

Summary Information

Module Code	5302MECH
Formal Module Title	Engineering Mathematics 2
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Elon Correa	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings
Ava Shahrokhi	Yes	N/A
Sean Malkeson	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings
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Teaching Responsibility

LJMU Schools involved in Delivery
Computer Science and Mathematics
Engineering

Learning Methods

Learning Method Type	Hours
Lecture	22
Tutorial	22

Module Offering(s)

Offering Code	Location	Start Month	Duration
SEP-CTY	CTY	September	12 Weeks

Aims and Outcomes

Aims	To provide a further course in engineering mathematics and its application to the solution of engineering problems.
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Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Solve first order and second order ordinary and partial differential equations for engineering problems.
MLO2	Solve simultaneous homogeneous ordinary differential equations
MLO3	Implement numerical methods to obtain solutions for mathematical problems.
MLO4	Apply mathematical software in the solution to problems involving topics on the syllabus.

Module Content

Outline Syllabus
The use of a computer algebra system (for example MATLAB or similar). Use of the software applied to the syllabus items below. The solution of first order Ordinary Differential Equations (ODE) 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 and application of software. Introduction to programming in MATLAB or similar symbolic mathematical software. Use numerical methods to solve engineering problems using appropriate software (e.g. MATLAB).

Module Overview

Additional Information

This module provides a basis in advanced engineering mathematics for level 5 students in mechanical and electrical engineering to enable them to apply this to the solution of engineering problems.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Test	Online Tests	50	0	MLO2, MLO1, MLO3
Report	Numerical Analysis Code	50	0	MLO4, MLO2, MLO1, MLO3