Liverpool John Moores University

Title:	ENGINEERING PRINCIPLES
Status:	Definitive
Code:	**4503ICBTBS** (126978)
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:	FHEQ4	**Credit Value:**	15	**Total Delivered Hours:**	67
Total Learning Hours:	150	**Private Study:**	83		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	45
Practical	10
Tutorial	10

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Portfolio	AS1	Lab Portfolio (equivalent to 1500 words)	40	
Exam	AS2	Written Examination (Closed Book)	60	2

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.

Learning Outcomes

After completing the module the student should be able to:

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

Learning Outcomes of Assessments

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

Lab Portfolio	1	2	3	4
Written Examination	1	2	3	4

Outline Syllabus

General Engineering
Basic engineering relationships and units: mass, force, distance, time, velocity, acceleration and Newton's laws of motion.

Heat Transfer
Thermal 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 Engineering
Fundamental 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 Mechanics
Thermodynamic 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 to
Steady 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.

Learning Activities

Students will be supported in their learning, to achieve the above learning outcomes, in the following ways:
By a series of lectures, workshops, group work and presentations.
A recommended resource list - indicating key reading, virtual and physical learning assistance, is provided to help enable students to undertake self-directed study.

Notes

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