

Module specification

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Module Code	ENG505
Module Title	Electrical & Electronic Principles
Level	5
Credit value	10
Faculty	FAST
HECoS Code	100163
Cost Code	GAME
Pre-requisite module	ENG429 Electrical Science

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
HNC Electrical & Electronic Technology	Core

Breakdown of module hours

Learning and teaching hours	30 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	30 hrs
Placement hours	0 hrs
Guided independent study hours	70 hrs
Module duration (Total hours)	100 hrs

Module aims

To acquaint students with a.c.theory developed from Electrical Engineering Science, circuit theorems; three phase technology including power measurement, complex waves and transients.

Module Learning Outcomes

At the end of this module, students will be able to:

1	Solve complex problems relating to series and parallel a.c. circuits
2	Determine unknown values of current using circuit theorems
3	Resolve problems associated with star connected and delta connected three phase circuits
4	Investigate and analyse complex waves using software packages
5	Investigate and analyse transients in R-L-C circuits

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: Assessment 1 is assessed by in-class test.

Assessment 2: Assessment 2 is assessed by students producing a report based on analysing complex waves and transients in R-L-C circuits using software package.

Assessment number	Learning Outcomes to be met	Type of assessment	Duration/Word Count	Weighting (%)	Alternative assessment, if applicable
1	1,2,3	In-class test	1hr 30 mins	50%	
2	4,5	Coursework	2000 words	50%	

Derogations

None

Learning and Teaching Strategies

Formal lectures backed up with worked examples of the principles in ascending order of complexity.

Welsh Elements

This module will be delivered through the medium of English; however, students have the option to submit their assessments in the medium of Welsh. While this module is not currently offered fully through Welsh, Welsh language support and guidance are available, and some learning materials or tutorial discussions may incorporate Welsh elements where appropriate.

Indicative Syllabus Outline

1. Circuit theory: Transformation theorems, energy sources as constant voltage and constant current generators, maximum power transfer theorem. Thevenin's and Norton's theorem. Circuit theory, magnetically coupled circuits, dot notation, and equivalent circuit of transformers. R-L-C circuits, series and parallel resonant circuits, impedance, phase angle, dynamic impedance, Q factor.
2. Two-port networks: Asymmetrical two-port networks, L-networks; Symmetrical two port networks, T and Pi networks; Iterative, image and characteristic impedances; propagation coefficient, Symmetrical attenuators, relationship between Neper and dB.
3. Complex waves: Power factor, RMS value of complex waves, instantaneous current flow in R, RL, RC & RLC ccts including @ resonance. Fourier analysis of complex waves.
4. Transients in R-L-C Circuits: Laplace transforms s-plane analysis. Transient analysis, expressions for RL and RC networks. Simple R-L-C networks. Circuit responses, over, under, zero, critically damped response following step and sinusoidal inputs, zero initial conditions being assumed.

Indicative Bibliography

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

Essential Reads:

Bird, J. (2021) Bird's Electrical Circuit Theory and Technology. 7thed. Routledge

Hughes, E. (2008) Hughes Electrical and Electronic Technology. 10thed. Prentice Hall.
(<https://gctbooks.files.wordpress.com/2015/03/hughes-electrical-and-electronic-technology-10th-edition.pdf>)

Other indicative reading:

Bird J. (2017) Electrical and Electronic principles and Technology. 6th ed. Taylor and Francis

Administrative Information

For office use only	
Initial approval date	August 2016
With effect from date	September 2021
Date and details of revision	6 July 2021, revalidated. /05/2026 updated to new template during re-validation.
Version number	3