Liverpool John Moores University

Title:	Engineering Mathematics 2
Status:	Definitive
Code:	**5102SBC** (124865)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	The Sino-British College

Team	Leader
Robert Wilkinson	Y

Academic Level:	FHEQ5	**Credit Value:**	10	**Total Delivered Hours:**	46
Total Learning Hours:	100	**Private Study:**	54		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	22
Tutorial	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	100	2

Aims

To develop further understanding in engineering mathematics for application to the solution of engineering problems

Learning Outcomes

After completing the module the student should be able to:

1 Solve linear, first order, constant coefficient ordinary differential equations by the method of integrating factor 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 using 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 Find numerical solutions of ordinary differential equations

Learning Outcomes of Assessments

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

Examination	1	2	3	4	5	6	7	8

Outline Syllabus

The solution of first order ODE's by the integrating factor method.
The solution of second order ODE's by the method of undetermined coefficients. Application to single degree of freedom oscillating systems.
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 first and second order, homogeneous simultaneous ODE's with constant coefficients. 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.

Learning Activities

A combination of lectures and tutorials

Notes

This module provides a basis in advanced engineering mathematics for level five students in mechanical and electrical engineering.