Module specification

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Module Code	ENG461
Module Title	Engineering Mathematics
Level	4
Credit value	20
Faculty	FAST
HECoS Code	100403
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng Aeronautical Engineering MEng Aeronautical Engineering	Core Core
BEng Automotive Engineering MEng Automotive Engineering	Core Core
BEng Electrical and Electronic Engineering MEng Electrical and Electronic Engineering	Core Core
BEng Renewable Energy and Sustainable Engineering MEng (Hons) Renewable Energy and Sustainable Engineering	Core Core
BEng Industrial Engineering Design (Mechanical)	Core
BEng Industrial Engineering Design (Electrical)	Core
BEng Production Engineering	Core
BEng Low Carbon Energy, Efficiency and Sustainable Engineering	Core
FdEng Industrial Engineering (Mechanical)	Core
FdEng Industrial Engineering (Electrical)	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	42hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	0hrs

Learning and teaching hours	42hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	42hrs
Placement / work based learning	0 hrs
Guided independent study	158 hrs
Module duration (total hours)	200 hrs

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Initial approval date	Feb 2017
With effect from date	September 2022
Date and details of revision	Aug 22: Learning outcomes and assessment update in Engineering re-validation March 25 AM2 to change assessment type and increase teaching hours. Addition to FdEng and Degree Apprenticeship programme titles
Version number	3

Module aims

- To provide a foundation of mathematical knowledge covering a wide range of basic topics, and
- To calculus and develop the application of mathematical principles in the solution of engineering problems, including by means of computer modelling software.

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

1	Use algebraic and trigonometric processes to derive and manipulate functions and equations. Plot graphs of functions and calculate their slopes and intercepts.
2	Apply vectors, matrices, and complex numbers and be able to find powers and roots of complex numbers
3	Use differentiation and integration processes including first order differential equations.
4	Use statistical analysis to analyse collected data in calculation of the mean, median, mode, and standard deviation.
5	Develop skills in using mathematical modelling software (such as MATLAB etc.).

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 2-hour examination covering outcomes 2,3,4 . It is an unseen time-constrained one with a fixed number of questions at the end of the trimester.

Assessment Two: is by means of a 2000 word coursework covering outcomes 1 and 5, utilising software to model mathematical problems

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	2,3,4	Examination	50%
2	,1,5	Coursework	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 and tutorials.

Tutorials – Close interaction with students ensuring that the work presented during lectures has been understood, with specific help being given in order to overcome any learning problems, should they occur.

The module is taught through a combination of lectures and tutorials. 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

Algebra: Rules and manipulation of algebraic expressions. Solutions of equations.

Functions and Graphs: Define function. Plotting and interpreting graphs. Slopes, intersection.

Complex numbers: Different forms and arithmetic, powers and roots.

Vector algebra: Addition and subtraction, scalar multiplication.

Differentiation Calculus: Rules of differentiation, application in engineering.

Integral Calculus: Definite and indefinite integrals; integration by parts; numerical integration.

First Order Differential Equations: Solution of first order linear differential equations by direct integration and by separating variables.

Statistics: Define and calculate numeric measures of average and spread.

Software: Mathematical modelling software to support other elements of this module.

Indicative Bibliography:

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

Essential Reads

J. Bird, *Bird's Engineering Mathematics*, 9th Ed. Routledge, 2021.

Other indicative reading

K. Singh, *Engineering Mathematics through Applications*, 2nd Ed. Palgrave Macmillan Limited, 2011.

S. Attaway, *Matlab: A Practical Introduction to Programming and Problem Solving*, 5th Ed. Oxford: Butterworth-Heinemann, 2019.

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

Practical Skillsets

Critical Thinking
Communication