

**Summary Information**

<b>Module Code</b>	4332BEUG
<b>Formal Module Title</b>	Electrical and Mechanical Engineering Principles
<b>Owning School</b>	Civil Engineering and Built Environment
<b>Career</b>	Undergraduate
<b>Credits</b>	20
<b>Academic level</b>	FHEQ Level 4
<b>Grading Schema</b>	40

**Module Contacts****Module Leader**

<b>Contact Name</b>	<b>Applies to all offerings</b>	<b>Offerings</b>
Jeffrey Cullen	Yes	N/A

**Module Team Member**

<b>Contact Name</b>	<b>Applies to all offerings</b>	<b>Offerings</b>
Badr Abdullah	Yes	N/A

**Partner Module Team**

<b>Contact Name</b>	<b>Applies to all offerings</b>	<b>Offerings</b>
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**Teaching Responsibility**

<b>LJMU Schools involved in Delivery</b>
Civil Engineering and Built Environment

**Learning Methods**

Learning Method Type	Hours
Lecture	22
Online	11
Practical	11
Tutorial	11

### Module Offering(s)

Offering Code	Location	Start Month	Duration
JAN-CTY	CTY	January	12 Weeks

### Aims and Outcomes

<b>Aims</b>	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.
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### Learning Outcomes

After completing the module the student should be able to:

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

## Module Content

### 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. AC Theory Introduction to sensors using electrical principles Introduction to power and data cabling Fluid Mechanics & Thermodynamics 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

### Module Overview

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.

### Additional Information

This module provides an education in the principle concepts of mechanical and electrical engineering to support studies in Building Services Engineering, Architectural Engineering and similar engineering disciplines. On the Building Services Engineering Degree Apprenticeship programme, the knowledge learning outcome is K1 and the skills learning outcomes are S1 and S2.

## Assessments

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