Liverpool John Moores University

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Title:	ENGINEERING MATHEMATICS
Status:	Definitive
Code:	**4109BEUG** (118097)
Version Start Date:	01-08-2016

Owning School/Faculty: Civil Engineering
Teaching School/Faculty: Civil Engineering

Team	Leader
Stephen Wylie	Y
Felicite Ruddock	

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		60	2
Technology	AS2		20	
Technology	AS3		20	

Aims

To reinforce mathematics learning from school, to develop mathematical techniques, and to learn to apply these 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 in the solution of engineering problems
2 Use and apply mathematical software to the solution of engineering mathematics problems
3 Apply techniques in differentiation and integration to the solution of engineering problems
4 Apply the above mathematical techniques in a time limited environment

Learning Outcomes of Assessments

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

Examination   4

Technological Task 1   1   2

Technological Task 2   3

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. Basic use of Euler's formula.

Introduction of the use of 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.   Applications in Engineering.

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. Applications

Ordinary differential equations. First order linear, constant coefficient equations. Separation of variables. Application to modeling.

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 Civil and Building Services Engineering.