Module Title **Mathematics 3A** **Keywords** Eigenvalues, Partial Differential Equations, Vector Calculus, Computer Packages	Reference CM3900 SCQF Level SCQF 9 SCQF Points 15 ECTS Points 7.5 Created May 2002 Approved June 2002 Amended October 2012 Version No. 3

This Version is No Longer Current

The latest version of this module is available here

Prerequisites for Module

CM2901 Mathematics 2A.

Corequisite Modules

None.

Precluded Modules

None.

Aims of Module

To provide the student with the ability to apply advanced mathematics techniques to applied problems in Science and Technology.

Learning Outcomes for Module

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

Indicative Student Workload

Contact Hours	Full Time
Lectures	20
Tutorials	16
Computing Laboratories	12
Assessments	8
Directed Study	
Directed Study	20
Private Study	
Private Study	74

Mode of Delivery

The course is lecture and tutorial based with computing laboratories in which mathematics packages will be used to solve extended problems which apply the mathematics techniques to practical problems.

to:

1. Calculate matrix eigenvalues and eigenvectors by hand or by computer as appropriate and apply eigen-methods to the solution of problems in Science and Technology.
2. Derive and apply solutions of partial differential equations by separation of variables and Fourier series.
3. Derive and apply solutions of partial differential equations by finite difference methods.
4. Perform calculations using the vector differential operators grad, div and curl and apply these to problems in Science and Technology.
5. Use computational packages in support of the other learning outcomes.

Indicative Module Content

Eigenvalues and eigenvectors of matrices and their relation to second order systems including degenerate systems. Development and solution differential equations using eigen methods. Partial differential equations using separation of variables and Fourier series to include heat flow in one dimension, one-dimensional vibration and Laplaces equation. Div, grad and curl and their identities. Application of the vector

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. KREYSZIG, A., 2011. Advanced Engineering Mathematics. 10th ed. J Wiley.

operators to problems in Science and Technology.