Liverpool John Moores University

Title:	SUSTAINABLE BUILDING SERVICES ENGINEERING
Status:	Definitive
Code:	**6143UG** (102666)
Version Start Date:	01-08-2011
Owning School/Faculty:	Built Environment
Teaching School/Faculty:	Built Environment

Team	Leader
Laurence Brady	Y

Academic Level:	FHEQ6	**Credit Value:**	12.00	**Total Delivered Hours:**	57.00
Total Learning Hours:	120	**Private Study:**	63		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	42.000
Tutorial	12.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Choice of questions	50.0	3.00
Report	AS2	Assignment	50.0	

Aims

To provide students with an understanding of the environmental consequences of energy use in general and via building services installations in particular.
To provide students with the knowledge and skills to critically evaluate the environmental and economic benefits of various strategies and technologies for reducing the energy usage and environmental impact of building services.

Learning Outcomes

After completing the module the student should be able to:

1 Critically analyse the requirements of the main climate change agreements and protocols and the contribution of the building services engineers in meeting these objectives.
2 Evaluate the relative features of alternative energy and water sources and establish the feasibility of their usage for specific applications.
3 Citically analyse existing building services engineering designs and proposals to establish effective strategies for achieving more sustainable solutions and energy efficient buildings.
4 Critically evaluate energy and environmental performance rating of buildings and their services installations and make comparisons with established performance indicators and targets.

Learning Outcomes of Assessments

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

EXAM	1	2	
REPORT	2	3	4

Outline Syllabus

Climate Change and Depletion of Natural Resources:
How energy is derived, generated and transported. Energy utilisation and environmental impact. Water resource demands of building services. The need for conservation and reform. International environmental agreements and protocols. The role of the building services engineer in meeting the objectives of the climate change programme.
Energy sources and sustainability of alternative energy sources:
Sustainability in the generation and utilisation of energy and water. Application and economics of renewable energy sources; conventional solar systems, photovoltaic, active and passive solar energy systems. Hydro-electric, wind, bio-mass, waste incineration, combined heat and power. Ground source heat pumps, use of ground water as an energy medium or for domestic water usage. Rainwater harvesting, use of water recovery or grey water schemes.
Energy efficient design:
Role of the building services engineer within the building design team. Energy efficient solutions for maintaining the internal environment. Designing for reduced energy requirements and carbon emissions. Heat recovery technologies and opportunities. Technology, application and economics of CHP. Sizing and selection of M&E building services plant and equipment to minimise energy requirement and environmental impact. Techniques for cooling load reduction. Free and passive cooling techniques, applications and strategies. Role of controls, BMS, commissioning and hand over procedures in energy reduction.
Energy Audit and Performance Rating
Determining the energy utilisation, performance and running costs for commercial buildings. Assessing the energy and CO2 performance of buildings and their

services against legislative requirements, energy performance indicators and benchmarks. Strategies, procedures and techniques for assessing carbon emission. Carbon Trading, creating a low carbon economy.

Learning Activities

Lectures, tutorials, case studies.

References

Course Material	Book
Author	CIBSE
Publishing Year	2004
Title	Guide F: Energy Efficiency in Buildings
Subtitle	
Edition	
Publisher	CIBSE
ISBN	1903287340

Course Material	Book
Author	CIBSE
Publishing Year	2006
Title	TM38 Renewable Energy Sources for Buildings
Subtitle	
Edition	
Publisher	CIBSE
ISBN	1903287731

Course Material	Book
Author	CIBSE
Publishing Year	2006
Title	TM22 Energy Assessment and Reporting Methodology (inc CD-Rom)
Subtitle	
Edition	2nd Edition
Publisher	CIBSE
ISBN	190328760X

Course Material	Book
Author	Pitts, A.
Publishing Year	2003
Title	Planning and Design Strategies for Sustainability and Profit
Subtitle	
Edition	

Publisher	Architectural Press
ISBN	0750654643

Course Material	Book
Author	CIBSE
Publishing Year	2000
Title	TM22 Understanding Photovoltaics
Subtitle	
Edition	
Publisher	CIBSE
ISBN	1903287731

Course Material	Book
Author	CIBSE
Publishing Year	1999
Title	AM12 Small Scale Combined Heat and Power
Subtitle	
Edition	
Publisher	CIBSE
ISBN	0900953926

Course Material	Book
Author	CIBSE
Publishing Year	2000
Title	TM36 Climate Change and the Indoor Environment: impacts and adaptation
Subtitle	
Edition	
Publisher	CIBSE
ISBN	1903287502

Notes

The module provides students with an understanding of the environmental consequences of energy use in general and via building services installations in particular. It also provides students with the knowledge and skills to critically evaluate the environmental and economic benefits of various strategies and technologies for reducing the energy usage and environmental impact of building services.