LIVERPOOL JOHN MOORES UNIVERSITY

Engineering Mathematics

Module Information

2022.01, Approved

Summary Information

Module Code	4227BEUG
Formal Module Title	Engineering Mathematics
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 4
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Civil Engineering and Built Environment

Learning Methods

Learning Method Type	Hours
Lecture	44
Tutorial	12
Workshop	12

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-CTY	CTY	September	12 Weeks

Aims and Outcomes

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

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Use basic algebraic manipulations, matrices and mathematical functions proficiently in the analysis and solution of engineering problems
MLO2	2	Use and apply mathematical software to the solution of engineering mathematics problems
MLO3	3	Apply differential and integral calculus proficiently in the analysis and solution of engineering problems
MLO4	4	Communicate effectively through the clear presentation of mathematical equations and formulae.

Module Content

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; ForcesExponential 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: CentroidsFunctions: 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: ForcesBasic matrix manipulation including the inverse matrix. Applications: Solution of systems of linear equations.1st order differential equations
Module Overview	The aim of this module is to develop your knowledge and understanding of the mathematics underpinning engineering, and to apply these techniques within an engineering context. This module provides a foundation in engineering mathematics for use in the analysis and solution of engineering problems.
Additional Information	This module provides a foundation in engineering mathematics for use in the analysis and solution of engineering problems.In this module, the knowledge learning outcomes are K1, K2, the behaviours learning outcomes are B1, B6 and the skills learning outcomes are S7.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Test	In-class test	30	0	MLO1, MLO2, MLO3, MLO4
Centralised Exam	Examination	70	2	MLO1, MLO2, MLO3, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Badr Abdullah	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings