Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	ENG4AL
Module Title	Electrical Engineering
Level	4
Credit value	20
Faculty	FAST
HECoS Code	100163
Cost Code	GAME
Pre-requisite module	None

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
BEng (Hons) Mechatronics Engineering	Core

Breakdown of module hours

Learning and teaching hours	60 hrs
Placement tutor support hours	0 hrs
Supervised learning hours e.g. practical classes, workshops	0 hrs
Project supervision hours	0 hrs
Active learning and teaching hours total	**0** hrs
Placement hours	0 hrs
Guided independent study hours	140 hrs
Module duration (Total hours)	200 hrs

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

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 1: A 2-hour examination covering outcomes 1 and 2. It is an unseen time-constrained.

Assessment 2: A 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 number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1, 2	Examination	2 hrs	50%	
2	3, 4	Coursework	2000	50%	

Derogations

None

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.

Welsh Elements

Programme is delivered in English and Chinese, however students can submit assessments in Welsh.

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/

Administrative Information

For office use only	
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