

Summary Information

Module Code	6332BEUG
Formal Module Title	Environmental Analysis
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 6
Grading Schema	40

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Saiful Bhuiyan	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings
Hu Du	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings
--------------	--------------------------	-----------

Teaching Responsibility

LJMU Schools involved in Delivery
Civil Engineering and Built Environment

Learning Methods

Learning Method Type	Hours
Lecture	20
Online	10
Tutorial	20

Module Offering(s)

Offering Code	Location	Start Month	Duration
SEP-CTY	CTY	September	12 Weeks

Aims and Outcomes

Aims	To develop an understanding of the theory, principles and practices of building energy systems modelling and simulation techniques and to use analytical approaches to the appraisal of environments and design proposals.
-------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Critically analyse the various complex heat and mass transfer processes occurring in buildings and associated practical engineering applications.
MLO2	Critically analyse air flow processes typically taking place in buildings to produce practical natural ventilation solutions.
MLO3	Critically analyse the aural environment in buildings with particular regard to noise and vibration caused by building engineering plant and systems.
MLO4	Utilise industry standard modelling and simulation software to analyse complex buildings.
MLO5	Demonstrate an understanding of the entrepreneurial process to establish innovative solutions to industry problems.

Module Content

Outline Syllabus

Thermal Analysis: Building energy flowpaths, Overview of heat transfer at surfaces; Transient heat transfer, thermal storage effects, passive solar buildings, Principles of Energy modelling techniques, Steady state, dynamic (admittance) and numerical analysis (finite temperature difference). Air Flow Analysis: Heat and mass transfer by convection; fundamental concepts convective heat transfer, flow of working fluids, driving forces for air flow. Ventilation & Air Flow prediction; use of empirical and simplified approaches to determining building air change rate for plant sizing, principles of single and multi- zonal approaches to predicting air movements within buildings, application of Acoustics and noise control; measurement of sound levels, insulation, absorption, attenuation, acoustic characteristics of building materials and systems, noise control in buildings. Vibration; simple harmonic motion, modes of vibration, characteristics of springs, static and dynamic modulus of materials and natural frequency, vibration isolation and control in buildings. Computational Fluid Dynamics (CFD) to predicting the air flow, temperature and pollutant distribution, air velocities, fire and smoke movement in and around buildings. Building Simulation: use of modelling and simulation software to investigate and analyse buildings.

Module Overview

This module aims to develop an understanding of the theory, principles and practices of building energy systems modelling and simulation techniques and to use analytical approaches to the appraisal of environments and design proposals.

Additional Information

This module is designed to contrast the traditional longhand calculation and estimation methods of analysing building internal environments and engineering processes with modern innovations in building thermal and energy modelling, and building information modelling. On the Building Services Engineering Degree Apprenticeship programme, the knowledge learning outcomes are K1, K2, the skills learning outcomes are S1, S2, S3, and the behaviours learning outcomes is B6.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Report	BUILDING SIMULATION REPORT	40	0	MLO3, MLO4, MLO5, MLO2, MLO1
Centralised Exam	Exam	60	2	MLO3, MLO4, MLO5, MLO2, MLO1