Module specification

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Module Code	ENG4B1
Module Title	Introduction to Electrical & Mechanical Engineering Science
Level	4
Credit value	20
Faculty	FAST
HECoS Code	100184
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
MEng Aeronautical Engineering	Core
BEng (Hons) Aeronautical Engineering	Core
MEng Mechanical Engineering	Core
BEng (Hon) Mechanical Engineering	Core
MEng Automotive Engineering	Core
BEng (Hons) Automotive Engineering	Core
MEng Electrical and Electronic Engineering	Core
BEng (Hons) Electrical and Electronic Engineering	Core
MEng Renewable and Sustainable Engineering	Core
BEng (Hons) Renewable and Sustainable Engineering	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	48 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	48 hrs
Placement / work based learning	0 hrs
Guided independent study	152 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	22/08/2022
With effect from date	September 2022
Date and details of revision	
Version number	1

Module aims

- To provide the learner with a basic underpinning knowledge of electrical and electronic components and circuit theories that could form the basis for further study in the field of electrical and electronic engineering.
- To provide the learner with the essential principles of mechanical engineering related to force, stress and strain, simple flexion and torsion and develop a strong practical understanding of their measurement.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Define fundamental terms and component characteristics in basic electrical and electronic circuits.
2	Perform circuit analysis and calculations in basic electrical and electronic circuits.
3	Identify and calculate forces, stresses, strains, flexions, and torsions in simple situations.
4	Practically measure stress, strain and torsion and determine the errors in the measurement loop.

Assessment

Indicative Assessment Tasks:

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Assessment One: is by means of a portfolio of activities covering outcomes 1 and 2.

Assessment Two: is by means of a portfolio of activities covering outcomes 3 and 4.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 2	Portfolio	50%
2	3, 4	Portfolio	50%

Derogations

A derogation from regulations has been approved for this programme which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Learning and Teaching Strategies

The module is taught through a combination of lectures and workshops. An active and inclusive approach is used to engage learners in the topics and will involve individual, group work and flipped learning experiences aligned to the university's Active Learning Framework (ALF). The approach offers students a flexible and adaptive learning experience that can accommodate a range of options that includes both on campus learning and remote learning where appropriate.

The Moodle VLE and other on-line materials and resources will be available to support learning. ALF offers a balance between the classroom elements and digitally enabled activity incorporating flexible and accessible resources and flexible and accessible feedback to support learning.

Indicative Syllabus Outline

Electrical Fundamentals – Voltage, Current, Resistance, Power

Electrical Components – Resistors, Diodes, Transistors, Capacitors, Inductors, Wires and cables, Switches, Integrated Circuits, Fuses, Circuit Breakers, Transformers, Batteries, Relays, Motors and Generators

Electrical Laws – Ohm's Law, Kirchhoff's Voltage and Current Laws, Mesh Analysis, Thevenin's Theorem, Nortons Theorem, Max Power Transfer Theorem, Star and Delta Transforms.

Alternating Current (AC) Fundamentals – Peak, peak-to-peak, RMS, time period, frequency, impedance, phasor diagrams.

Systems of Force and Moments: Type of forces; Equilibrium and free-body diagrams; Two dimensional and three-dimensional force systems; Two-dimensional and three-dimensional; Couples; Moment of a force about a line; Equivalent systems.

Elastic deformation – Stress and Strain – Elongation of simple elements, flexion of simply supported beams, torsion of a bar. Concept of stress concentration.

Measurement techniques: DTI and strain gauges. Practical application of strain gauges - Systematic and random error of measurements.

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads

J. Bird, Bird's *Electrical Circuit Theory and Technology*, 7th Edition, Routledge, 2021.

J. Wickert, *An Introduction to Mechanical Engineering,* 4th Edition, Cengage, 2020.

Other indicative reading

M. Novak, *Introduction to Sensors for Electrical and Mechanical Engineers, CRC Press, 2020.*

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

Core Attributes
Engaged
Creative

Key Attitudes
Commitment
Curiosity
Confidence
Adaptability

Practical Skillsets
Critical Thinking
Communication