

## Liverpool John Moores University

Title: Advanced Mathematics for Engineering  
Status: Definitive  
Code: **5535ENGIOM** (117270)  
Version Start Date: 01-08-2016

Owning School/Faculty: Maritime and Mechanical Engineering  
Teaching School/Faculty: Maritime and Mechanical Engineering

Team	Leader
Russell English	Y

**Academic Level:** FHEQ5      **Credit Value:** 10      **Total Delivered Hours:** 26  
**Total Learning Hours:** 100      **Private Study:** 74

### Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	18
Tutorial	6

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam		60	2
Technology	Coursework		40	

### Aims

*To provide a foundation in advanced engineering mathematics for its application to the solution of engineering problems.*

### Learning Outcomes

After completing the module the student should be able to:

- 1 Apply complex numbers to the solution of engineering problems
- 2 Solve first and second order ordinary differential equations and apply to the modelling of engineering problems
- 3 Use Laplace transforms in the solution of engineering problems
- 4 Use Fourier methods in the solution of engineering problems
- 5 Apply z-transforms to signal processing
- 6 Apply mathematical software to the solution of engineering problems

### Learning Outcomes of Assessments

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

Exam	1	2	3	4	5	
Coursework	1	2	3	4	5	6

### Outline Syllabus

*Complex numbers: Complex arithmetic, complex conjugate, Argand diagram. Rectangular, polar forms. Magnitude and phase. Euler's formula.*  
*The solution of first order ODE's by for example, separation of variables*  
*The solution of inhomogeneous second order ODE's by the method of undetermined coefficients.*  
*Periodic functions. Fourier series for functions of any period. Harmonics.*  
*Laplace and Fourier transform: Definitions, properties, inversion and applications*  
*The z-transform: Definitions, properties, inversion of z-transform. Applications to signal processing.*  
*Apply mathematical software e.g. MATHCAD or DERIVE to the solution of engineering problems*

### Learning Activities

A combination of lectures and tutorials.

### Notes

Advanced methods in engineering mathematics are studied and applied.