Liverpool John Moores University

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Title:	ADVANCED ENGINEERING MATHEMATICS
Status:	Definitive
Code:	**5076ENG** (116947)
Version Start Date:	01-08-2018
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Maritime and Mechanical Engineering

Team	Leader
Ian Jones	Y

Academic Level:	FHEQ5	**Credit Value:**	10	**Total Delivered Hours:**	44
Total Learning Hours:	100	**Private Study:**	56		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	21
Practical	21

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam		60	2
Technology	Tech		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 and second order differential equations using analytical and numerical techniques and apply to the modeling of engineering problems.
2 Find first and second order partial derivatives for functions of several variables and apply to engineering problems involving optimisation and errors
3 Use eigenvectors and eigenvalues in the solution of engineering problems
4 Use Laplace transforms in the solution of engineering problems involving ordinary differential equations
5 Use Fourier series in the solution of engineering problems
6 Apply symbolic mathematical software eg. Mathcad in the solution to problems involving topics on the syllabus

Learning Outcomes of Assessments

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

Exam	1	2	3	4	5	6
Technology	1	2	3	4	5	6

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 second order, 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.

Numerical solution of ODE's. Euler's method and application of software.

The use of a symbolic mathematical package eg Mathcad in the solution of problems involving the above topics.

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 electrical engineering.
For each topic area of the syllabus, relevant commands will be given for application of a symbolic algebra package, e.g. Mathcad to harder problems.
Coursework assessment will be through online questions delivered using the Mapleta software. The examination will be online also delivered using the Mapleta software. Examinees will have access to the same symbolic mathematical software used in the module eg. Mathcad.