Liverpool John Moores University

Title:	ENGINEERING MATHEMATICS
Status:	Definitive
Code:	**4016ENG** (105216)
Version Start Date:	01-08-2016

Owning School/Faculty: Maritime and Mechanical Engineering
Teaching School/Faculty: Maritime and Mechanical Engineering

Team	Leader
Ian Jones	Y

Academic Level:	FHEQ4	**Credit Value:**	24	**Total Delivered Hours:**	74
Total Learning Hours:	240	**Private Study:**	166		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	36
Practical	12
Tutorial	24

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	50	2
Essay	AS2	MapleTA assessment	50	

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 series expansions of commonly occurring functions in the solution of engineering problems
6   Use vectors and matrices in the solution of engineering problems
7   Solve first order ordinary differential equations by the method of separation of variables and apply to the modelling of engineering problems
8   Use and apply mathematical software to the solution of engineering mathematics problems

Learning Outcomes of Assessments

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

EXAM	1	2	3	4	5	6	7	
CW	1	2	3	4	5	6	7	8

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.

Introduction of the use of a computer algebra system e.g. DERIVE or MATHCAD.

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, 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 level one students in all engineering fields.