

Module specification

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Module Code	ENG427
Module Title	Engineering Mathematics
Level	4
Credit value	20
Faculty	FAST
HECoS Code	100089
Cost Code	GAME
Pre-requisite module	L3 Mathematics for Engineering Technicians (or similar)

Programmes in which module to be offered

Programme title	Core/Optional/Standalone
HNC Electrical & Electronic Technology	Core
HNC Mechanical Technology	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	60 hrs
Placement hours	0 hrs
Guided independent study hours	140 hrs
Module duration (Total hours)	200 hrs

Module aims

To provide fundamental mathematical knowledge and techniques to successfully solve problems encountered in a work situation. It will also enable successful completion of Higher National programme and progress to further studies.

Module Learning Outcomes

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

1	Apply complex numbers to the solution of engineering problems.
2	Apply algebra and trigonometry to solve engineering problems.
3	Solve basic engineering problems using mathematical models employing calculus.

Assessment

Indicative Assessment Tasks:

Assessment is 100% in-course. 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: Outcomes 1, 2 will be assessed using an in-class test based on the learned methods appropriate to complex numbers, algebra and trigonometry.

Assessment 2: Outcome 3 will be assessed using an in-class test based on the application of calculus to real life engineering problems.

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

Derogations

None.

Learning and Teaching Strategies

The module will be presented to students through a specified series of lectures and tutorials assisted by notes via VLE platform. It will be underpinned by use of computer assisted packages, the learning element will be evaluated by a set of assignments on computer element and tests to ensure outcomes are achieved. This will be a progressive set of worked examples throughout the module. Innovative use of a computer-based multi-choice questions package – is expected to form a key part in the development of this module.

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. Complex Numbers: Application of complex numbers in a variety of engineering problems.
2. Algebraic and trigonometric methods: Algebraic methods: rules of order for partial fractions including – linear, repeated, and quadratic factors, reduction of algebraic fractions to partial fractions. Exponential and hyperbolic functions: relationship between exponential and logarithmic functions, solution of equations involving exponential and logarithmic expressions. Trigonometric identities: relationship between trigonometric and hyperbolic identities, double angle and compound angle formulae and the conversion of products to sums and differences.
3. Calculus: Introduction to calculus: the concept of the limit and continuity, definition or derivative, derivatives of standard functions, notion of the derivative and rates of change, differentiation of functions using the product, quotient, and function of a function rules, introduction to the integral calculus as the calculation of area and the inverse of differentiation, the indefinite integral and the constant of integration, standard integrals, and the application of algebraic and trigonometric functions, the definite integral and area under curves. Further integration: second order and higher derivatives, implicit functions, introduction to differential equations both first order and second order, partial derivatives, and partial differentiation. Further integration: integration by parts, integration by substitution, integration using partial fractions.
4. Computational Packages: Introduction to the major computer-based packages available at present. Use of packages to solve problems already encountered in the course and for graphical presentations.

Indicative Bibliography

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

Essential Reads:

Bird, J. (2017) Higher Engineering Mathematics 8th ed. Routledge.

Other indicative reading:

Booth, Stroud (2002) *Engineering Mathematics*. 8th ed. Palgrave.

Bird, May (2002) Technician Mathematic 4 & 5. Longman.

Administrative Information

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Initial approval date	August 2016
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