

Liverpool John Moores University

Title: Engineering Mathematics
Status: Definitive
Code: **4505ENGICA** (119134)
Version Start Date: 01-08-2018

Owning School/Faculty: Engineering
Teaching School/Faculty: HICOM University College Sdn,Bhd

Team	Leader
Russell English	

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

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	32
Practical	36

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1		50	
Exam	AS2		50	2

Aims

To provide a foundation in engineering mathematics for its application to the solution of engineering problems

Learning Outcomes

After completing the module the student should be able to:

- 1 Use basic algebraic manipulations in the solution of engineering problems
- 2 Use basic mathematical functions in the solution of engineering problems
- 3 Use basic complex numbers in the solution of engineering problems
- 4 Apply techniques in differentiation and integration to the solution of engineering problems
- 5 Use vectors and matrices in the solution of engineering problems
- 6 Solve first order ordinary differential equations by the method of separation of variables and apply to the modelling of engineering problems

Learning Outcomes of Assessments

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

Coursework	1	2	3	4	5	6
Exam	1	2	3	4	5	6

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, the straight line, simple polynomial curves.

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

Trigonometry: Angles and circular measure. Trigonometric ratios for right-angled triangles. Sine and cosine rules. Trigonometric functions and their graphs, simple 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.

Complex numbers: Complex arithmetic, complex conjugate, Argand diagram.

Rectangular, polar forms. Magnitude and phase. Very basic treatment of Euler's formula.

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.

Integral calculus as inverse of differentiation and as a limit of a sum. Standard integrals, linearity, integration of composite functions. Other methods of integration.

Numerical integration.

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

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

Ordinary differential equations. First order linear, constant coefficient equations.

Separation of variables. Application to modelling

Learning Activities

A combination of lectures and tutorials. The tutorials will enable students to apply learning to the solution of engineering mathematics problems.

Course Material	Book
Author	Stroud K A & Booth D
Publishing Year	2007
Title	Engineering Mathematics
Subtitle	
Edition	6th
Publisher	Palgrave
ISBN	9781403942463

Course Material	Book
Author	James, G. et al
Publishing Year	2007
Title	Modern Engineering Mathematics
Subtitle	
Edition	4th
Publisher	Pearson
ISBN	0132391443

Course Material	Book
Author	Croft, A & Davison, R
Publishing Year	2008
Title	Mathematics for Engineers
Subtitle	
Edition	3rd
Publisher	Pearson
ISBN	9780132051569

Course Material	Book
Author	Singh, K
Publishing Year	2011
Title	Engineering Mathematics through Applications
Subtitle	
Edition	2nd
Publisher	Pargrave
ISBN	9780230274792

Notes

This module provides a foundation in engineering mathematics for level one students in mechanical, automotive, electrical and civil engineering.