

Liverpool John Moores University

Title: Pre Masters Maths
Status: Definitive
Code: **6501PMEC** (120811)
Version Start Date: 01-08-2016

Owning School/Faculty: Electronics and Electrical Engineering
Teaching School/Faculty: Study Group

Team	Leader
Michael Shaw	Y

Academic Level: FHEQ6
Credit Value: 15
Total Delivered Hours: 72
Total Learning Hours: 150
Private Study: 78

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	30
Practical	10
Seminar	20
Tutorial	10

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	AS1	Four in class tests	40	
Exam	AS2	Examination	60	2

Aims

This module aims to refresh and further develop the common mathematical skills necessary to support those students who require additional preparation in mathematics for progression to postgraduate programmes in Engineering and Computing.

Learning Outcomes

After completing the module the student should be able to:

- 1 Solve linear, second order, constant coefficient ordinary differential equations and apply to the modelling 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 Solve simultaneous homogeneous ordinary differential equations with constant coefficients and apply to the solution of a two degree of freedom system.
- 5 Use Laplace transforms in the solution of engineering problems involving ordinary differential equations.
- 6 Use Fourier series in the solution of engineering problems.
- 7 Find numerical solutions of ordinary differential equations.
- 8 Find and apply Z transforms to engineering problems.
- 9 Use differential vector calculus and appreciate its application in engineering.
- 10 Apply symbolic mathematical software e.g. 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:

In class test	1	2	3	4	5	6	7	8	9	10
Examination	1	2	3	4	5	6	7	8	9	

Outline Syllabus

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 vector calculus. Divergence, gradient and curl and their physical meanings and applications.

Z transforms. Definition and properties. Inversion. Applications.

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

Learning Activities

Lectures, seminars, group work, student presentations, computing laboratory work. Independent learning and self-directed study will support these activities.

Notes

This module will provide students with the knowledge and skills required to study a postgraduate level programme in Engineering or Computing.