Module Specification

Zero Carbon Buildings (Energy Management and Performance)

Version: 2022-23, v1.0, 19 Jul 2022

Contents

Part 1: Information

Module title: Zero Carbon Buildings (Energy Management and Performance)

Module code: UBLMM1-30-3

Level: Level 6

For implementation from: 2022-23

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: Arnolfini

Field: Architecture and the Built Environment, LLE

Module type: Standard

Pre-requisites: Zero Carbon Buildings (Technology and Modelling) 2022-23

Excluded combinations: Energy Management and Performance Evaluation 2022-23, Interactive Systems and Comfort Controls 2022-23

Co-requisites: None

Continuing professional development: Yes

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: BEFORE: Learners joining this level 6 course are expected to have fundamental knowledge of building physics (such as the heat-balance equation), as covered in the level 4 course Zero Carbon Buildings (Environments and Materials) and the skills to apply zero carbon design theory, as covered in the level 5 course Zero Carbon Buildings (Technology and Modelling).

DURING: Learners will gain ability to critically evaluate an energy retrofit proposal for a given case study building, including technical aspects, economic costings and impact on human factors.
AFTER: Upon completion of the course, learners shall have the skills to undertake retrofit coordination and energy management roles for conventional commercial buildings.

Features: This module has been designed to be delivered as a stand-alone credit-bearing short course, meeting the criteria for Lifelong Loan Entitlement funding through the Student Loan Company.

The learning outcomes map directly to the existing UWE modules UBLMGP-15-3 and UBLLHP-15-3, which form part of our BEng (Hons) Building Services Engineering and BEng (Hons) Architecture and Environmental Engineering programmes and so learners who progress to the full programme can use the short course to offset these credits. Hence, this course is an excluded combination of these similar modules.

As this module can be taken as a stand-alone short course, where learners may lack the peer support and institutional knowledge of students on full degree programmes, the course has been designed to meet the highest standard of inclusive design, including:
-A primary in-person teaching environment, that represent at least 72 contact hours out of a total 300 hours of learning (25%).
-A secondary online learning environment where material is available in digital formats, including recordings of in-person delivery.
-Learning material and online reading publications in formats more accessible to neurodiverse learners.
-Each element of learning shall be divided into short presentations on theory, followed by interactive learning activities, using technology enhanced learning, detailed session plans and related reading lists.
-Where possible the use of hands-on learning equipment and real-world case studies, will be used to give the learning a professional focus.

Educational aims: See learning outcomes.

Outline syllabus: Management in the Energy Industry: structure of the energy supply industry, energy-use regulations and certification schemes, incentive schemes, energy in facility management, energy markets, tariffs.

Data Gathering and Analysis: data gathering techniques, energy audits, monitoring and instrumentation, metering and sub-metering, EBMS systems, surveying, CUSUM analysis, Sankey diagrams, benchmarking.

Performance Evaluation: technical and financial analysis of: mechanical systems, control systems, electrical systems; encouraging energy efficient behaviour change; soft landings.

Human factors in building performance: user movement in buildings; visual effects on users; predicting user behaviour in response to audio/visual signalling and design semantics of interactive objects; sensors and smart technologies.

Facilitating a sustainable use of energy technologies: using semantic design to encourage low energy use of buildings; interface with HVAC controls; energy-use feedback; user education of technical systems.

Part 3: Teaching and learning methods

Teaching and learning methods: Regular online (flipped) lectures are to introduce topics, define the scope of learning required and provide initial conceptual development.
Lectures are followed by supervised face-to-face tutorial/seminar sessions to reinforce cognitive development and provide feedback. Supervised tutorials provide guidance in applying quantitative methods required for solving problems, and provide feedback on independent learning and activities undertaken in support of the planned site visits. Software workshops are used to support student learning data analysis software.

Directed independent learning in this module includes time engaged with essential

reading, completion of tutorial exercise drills, preparation for, and completion of, summative assignment.

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

MO1 Propose an energy retrofit plan for a case study building, informed by a thorough review of academic literature and related site evaluations of such aspects as functionality, comfort, energy, sustainability and user satisfaction, using a range of recognised procedures, monitoring equipment and software.

MO2 Prepare a feasibility report for an energy related project in an existing building, accounting for energy generation/efficiency projections, technology assessment, regulation compliance, qualification for incentive schemes, lifecycle costs and user acceptability

MO3 Defend the usability of the retrofit proposal, when faced by conflicting requirements of owners, users, maintainers, constructers and designers and present the feasibility study to a critical audience, clearly evaluating the risks and opportunities.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

E-learning/online learning = 24 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/ublmm1-30-3.html

Part 4: Assessment

Assessment strategy: Component A: Presentation - using an audio visual aid (such as PowerPoint) learners shall defend their energy retrofit proposal for a given case study building, from a critical audience.

Component B1: energy retrofit initial proposal, including site analysis requirements, literature review and human factor consideration.
Component B2: feasibility report of an energy retrofit proposal including performance data analysis, costing and monitoring proposal.

Resit shall be the same assessment strategy with alternative questions as appropriate.

Assessment components:

Presentation - Component A (First Sit)
Description: Defend the energy retrofit proposal (20 mins).
Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO3

Report - Component B (First Sit)
Description: Energy Retrofit Report
Submit a report outlining the proposal for the energy retrofit of a given case study building, the related site analysis, supported by a review of academic and professional literature and consideration of the role that human factors may play in the success of the proposal (2,000 words).
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1

Report - Component B (First Sit)
Description: Energy Feasibility Report
Final feasibility report covering analysis of performance data, costing, monitoring proposal and SWOT analysis of human factors (3,000 words).
Weighting: 50 %
Final assessment: No

Group work: No
Learning outcomes tested: MO2

Presentation - Component A (Resit)
Description: Defend the energy retrofit proposal (20 mins).
Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO3

Report - Component B (Resit)
Description: Energy Retrofit Report
Submit a report outlining the proposal for the energy retrofit of a given case study building, the related site analysis, supported by a review of academic and professional literature and consideration of the role that human factors may play in the success of the proposal (2,000 words).
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1

Report - Component B (Resit)
Description: Energy Feasibility Report
Final feasibility report covering analysis of performance data, costing, monitoring proposal and SWOT analysis of human factors (3,000 words).
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2

Part 5: Contributes towards

This module contributes towards the following programmes of study: