinning renewable energy power-plant
3 Appraise the appropriateness of different types of power plant for particular applications and load including life cycle costs
4 Evaluate the fuel and/or resource requirement and consequences of using a particular energy system (including life cycle costs).

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Power Generation	4		
2 hours; 3 from 5 questions	1	2	3

Outline Syllabus

Engineering Principles of Thermodynamic Power Cycles: Air, Rankine and Combined. Their practical performance limit and efficiency. Also how the power cycle is adapted for nuclear fuel and some consequences of this choice of fuel.

Fluid mechanical principles of Wind and Hydro Plant. Principle of photovoltaic electrical generation including the implications of power-insolation curve. Statistical analysis of wind data. Distinction between types of solar radiation. Relationship between incident and panel angle. Systemic implications of variability of supply for wind and PV.

Applicability of energy-plant to the various type and size of load e.g. large base-load or small peak power requirement. The fuel or weather requirement for each type of plant in order to operate effectively.

Basic Life-Cycle costs for energy plant based on present and anticipated fuel costs.

Learning Activities

Delivered with a range of lectures, tutorials and case studies.

Notes

This module will provide students with an understanding of the engineering principles associated with both conventional and renewable energy power plant. Also students will be able to appraise the appropriateness of a particular power plant in terms of load and life cycle costs, as well as the resource requirements and consequences of

using a particular energy system.