Liverpool John Moores University

Title:	ENVIRONMENTAL ANALYSIS
Status:	Definitive
Code:	**6501ICBTBS** (127099)
Version Start Date:	01-08-2021
Owning School/Faculty:	Civil Engineering and Built Environment
Teaching School/Faculty:	ICBT, Colombo

Team	Leader
Alison Cotgrave	Y

Academic Level:	FHEQ6	**Credit Value:**	20	**Total Delivered Hours:**	40
Total Learning Hours:	200	**Private Study:**	160		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	20
Tutorial	20

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	BUILDING SIMULATION REPORT	50	
Test	AS2	TIME CONTROLLED ASSIGNMENT	50	

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:

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

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

BUILDING SIMULATION REPORT	4	5	
TIME CONTROLLED ASSIGNMENT	1	2	3

Outline Syllabus

Thermal Analysis: Evaluation of Building energy flow-paths, including transient and storage effects.

Demonstration and application of energy modelling principles and techniques including steady state, dynamic (admittance) and numerical analysis.

Analysis of the concepts and theorems underlying air flow behaviour. These include fluid mechanics and convective heat/mass transfer. Associated techniques include ventilation & air flow prediction using computational fluid dynamics as well as empirical and simplified approaches for determining building air change rate for plant sizing, principles of single/ multi- zonal approaches for the prediction of air/smoke movement within buildings and indoor pollution distribution.

Interpretation and application of acoustics and noise control; measurement of sound levels, insulation, absorption, attenuation for a building services engineering context. Evaluation of acoustic characteristics of building materials and systems and consequent analysis of noise control in buildings. This includes summarization and application of techniques affected by 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.

Evaluation and analysis of building performance, energy efficiency, comfort levels and life-cycle analysis using dynamic simulation modelling software. Evaluation of consequent influences and constraints on building electrical power/lighting and fossil fuel use with implications for facilities management.

Learning Activities

Lectures, tutorials, computer workshop.

Notes

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.