Module specification

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Refer to the module guidance notes for completion of each section of the specification.

Module code	ENG4AL
Module title	Electrical Engineering
Level	4
Credit value	20
Faculty	FAST
Module Leader	Dr Sultan Shoaib
HECoS Code	100163
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Mechatronics Engineering	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	60 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	**0** hrs
Placement / work based learning	0 hrs
Guided independent study	140 hrs
Module duration (total hours)	200 hrs

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Initial approval date	24/09/2020
With effect from date	24/09/2020

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Date and details of revision	
Version number	1

Module aims

To understand and predict electrical circuit variables, both ac and dc in standard circuit configurations (series/parallel circuits) and specify circuit components to satisfy electrical circuit design;

To develop theoretical and practical analysis techniques in order to predict behaviour of various configurations of electrical/electronic circuits (ac and dc) by means of calculation, laboratory and by computer simulation.

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

1	Define fundamental electrical variables in dc and ac circuits.
2	Select and use appropriate methods to analyse electrical circuit behaviour.
3	Apply the theoretical principles to practical circuit conditions.
4	Use appropriate software packages to simulate and predict circuit performance.

Assessment

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.

Indicative Assessment Tasks:

Assessment One is by means of coursework covering outcomes 3 and 4. Which will examine the level of knowledge and understanding the student has attained relating to the principles, theory and practical aspects of the module.

Assessment Two is by means of an examination covering outcomes 1 and 2. It is an unseen time-constrained (2 hours).

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	3, 4	Coursework	50%
2	1, 2	Examination	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 will be presented to students through lectures, tutorials and laboratory experiments. Learning materials including computer tools will be used together with demonstrations and directed learning opportunities.

Formative assessment takes place throughout the module during tutorials and feedback is given during these tutorials.

Indicative Syllabus Outline

Properties of resistive and reactive Components: Resistivity, Resistors, capacitors, inductors, batteries. Use of reference data (catalogues, CD-ROM, data sheets) for parameters.

DC Circuit Variables and Elements: Define variables: charge, current, resistance, pd and emf, power, energy, capacitance, inductance, Ideal voltage and current sources.

DC Circuit Analysis: Circuit configurations; Series, parallel and Series/parallel combinations; Circuit analysis using: Ohm's Law and Kirchhoff's Laws, voltage and current division, superposition, Thevenin and Norton's theorems.

AC Waveforms: AC waveforms and variables: sinusoidal, instantaneous value, maximum, mean, RMS, frequency. AC circuits: resistance, reactance, impedance, conductance, susceptance, admittance.

AC Circuits: Analysis of RL, RC and RLC Series circuits using phasor diagrams and mathematical analysis; phase angle, impedance, power, power factor.

AC Circuit Analysis: Series, parallel and series/parallel circuits; Circuit analysis using complex notation: power dissipation in circuits - real/apparent/reactive. Power factor correction methods.

Electrical power: basic power supply design including transformers, rectification, smoothing and voltage regulation. Electrical hazards and EMC.

Polyphase Voltages: Generation of 3 phase voltages; balanced star and delta systems; Unbalanced star loads and neutral current; phasor diagrams;

Motor principles, DC motors, induction machines, single-phase versus three-phase distribution; power factor correction, comparison between two motors having different capital costs and losses.

Indicative Bibliography:

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

Essential Reads

Bird, J. (2013) Electrical Circuit Theory and Technology, 5th Edn., Newnes.

Other indicative reading

Hughes, E. (2012) Electrical and Electronic Technology, 11th Edn, Prentice Hall.

Bird, J. (2017) Electrical and Electronic Principles and Technology, 6th Edn., Routledge.

Key Website References: Khan Academy: http://www.khanacademy.org/

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. Click here to read more about the Glyndwr Graduate attributes

Core Attributes
Engaged

Key Attitudes
Curiosity

Practical Skillsets
Critical Thinking
Communication