LIVERPOOL JOHN MOORES UNIVERSITY

Engineering Mathematics 2

Module Information

2022.01, Approved

Summary Information

Module Code	5321CIT
Formal Module Title	Engineering Mathematics 2
Owning School	Engineering
Career	Undergraduate
Credits	10
Academic level	FHEQ Level 5
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
Changshu Institute of Technology

Learning Methods

Learning Method Type	Hours
Lecture	40
Practical	8

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-PAR	PAR	September	12 Weeks

Aims and Outcomes

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

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Solve linear, first and second order, constant coefficient ordinary differential equations by the method of integrating factor and apply to the modelling of engineering problems.
MLO2	2	Find first and second order partial derivatives for functions of several variables and apply to engineering problems using optimisation and errors.
MLO3	3	Use eigenvectors and eigenvalues in the solution of engineering problems.
MLO4	4	Solve simultaneous homogeneous ordinary differential equations with constant coefficients and apply to the solution of a two degree of freedom system.
MLO5	5	Use Laplace transforms in the solution of engineering problems involving ordinary differential equations. Use Fourier series in the solution of engineering problems.
MLO6	6	Find numerical solutions of ordinary differential equations and apply symbolic mathematical software e.g. MATLAB in the solution to problems involving topics on the syllabus.

Module Content

Outline Syllabus	1. The solution of first order ODE's by the integrating factor method2. The solution of second order ODE's by the method of undetermined coefficients3. Application to single degree of freedom oscillating systems4. Functions of several variables. Partial differentiation with application to optimization and error estimation5. Eigenvalues and eigenvectors. By manual calculation for low order matrices. Use of software for matrices of larger order6. Solution of two first and second order, homogeneous simultaneous ODE's with constant coefficients. Application to normal modes for a two degree of freedom7. Laplace transforms. Concepts. Use of tables. The inverse transform. Application to the solution of ODE's. Transfer functions and stability8. Periodic functions. Fourier series for functions of any period. Harmonics.9. Numerical solution of ODE's. Euler's method and application of software.10. The use of a symbolic mathematical package e.g. MATLAB in the solution of problems involving the above topics.
Module Overview	
Additional Information	This module provides a basis in advanced engineering mathematics for level five 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.Reports are 2500 maximum word count.Examinations are 2 hour duration.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Exam	Final Exam	70	2	MLO1, MLO2, MLO3, MLO4, MLO5
Report	Report	30	0	MLO1, MLO3, MLO4, MLO6

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Clifford Mayhew	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings