Liverpool John Moores University

Title:	ANALYSIS AND SIMULATION OF THE INTERNAL ENVIRONMENT
Status:	Definitive
Code:	**6103BEUG** (117997)
Version Start Date:	01-08-2019
Owning School/Faculty:	Built Environment
Teaching School/Faculty:	Built Environment

Team	Leader
Derek King	Y

Academic Level:	FHEQ6	**Credit Value:**	24	**Total Delivered Hours:**	51
Total Learning Hours:	240	**Private Study:**	189		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Tutorial	24

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	3
Report	AS2	Report	30	

Aims

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

Learning Outcomes

After completing the module the student should be able to:

1 Critically analyse energy flowpaths in buildings by the application of energy modelling techniques.
2 Evaluate the visual and aural environment by the application of fundamental principles.
3 Critically evaluate the principles and theories that underpin commercial modelling and simulation software.
4 Apply modelling and simulation software to analyse complex buildings and their proposed services installations.

Learning Outcomes of Assessments

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

EXAMINATION	1	2
REPORT	3	4

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 Computational Fluid Dynamics (CFD) to predicting the air flow, temperature and pollutant distribution, air velocities, fire and smoke movement in and around buildings.
Visual Environment Analysis: Principles of lighting, surface reflectance and inter-reflectance and colour, inter, point to point illuminance levels, integration of daylighting with artificial lighting, plotting illuminace levels. Approaches to inter-reflection calculation and rendering models. Analysing and interpreting rendered images.
Aural Analysis: Sound fundamentals; measurement of sound, aural environment, vibration, measurement of vibration, noise generation in engineering services and noise control techniques, acoustic surveys and analysis.
Building Simulation: Simulation strategies, dynamic modelling building, systems and control, buildings, use of modelling and simulation software to investigate and analyse buildings and proposed systems.

Learning Activities

Lectures, tutorials, computer workshop.

Notes

The module develops an understanding of the theory, principles and practices of building energy systems modelling and simulation techniques and to use an analytical approach to the appraisal of environments and design proposals.