Mechanical Engineering for Buildings

Module Information

2022.01, Approved

Summary Information

Module Code	5332BEUG
Formal Module Title	Mechanical Engineering for Buildings
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Civil Engineering and Built Environment

Learning Methods

Learning Method Type	Hours
Lecture	20
Tutorial	30

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-CTY	CTY	September	12 Weeks

Aims and Outcomes

Aims	To develop the student's understanding of the principles of heat transfer, thermodynamics and general engineering and the application of these principles to sustainable and energy efficient design and operation of building engineering systems, plant and equipment.To enable students to utilise appropriate mathematical methods to solve mechanical engineering problems.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Apply the principles of heat transfer, thermodynamics and general engineering to control of the internal environment.
MLO2	2	Apply the principles of heat transfer, thermodynamics and general engineering to the selection of sustainable and energy efficient building engineering systems, plant and equipment.
MLO3	3	Analyse moderately complex buildings using longhand calculation and estimation methods to evaluate heating loads, cooling loads and energy requirements.
MLO4	4	Analyse moderately complex buildings using industry standard software packages to evaluate heating loads, cooling loads and energy requirements.
MLO5	5	Utilise appropriate mathematical methods to solve practical mechanical engineering problems.

Module Content

Outline Syllabus	Radiation: Reflectivity, transmissivity, absorptivity, emissivity for different surfaces. Wave characteristics and parameters associated with electromagnetic radiation. Asymmetric radiation and discomfort asymmetry. Heating and cooling loads: Analysis and longhand calculation of building heating and cooling loads, compliance with legislation and energy efficiency standards. Use of thermal analysis software to determine heating and cooling loads. Psychrometrics: psychrometric properties of air, psychrometric cycles for heating and cooling processes, evaluation of cooling and heating plant duties. Thermodynamic properties of fluids; application of the first law of thermodynamics to steady flow and non-flow processes for gases, vapours and liquids. Thermodynamic cycles: use of T-S and p-H diagrams to show commonly encountered thermodynamic cycles. Performance analysis of practical thermodynamic cycles, comparison with the Carnot cycle. Thermodynamic processes in refrigeration cycles, heat pumps and heat engines. Refrigeration: vapour compression and absorption refrigeration cycles, refrigerants, compressors, condensers, evaporators.
Module Overview	
Additional Information	This module is designed to run in semester 1 alongside the complementary Electrical Engineering for Buildings module to provide students with the necessary grounding in the underpinning principles of mechanical engineering, heat transfer, thermodynamics and fluid mechanics, so that they may undertake the appropriate Design Project module in semester 2.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Centralised Exam	Exam	50	2	MLO1, MLO2, MLO3, MLO5
Essay	BUILDING THERMAL ANALYSIS	50	0	MLO3, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings

Saiful Bhuiyan	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings