

Module Details	
Module Title	Environmental Systems in Buildings
Module Code	CSE5020-B
Academic Year	2024/5
Credits	20
School	School of Built Environment, Architecture & Creative Industries
FHEQ Level	FHEQ Level 5

Contact Hours	
Type	Hours
Directed Study	140
Lectures	24
Tutorials	36

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Academic Year

Module Aims
<p>Maintaining and improving the quality of our environment is important to life and to the quality of life. In depth understanding of the climate and environment are an integral part of the design process. It seeks to help students develop critical stances concerning the role that environmental design plays in facilitating occupants' satisfaction and comfort in the indoor environment. This module aims to:</p> <p>Introduce the ways buildings use energy; methods of matching these demands through renewables and low-energy systems; and techniques for assessing the carbon footprint and performance of the building using benchmarking, monitoring, and evaluation.</p> <p>Provide students the ability to reflect on the appropriate environmental strategies and systems that respond to the needs of the occupant, building programme and prevailing climate.</p> <p>Offer the opportunity to explore and appreciate the main steady state and dynamic energy flows that occur with and within a building; understanding of the heat loss / gain mechanisms that occur within a building and an appreciation of the integrated ?servicing? required to manage these flows.</p> <p>Provide students the ability to integrate environmental design strategies in new as well as in existing buildings (as a means of retrofit) in a rigorous manner using a range of analytical tools and techniques in a creative and rigorous manner</p>

Outline Syllabus

Introduction to planning and design for human comfort

Introduction to climate, units of heat and energy; temperature, sensible and latent heat capacity.

Climate: The sun; Sun-path diagrams; Solar radiation, Global climate, greenhouse effect

Thermal comfort: personal variables; physical variables; construction; average U values? heat transfer through roofs and floors; and ventilation heat loss. Concepts of solar and internal gains.

Thermal behaviour of buildings: Solar control; Shading design; Radiation calculations; Solar heat gain

Thermal Bridging ? Structural and Geometric

Dynamic Heat Flows within Buildings

Lifecycle Analysis / Environmental Impact Assessment

PassivHaus, Environmental Assessment Methods (e.g. BREEAM, LEED, etc.)

Ventilation: Buoyancy Driven Ventilation, and Wind Driven Ventilation

Energy / Carbon Auditing of Buildings

Energy Efficient / Renewable Technologies and Systems

Whole Systems Thinking

Retrofit strategies for buildings

Energy Modelling Tools / Software

Sustainable Urban Drainage Systems (SUDS)

Organisational skills: work to fulfil briefs and deadlines and to take on responsibility for work

Communicate ideas and arguments coherently and effectively in spoken and written words as well as other media.

Problem-solve: have the ability to analyse problems and to propose solutions. Be able to think critically: to reflect upon feedback and to improve performance

Learning Outcomes	
Outcome Number	Description
01	Understand how buildings use energy, the demands and loads within buildings and the impact of occupancy on energy use.
02	Account for heat / energy flows in buildings, assess their importance, explore them in detail and critically reflect on them using a range of analytical, technical and observational tools and techniques.
03	Demonstrate an appreciation of the low energy / energy efficient technologies / systems / approaches and how they may offset the energy / carbon demands associated with these flows.
04	Explore these low energy / energy efficient technologies / systems / approaches (in a rigorous manner), assessing their importance, and critically reflect on them using a range of analytical, technical and observational tools and techniques.
05	Critically reflect on and evaluate user requirements in design of environmental systems for buildings, selection of appropriate equipment and materials, and their integration into building fabric and structural systems of new and existing buildings.

Learning, Teaching and Assessment Strategy
<p>The teaching and learning methods have been selected to engage students in developing their knowledge and understanding of Environmental Systems in Buildings through formal learning opportunities such as lectures and tutorials, and informal and social learning through team-working in projects</p> <p>Throughout the module, students will be set formative assessment activities that will help develop confidence in tackling problems of environmental integration of systems in buildings and in the use of the appropriate software tools, and other techniques that will support them. The timely constructive feedback from this formative assessment will support students develop the skills and knowledge required for the summative assessment.</p> <p>The module will be summatively assessed through Coursework and an examination which is related to a set of exercises developed through lectures, group and individual tutorials, to continually appraise, evaluate and develop the work.</p> <p>If a student requires supplementary assessment for re-assessment, the assessment method will be the same as original.</p>

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Coursework - Patchwork Assessment	Collection of Assignments	50%
Summative	Examination - Open Book	Exam	50%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

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