



Module Specification

Low Carbon Building Services

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Part 1: Information

Module title: Low Carbon Building Services

Module code: UBLMN7-30-3

Level: Level 6

For implementation from: 2021-22

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, School for Higher and Professional Education

Field: Architecture and the Built Environment

Module type: Standard

Pre-requisites: None

Excluded combinations: Energy Transformations 2021-22

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: See Learning Outcomes

Outline syllabus: Fuels and combustion: combustion principles, burner technology and control, fuel storage and handling; sustainable fuels - biofuels and energy from waste; anaerobic digestion; pyrolysis and fuel modification processes;

Boilerhouse practice and system design: hot water and steam generation; plant management and operation; boiler testing and rating; flue gas analysis; emissions control and dispersion; flue and chimney design

On-site electricity generation and storage: diesel generators; battery systems; uninterruptable power supplies; microgeneration; combined heat and power; trigeneration; fuel cells and hydrogen cycles

Solar energy: solar data and geometry, estimation of solar irradiance, active thermal solar collectors, photo-voltaic energy systems; building integrated PV;

Thermal Simulation of Buildings and Services: Introduction to computational fluid dynamics (CFD); dynamic behaviour of materials, space heating, thermal mass; fluid flow, heat transfer and heat exchange; thermal modelling of buildings and artificial lighting.

Lighting Services: user requirement, design calculations, lamp technologies, luminaire technologies, energy efficiency, health and comfort performance.

Energy Modelling: Energy benchmarking; CO2 emissions; compliance software.

Part 3: Teaching and learning methods

Teaching and learning methods: Contact time: 72 hours

Assimilation and development of knowledge: 148 hours

Exam preparation: 40 hours

Coursework preparation: 40 hours

Total study time: 300 hours

Scheduled learning Lectures are to introduce topics, define the scope of learning required and provide initial conceptual development. Lectures are followed in the subsequent week by supervised 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 simulation software.

Independent learning Directed independent learning in this module includes time engaged with essential reading, completion of tutorial exercise drills, preparation for and subsequent analysis of laboratory investigations, preparation for, and completion of, summative assignment. Time spent on independent learning should be in the order of 4-5 hours per week.

Module Learning outcomes:

MO1 Develop appropriate low carbon design strategies for a building and estimate the building performance using computational methods

MO2 Develop and simulate energy efficient lighting systems for complex installations

MO3 Critically evaluate the thermal response of buildings under dynamic conditions and estimate the carbon impact design alternatives

MO4 Define the design tasks associated with quantifying sustainable use of energy, water, materials, light and sound

MO5 Critically evaluate the design proposals for engineering plant and systems involving the production, generation and conversion of energy

MO6 Quantitatively analyse energy systems to evaluate inputs/outputs, efficiencies, life-cycle costing, carbon intensity and associated performance criteria

MO7 Plan and execute test procedures to establish plant operation characteristics, record and analyse data, and report results using appropriate forms

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](https://uwe.rl.talis.com/modules/ublmn7-30-3.html) via the following link <https://uwe.rl.talis.com/modules/ublmn7-30-3.html>

Part 4: Assessment

Assessment strategy: Reports are appropriate forms of assessment as they draw together different aspects of the theory being discussed in a format that would be used in industry. An examination ensures students are focused on turning their learning into a meaningful output.

The Assessment:

Summative assessment will be via a combination of formal set exercises and coursework assignment, as follows:

Component A - Recorded Presentation of 15mins – Students complete set calculations, then prepare and submit a recorded presentation to explain the steps in their calculations and the application of these in practice, relating to topics from across the module content

Component B – Portfolio Report covering:

Part B1 – report into a low carbon design strategy and building fabric thermal and light performance analysis.

Part B2 - report taking account of the likely inclusion of graphical, quantitative and computer-generated outputs.

Formative feedback and preparation for Component A will be undertaken in the programme of scheduled tutorials.

Assessment components:

Set Exercise - Component A (First Sit)

Description: Recorded Presentation (15 mins) of Calculations and Application

Weighting: 25 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO4, MO5, MO6

Report - Component B (First Sit)

Description: Portfolio (4000 words)

Weighting: 75 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO7

Set Exercise - Component A (Resit)

Description: Recorded Presentation (15mins) of Calculations and Application

Weighting: 25 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO4, MO5, MO6

Portfolio - Component B (Resit)

Description: Report (4000 words)

Weighting: 75 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO7

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Building Services Engineering {Top-Up} [Aug][FT][SHAPE][1yr] BEng (Hons) 2021-22

Building Services Engineering {Top-Up} [Aug][PT][SHAPE][2yrs] BEng (Hons) 2021-22

Architecture and Environmental Engineering [Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20

Architecture and Environmental Engineering [Sep][FT][Frenchay][4yrs] BEng (Hons) 2019-20

Architecture and Environmental Engineering {Foundation} [Sep][SW][Frenchay][6yrs] BEng (Hons) 2018-19

Architecture and Environmental Engineering {Foundation} [Sep][FT][Frenchay][5yrs] BEng (Hons) 2018-19

Building Services Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2019-20