

## Liverpool John Moores University

Title: Pre Masters Maths  
Status: Definitive  
Code: **6601PMEC** (124395)  
Version Start Date: 01-08-2021

Owning School/Faculty: Computer Science and Mathematics  
Teaching School/Faculty: Study Group

Team	Leader
Michael Shaw	Y

**Academic Level:** FHEQ6  
**Credit Value:** 20  
**Total Delivered Hours:** 41  
**Total Learning Hours:** 200  
**Private Study:** 159

### Delivery Options

Course typically offered: Semester 2 and Summer

Component	Contact Hours
Lecture	24
Seminar	9
Workshop	6

**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

*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 Demonstrate a critical understanding and evaluation of mathematics necessary to support application of key engineering principles.
- 2 Select and apply the appropriate mathematical methods, tools and notations in the analysis and solution of engineering problems.
- 3 Proficiently use symbolic mathematical software (e.g. Mathcad) in the solution to complex 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
Examination	1	2	

### **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**

A mix of lectures, seminars and workshops with in-class testing, computing laboratory work and homework, supported by independent learning and self-directed study. In each session the theory session is followed by a number of worked examples which are typical of, and lead to individual exercises for each unit.

## **Notes**

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