Module Proforma

Approved, 2022.04

Summary Information

Module Code	6336BEUG
Formal Module Title	Low Carbon Systems and Sustainability
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 6
Grading Schema	40

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Hu Du	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings
Laurence Brady	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings

Teaching Responsibility

LJMU Schools involved in Delivery
Civil Engineering and Built Environment

Learning Methods

Learning Method Type	Hours
Lecture	20
Tutorial	20

Module Offering(s)

Offering Code	Location	Start Month	Duration
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	To investigate the environmental consequences of energy use in buildings with particular reference to building engineering systems and services.To critically evaluate the environmental and economic benefits which are consequent on the specification of various building engineering systems including low and zero carbon technologies.To examine processes for the assessment of building energy loads at feasibility and post construction stages.

Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Evaluate the practicality, appropriateness and energy use implications of various types of building engineering systems which are used to control the internal environments of buildings.
MLO2	Evaluate the practicality of various low and zero carbon technologies in different construction scenarios.
MLO3	Evaluate the engineering implications of zero carbon statutory and non- statutory guidance and regulations
MLO4	Critically examine the energy and environmental performance rating of buildings and make comparisons with established performance indicators and targets.

Module Content

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 building engineering professionals 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 building engineering professionals 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 CO_2 performance of buildings and their services against legislative requirements, energy performance indicators and benchmarks. Strategies, procedures and techniques for assessing carbon emission. Decarbonisation of heating systems.

Module Overview

In this module students investigate the environmental consequences of energy use in buildings with particular reference to building engineering systems and services. You will critically evaluate the environmental and economic benefits which are consequent on the specification of various building engineering systems including low and zero carbon technologies and examine processes for the assessment of building energy loads at feasibility and post construction stages.

Additional Information

The module provides an understanding of the environmental consequences of energy use in general and via building services installations in particular. It also provides the knowledge and skills to critically evaluate the environmental and economic benefits of various strategies and technologies for reducing the energy usage. On the Building Services Engineering Degree Apprenticeship programme, the knowledge learning outcomes is K4, the skills learning outcomes are S1, S2, S3 and S8, and the behaviours learning outcomes is B5.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Report	Report	70	0	MLO2, MLO3, MLO1

Centralised Exam	Examination	30	2	MLO2, MLO4, MLO3, MLO1