Liverpool John Moores University

Title:	ADVANCED ENGINEERING MATHEMATICS
Status:	Definitive
Code:	**5026ENG** (105777)
Version Start Date:	01-08-2016
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Applied Mathematics

Team	Leader
Ian Jones	Y

Academic Level:	FHEQ5	**Credit Value:**	12	**Total Delivered Hours:**	42
Total Learning Hours:	120	**Private Study:**	78		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	20
Tutorial	20

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	60	2
Essay	AS2	Coursework	40	

Aims

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

Learning Outcomes

After completing the module the student should be able to:

1	Solve first order ordinary differential equations by the integrating factor method and apply to the modelling of engineering problems
2	Solve linear, second order, constant coefficient ordinary differential equations and apply to the modelling of engineering problems
3	Find first and second order partial derivatives for functions of several variables and apply to engineering problems involving optimisation and errors
4	Use eigenvectors and eigenvalues in the solution of engineering problems
5	Solve simultaneous homogeneous ordinary differential equations with constant coefficients and apply to the solution of a two degree of freedom system
6	Use Laplace transforms in the solution of engineering problems involving ordinary differential equations
7	Use Fourier series in the solution of engineering problems
8	Apply mathematical software to the numerical solution of ordinary differential equations

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

The solution of linear first order ODE's by the integrating factor method.

The solution of inhomogeneous second order ODE's by the method of undetermined coefficients.

Functions of several variables. Partial differentiation with application to optimisation and error estimation.

Eigenvalues and eigenvectors. By manual calculation for low order matrices. Use of software for matrices of larger order.

Solution of two homogeneous simultaneous ODE's with constant coefficients up to second order. Application to normal modes for a two degree of freedom system.

Laplace transforms. Concepts. Use of tables. The inverse transform. Application to the solution of ODE's. Transfer functions and stability.

Periodic functions. Fourier series for functions of any period. Harmonics.

Use of mathematical software in the numerical solution of ODE's.

Learning Activities

A combination of lectures and tutorials

Notes

This module provides a foundation in advanced engineering mathematics for level two students in mechanical and manufacturing themes.
For each topic area of the syllabus, relevant commands will be given for application of a symbolic algebra package, e.g. DERIVE or MATHCAD, to harder problems