

Liverpool John Moores University

Title: BUILDING ENGINEERING MATHEMATICS
Status: Definitive
Code: **4221BEUG** (124893)
Version Start Date: 01-08-2021

Owning School/Faculty: Civil Engineering and Built Environment
Teaching School/Faculty: Civil Engineering and Built Environment

Team	Leader
Derek King	Y

Academic Level: FHEQ4
Credit Value: 20
Total Delivered Hours: 57
Total Learning Hours: 200
Private Study: 143

Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	33
Tutorial	11
Workshop	11

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	REPORT	40	
Exam	AS2	EXAMINATION	60	2

Aims

To introduce the mathematics underpinning building services engineering and architectural engineering disciplines, and to apply these techniques within appropriate vocational contexts.

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:

REPORT	2	4	
EXAMINATION	1	2	3

Outline Syllabus

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

Elementary coordinate geometry: Distance between two points.

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

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

Differential calculus of one variable: Gradient of curve, derivatives of standard functions, linearity, derivatives of composite functions, products and quotients.

Integral calculus as inverse of differentiation. Standard integrals, linearity, integration of composite functions. Numerical integration.

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.

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

Basic matrix manipulation including the inverse matrix.

1st order differential equations.

Learning Activities

A combination of lectures, tutorials and workshop sessions in an IT suite. The workshops 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.