

Liverpool John Moores University

Title: ADVANCED ENGINEERING MATHEMATICS
Status: Definitive
Code: **5031BEUG** (102777)
Version Start Date: 01-08-2016

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

Team	Leader
Felicite Ruddock	Y

Academic Level: FHEQ5 **Credit Value:** 12 **Total Delivered Hours:** 39
Total Learning Hours: 120 **Private Study:** 81

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	18
Tutorial	18

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	choice of questions	70	3
Test	AS2	In class tests	30	

Aims

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

Learning Outcomes

After completing the module the student should be able to:

- 1 Solve first and second order ordinary differential equations and apply to the modeling of engineering problems.
- 2 Use of integration and finite difference methods in the solution of civil engineering problems.
- 3 Find first and second order partial derivatives for functions of several variables and apply to engineering problems involving optimisation.
- 4 Apply statistical tests and investigate correlation.
- 5 Apply numerical methods to Civil Engineering problems.

Learning Outcomes of Assessments

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

EXAM	1	2	3	4	5
IN CLASS	1	2	3	4	5

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 optimization.
The Newton-Raphson method
Eigenvalues and eigenvectors.
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.
Use of integration to find centre of mass
Finite Difference and finite element methods
Forecasting techniques
Linear Programming and Network Models
Hypothesis testing.
Correlation and regression.

Learning Activities

Lectures and tutorials.

Notes

This module provides a foundation in applying advanced engineering mathematics to the solution of Civil Engineering problems.