Module Specification

Energy Conservation in the Built Environment

Version: 2023-24, v2.0, 25 Jan 2023

Contents

Part 1: Information

Module title: Energy Conservation in the Built Environment

Module code: UBLMMU-30-2

Level: Level 5

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Environment & Technology

Department: FET Dept of Architecture & Built Environ

Partner institutions: None

Delivery locations: Frenchay Campus, Global College of Engineering and Technology (GCET)

Field: Architecture and the Built Environment

Module type: Module

Pre-requisites: None

Excluded combinations: Building Physics and Services 2023-24

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: This module aims to teach students the basics of energy conservation in the built environment – buildings and transport – giving students a

solid technical basis for the management and policy aspects explored in other modules.

In addition to Learning Outcomes, the educational experience may explore, develop, and practise but not formally discretely assess the following:

The broadening of information literacy with an introduction to a wide range of information types and sources.

Outline syllabus: Element 1 – Internal Environments, Science and Sustainability: the historical context;
Health and wellbeing in buildings; vernacular environments; air quality; the role of material science; the climate change context; the resource depletion context; the energy security context.

Element 2 – Human Thermal Comfort and Thermal Performance of Structures:
Thermal comfort; microclimates; heat loss in buildings; thermal insulation; air-tightness; casual and solar heat gains; thermal mass; passive cooling techniques; natural ventilation; condensation.

Element 3 – Mechanical Heating, Ventilation and Air Conditioning:
Space heating systems; mechanical ventilation; comfort cooling; humidity control; heat pumps; heat recovery, community heating.

Element 4 – Transport:
National transport policy and climate change; vehicle technology; potential for modal shift to walking, cycling and public transport; behaviour change; transport and spatial planning; aviation and shipping; freight and logistics.

Element 5 – Visual Comfort and Lighting:
Fundamentals of light and colour; workings of the eye; daylight in buildings; lamp technologies; luminaire geometry; lighting layouts; lighting control; lighting applications; emergency lighting; way-finding.

Element 6 – Electrical Power and Communications:
Electricity; electrical distribution; micro-generation; motors; power quality; IT networks; server rooms; wireless systems; lightning protection.

Element 7 – Boilers and Hot Water:
Combustion; stoichiometry; flue gas analysis; condensing boilers; combi-boilers; water cylinders; solar thermal; hot water distribution losses.

Element 8 – Controls – Building Management System:
Open and closed loop control; time switches; occupancy sensors; temperature, daylight, humidity and CO2 sensors; interlocks; control strategies.

Note: all elements are not weighted equally in study or assessment time

Part 3: Teaching and learning methods

Teaching and learning methods: Contact time including site visits: 72 hours

Assimilation and development of knowledge: 148 hours

Exam preparation: 40 hours

Coursework preparation: 40 hours

Total study time: 300 hours

For directed study students should carry out the learning activities given to them in each element, covering topics from lectures and essential reading sources.

For self-directed study, students should study aspects of the topics they find most interesting, recording their findings in a structured and coherent set of course notes.

Each element of syllabus will involve an introduction of the topics through lecture,

when students will receive an explanation of the context of the subject and an indication of the depth to which they are expected to study it. Topics will then be explored further in practical lab-based activities and tours of campus facilities.

Students will be supported in their study with on-line resources including publications, websites, video clips and blackboard resources.

Finally students will be supported in tutorials to analysis issues and solve related problems as required in assessments.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Explain the processes by which buildings have typically interacted with their physical environment and how that might differ in a sustainable context

MO2 Identify the aspects of environmental physics and building services that impact a building's carbon footprint

MO3 Explain the purpose and operation of simple Building Services Systems

MO4 Explain the main elements of UK Government policy on transport and climate change, and the main challenges involved in meeting national targets

MO5 Discuss the potential for energy and carbon reductions in transport from technological, behavioural and structural policy options

MO6 Perform the fundamental calculations associated with thermal comfort, heat balance, heating, cooling and ventilation in buildings, indicating the relevance of the results

MO7 Write a technical assessment of the energy conservation possibilities associated with the built environment

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/UBLMMU-30-2.html

Part 4: Assessment

Assessment strategy: The examination is used to concentrate students' attention on assimilating the factual and conceptual content of the module.

Exam - will contain short answer question to test general knowledge of the subject and apply problem solving skills to typical energy conservation scenarios in the built environment.

Portfolio - Coursework is used to improve technical report writing while analysing the practical implications of energy conservation in different systems associated with the built environment. Every element of the module will contain a directed piece of coursework that students will be expected to undertake. A selection of this work will then be submitted for assessment.

Resit Exam - students shall undertake another exam to the same format as the first attempt.
Resit Portfolio - students shall submit an improved version of their written work to the same brief as the first attempt.

Assessment components:

Examination (First Sit)
Description: Exam (3 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Portfolio (First Sit)
Description: Portfolio (3000 words)
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO6, MO7

Examination (Resit)
Description: Exam (3 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Portfolio (Resit)
Description: Portfolio (3000 words)
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO6, MO7

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Energy Technology and Management {Foundation} [Oct][FT][GCET][4yrs] BSc (Hons) 2021-22

Energy Technology and Management {Foundation} [Feb][FT][GCET][4yrs] BSc (Hons) 2021-22