

Module Title Mathematics 2 Keywords Ordinary Differential Equations, Laplace Transforms, Fourier Series, Partial Differentiation, Eigenvalues and Eigenvectors	Reference CM2901 SCQF SCQF 8 Level SCQF Points 15 ECTS Points 7.5 Created May 2002 Approved June 2002 Amended October 2012 Version No. 4
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This Version is No Longer Current

The latest version of this module is available [here](#)

Prerequisites for Module

Mathematics 1B (CM1902) or equivalent.

Laplace Transforms: Definition of Laplace transform and its inverse.

Use of tables to calculate Laplace transforms of elementary functions.

The solution of ordinary differential equations. The step function and impulse function.

Corequisite Modules

None.

Multivariable calculus: Partial differentiation. Application to problems in Science and Engineering.

Precluded Modules

None.

Aims of Module

To provide the student with the ability to apply advanced level mathematics to engineering problems.

Fourier Series: Decomposition of waveforms. Fourier series of simple functions. The use of symmetry. Amplitude spectra.

Indicative Student Workload

Learning Outcomes for Module

On completion of this module, students are expected to be able

<i>Contact Hours</i>	Full Time
Lectures	24
Tutorials	24
Computer Labs	10

to:

1. Solve first and second order ordinary differential equations by algebraic methods and apply Laplace transform methods to problems involving simple linear systems.
2. Carry out partial differentiation and apply it to problems in Science and Engineering.
3. Apply Fourier series techniques to periodic signals.
4. Calculate eigenvalues and eigenvectors of small matrices and apply diagonalisation in order to solve simultaneous ordinary differential equations.
5. Use a computer mathematics package to carry out the operations, as appropriate, in 1-4 above.

Indicative Module Content

The syllabus will include:

Further applications of a computer mathematics package for problems in engineering mathematics.

Solution of first and second order ordinary differential equations: separation of variables. Integrating factor method. Complementary function and particular integrals.

Assessment

6

Directed Study

Directed Study

30

Private Study

Private Study

56

Mode of Delivery

The module is lecture, tutorial and computer lab based.

Assessment Plan

	Learning Outcomes Assessed
Component 1	1,2,3,4
Component 2	5

Component 2 - Coursework

Component 1 - This is a closed book examination.

Indicative Bibliography

1. STROUD, K. A. and BOOTH, D. J., 2011. Advanced Engineering Mathematics. 5th ed. Palgrave.
2. STROUD, K.A. and BOOTH D.J., 2013. Engineering Mathematics. 7th ed. Palgrave.