Liverpool John Moores University

Title:	ENGINEERING MATHEMATICS
Status:	Definitive
Code:	**4227BEUG** (126398)
Version Start Date:	01-08-2021
Owning School/Faculty:	Civil Engineering and Built Environment
Teaching School/Faculty:	Civil Engineering and Built Environment

Team	Leader
Badr Abdullah	Y

Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	70
Total Learning Hours:	200	**Private Study:**	130		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	44
Tutorial	12
Workshop	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	AS1	In-class test	30	
Exam	AS2	Examination	70	2

Aims

To develop knowledge and understanding of the mathematics underpinning engineering, and to apply these techniques within an engineering context.

Learning Outcomes

After completing the module the student should be able to:

1	Use basic algebraic manipulations, matrices and mathematical functions proficiently in the analysis and solution of engineering problems
2	Use and apply mathematical software to the solution of engineering mathematics problems
3	Apply differential and integral calculus proficiently in the analysis and solution of engineering problems
4	Communicate effectively through the clear presentation of mathematical equations and formulae.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

In-class test	1	2	3	4
Examination	1	2	3	4

Outline Syllabus

Revision of basic algebraic techniques: substitution, simplification, factorisation, indices, evaluation and transposition of formulae, fractions and partial fractions. Linear and quadratic equations, linear simultaneous equations.

Revision of elementary coordinate geometry: Distance between two points.

Trigonometry: Angular measurement (radians and degrees, minutes and seconds), Sine and cosine rules. Trigonometric identities and equations. Applications: Surveying; Forces

Exponential function: Properties and graph. Natural logarithm as inverse of exponential function, graph and properties. Definitions and calculation of hyperbolic functions including inverse functions.

Revision of differential calculus of one variable: Gradient of curve, derivatives of standard functions, linearity, derivatives of composite functions, products and quotients. Applications: Stationary points. Rates of change.

Revision of integral calculus as inverse of differentiation. Standard integrals, linearity, integration of composite functions. Numerical integration. Applications: Centroids

Functions: Notation, types of function, composite and inverse, graphs.

Complex numbers: Complex arithmetic, complex conjugate, Argand diagram. Rectangular, polar forms. Magnitude and phase. Basic use of Euler's formula.

Roots: Numerical techniques, including the Newton-Raphson method. Applications: Solving cubic equations.

Basic vector algebra including Cartesian components and products. Differentiation of vectors. Applications: Forces

Basic matrix manipulation including the inverse matrix. Applications: Solution of systems of linear equations.

1st order differential equations

Learning Activities

A combination of lectures, tutorials and computer laboratories. The laboratories will enable students to use and apply mathematical software to the solution of engineering mathematics problems.

Notes

This module provides a foundation in engineering mathematics for use in the analysis and solution of engineering problems.