Engineering Principles

Module Information

2022.01, Approved

Summary Information

Module Code	4503ICBTBS
Formal Module Title	Engineering Principles
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	15
Academic level	FHEQ Level 4
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
International College of Business and Technology

Learning Methods

Learning Method Type	Hours
Lecture	45
Practical	10
Tutorial	10

Module Offering(s)

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

Aims and Outcomes

Aims	This module introduces the fundamental concepts and principles of mechanical and electrical engineering, heat transfer, thermodynamics and fluid mechanics, and the application of these to engineering problems in the built environment.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Apply general engineering basic principles to common problems in the built environment.
MLO2	2	Apply the basic principles of human thermal comfort and heat transfer to common problems in the built environment.
MLO3	3	Apply the basic principles of electrical engineering to common problems in the built environment.
MLO4	4	Apply the basic principles of thermodynamics, thermodynamic cycles and fluid mechanics to common problems in the built environment.

Module Content

Outline Syllabus	General EngineeringBasic engineering relationships and units: mass, force, distance, time, velocity, acceleration and Newton's laws of motion.Heat TransferThermal comfort in humans; factors affecting humans, thermal indices.Thermal properties of common building materials, resistances and U values.Principles of heat transfer by conduction, radiation and convection (natural and forced).Conduction through homogeneous and multi-layered structures. Electrical EngineeringFundamental notations and relations of electrical properties; Ohm's Law,Measurement of voltage, current and resistance.Kirchhoff's Laws; series and parallel circuit equivalences.Electromagnetism; induced emf's, transformers, power generation.Semiconductors; diode action, capacitance, inductance.Thermodynamics & Fluid MechanicsThermodynamic definitions; physical properties of fluids and mixtures.Work, power and energy; conservation of energy, open and closed systems, the steady flow energy equation, application to building engineering systems.Energy in flowing fluids; conservation of energy in a moving fluid, continuity, Bernoulli's equation and momentum equations with application to flow measuring devices.Energy losses in flowing fluids: principles and applications of frictional losses in pipe and duct networks and fittings. Thermodynamic properties of fluids; application of the first law of thermodynamics toSteady flow and non-flow processes for gases, vapours and liquids.Thermodynamic cycles: Use of T-S and p-H diagrams to construct heating and cooling refrigeration cycles. Thermodynamic processes in refrigeration cycles, heat pumps and heat engines.
Module Overview	
Additional Information	

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Portfolio	Lab Portfolio	40	0	MLO1, MLO2, MLO3, MLO4
Exam	Written Examination	60	2	MLO1, MLO2, MLO3, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Alison Cotgrave	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings