EV7134 Module Specification

Module Title: Low and Zero-Carbon Buildings	**Module Code: EV7134** **Level: 7** **Credit: 15** **ECTS credit: 7.5**	**Module Leader**: Frances Hill
Pre-requisite: none	**Pre-cursor: none**	
Co-requisite: none	**Excluded combinations: none**	**Suitable for incoming study abroad?** N

Location of delivery: CAT and online – blended delivery

Summary of module for applicants:

This module takes a detailed view of the requirements for new and retrofitted buildings to meet Low and Zero Carbon emission status and aims to enable students to:

Develop a deep understanding of the principles and consequences of energy and mass flows in buildings in terms of the building's orientation and the local climatic conditions.

Build a sound appreciation of how the energy transfers in buildings may be manually calculated, modelled, and simulated in computer modelling suites and how this is vital to optimise the design for energy efficiency.

Further hone a systematic, holistic, multidisciplinary, and analytical approach to the critical appraisal of passive and energy efficiency design, heat and moisture flows in new builds and renovations, with respect to the demands of climate change adaptation and the principles of sustainability.

Main topics of study:

- Energy and Mass flows in Buildings
- Post occupancy evaluation of building performance
- Thermal bridges
- Thermal mass in buildings
- Airtightness, ventilation and cooling
- Solar Gains
- Movement of moisture in building fabric
- Relative humidity, internal moisture control and moisture buffering
- Computer simulation of thermal and hygroscopic building performance
- Low and zero carbon buildings, including Passivhaus
- Retrofit – techniques, importance of continuity, detail
- Retrofit – consumer challenges

This module will be able to demonstrate at least one of the following examples/ exposures

Live, applied project ☐
Company/engagement visits ☒
Company/industry sector endorsement/badging/sponsorship/award ☐

Learning Outcomes for the module

Where a LO meets one of the UEL core competencies, please put a code next to the LO that links to the competence.

- *Digital Proficiency - Code = (DP)*
- *Industry Connections - Code = (IC)*
- *Social & Emotional Intelligence - Code = (SEI)*
- *Physical Intelligence - Code = (PI)*
- *Cultural Intelligence - Code = (CI)*
- *Community Connections & UEL Give Back - Code = (CC)*
- *Cognitive Intelligence – Code = (COI)*
- *Enterprise and Entrepreneurship (EE)*

At the end of this module, students will be able to:

Knowledge

1. Demonstrate a clear understanding of the principles of energy transfers and ventilation, condensation, moisture movements in buildings and passive building services in the contextof the design and refurbishment of buildings under an adaptation and sustainability remit (COI) (IC)

Thinking skills

2. Critically evaluate a building's design or proposed renovations to a building in terms ofeffectiveness in providing occupant comfort, energy efficiency, potential for rot and decay, wider environmental impacts and resilience to climate change (COI) (EE)

Subject-based practical skills

3. Demonstrate skills in numerical analysis applied to energy flows in buildings (DP)

Skills for life and work (general skills)

4. Effectively communicate (written and visual) to a wider audience (DP) (SEI) (CI)

Teaching/ learning methods/strategies used to enable the achievement of learning outcomes:
For students studying onsite and by distance learning:

The factual content of the module is taught through lectures, seminars, practical workshops, presentations, demonstrations and tutorials, and throughout this process an active exchange of views and opinions is encouraged. Students have access to MS Teams where they can access recorded and written support material, meet with their peers and a tutor to discuss any academic issue. Both theoretical and practical aspects are covered both onsite and through interactive sessions on Teams.

There is a formative learning element to the module to allow the students to receive critical feedback on their work without the pressure of marked assessment.

For distance learning (DL) students, learning will be supported through streamed and recorded Internet-based lectures (of the onsite lectures), situation related practical exercises, seminars and tutorials.

Lectures onsite and through MS Teams highlight key concepts, models and frameworks, and integrate additional resources (such as journal articles). They encourage deep learning through the use of self-assessment questions which encourage students to engage with the topic, to help students understand new topics and skills.

Assessment methods which enable students to demonstrate the learning outcomes for the module; please define as necessary:	**Weighting:**	**Learning Outcomes demonstrated:**
1. Case study – building refurbishment (2400 words max)	80%	1,2,3,4
2. Individual visual presentation (600 words equivalent)	20%	4

Reading and resources for the module:
These must be up to date and presented in correct Harvard format unless a Professional Body specifically requires a different format
Core

McMullan, R., (2017) *Environmental Science in Building* 8th Edition, London: Palgrave Macmillan.

Recommended

Attia, S. (2018) Net zero energy buildings (NZEP): Concepts, frameworks and roadmap for project analysis and implementation. Elsevier, Oxford.

Chartered Institute of Building Services Engineers (CIBSE), 2019, Environmental Design – CIBSE Guide A, London

Chartered Institution of Building Services Engineers, 2015 Building performance modelling. 2nd edition Applications Manual AM 11

Chartered Institution of Building Services Engineers, 2018 Application of soft landings and government soft landings in building services engineering Digital Engineering Series DE9

Chartered Institution of Building Services Engineers, 2020 Operational performance - surveying occupant satisfaction Technical Memoranda TM 62

LETI (2021) LETI Climate Emergency Retrofit Guide - How existing homes can be adapted to meet UK climate targets. LETI, London. (available from: https://www.leti.london/retrofit)

Further relevant website and other relevant resources, including CAT dissertations, will be provided within reading materials that are made available for the module.

Provide evidence of how this module will be able to demonstrate at least one of the following examples/ exposures

Live, applied project

Company/engagement visits Within the module we schedule lectures and practical sessions from a range of lecturers and external experts working in practice in the field. Over the past few years, these have been: Marion Lloyd Jones – Carbon Coop Diane Hubbard – GreenFootsteps John Butler – Sustainable Building Consultancy Nick Parsons - sustainablebuilding.org.uk ***Company/industry sector endorsement/badging/sponsorship/award***

Indicative learning and teaching time **(10 hrs per credit):**	**Activity**
1. Student/tutor interaction:	Lectures, seminars, tutorials, presentations, practicals / demonstrations **30 hours**
2. Student self learning and research time:	Seminar reading and preparation, assignment preparation, background reading, and research activities. **120 hours**
Total hours:	**150 hours**

For office use only. (Not required for Programme Handbook)

Assessment Pattern for Unistats KIS (Key Information Sets)	**Weighting:**
Coursework *(written assignment, dissertation, portfolio, project output)*	
Practical Exam *(oral assessment, presentation, practical skills assessment)*	
Written Exam	

HECoS Code:	
UEL Department:	