

## MODULE DESCRIPTOR

### Module Title

Mathematics 3

Reference	EN3900	Version	5
Created	April 2022	SCQF Level	SCQF 9
Approved	June 2002	SCQF Points	15
Amended	June 2022	ECTS Points	7.5

### Aims of Module

To provide the student with the ability to apply advanced mathematics techniques to applied problems in engineering.

### Learning Outcomes for Module

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

- 1 Calculate matrix eigenvalues and eigenvectors by hand or by computer as appropriate and apply eigen-methods to the solution of problems in engineering.
- 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 engineering.
- 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 of 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 Laplace's equation. Finite difference methods to solve PDEs. Div, grad and curl and their identities. Application of the vector operators to problems in Science and Technology.

### Module Delivery

Full-time students: The module is delivered using a series of lectures with associated tutorials and computer laboratories where techniques can be applied. Part-time students: This module is delivered by a combination of lectures and tutorials online. It will be supported by drop-in evening sessions and labs on campus. Assessments will primarily be online although exams will be held on campus with the full-time cohorts.

**Indicative Student Workload**

	Full Time	Part Time
Contact Hours	48	48
Non-Contact Hours	102	102
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
<i>Actual Placement hours for professional, statutory or regulatory body</i>		

**ASSESSMENT PLAN**

If a major/minor model is used and box is ticked, % weightings below are indicative only.

**Component 1**

Type:	Practical Exam	Weighting:	30%	Outcomes Assessed:	5
Description:	Computer based laboratory test.				

**Component 2**

Type:	Examination	Weighting:	70%	Outcomes Assessed:	1, 2, 3, 4
Description:	Closed book examination.				

**MODULE PERFORMANCE DESCRIPTOR****Explanatory Text**

The module has 2 components and to gain an overall pass a minimum D grade must be achieved in each component. The component weighting is as follows: C1 is worth 30% and C2 is worth 70%.

		Practical Exam:						
		A	B	C	D	E	F	NS
Examination:	<b>A</b>	A	A	B	B	E	E	
	<b>B</b>	B	B	B	C	E	E	
	<b>C</b>	B	C	C	C	E	E	
	<b>D</b>	C	C	D	D	E	E	
	<b>E</b>	E	E	E	E	E	F	
	<b>F</b>	F	F	F	F	F	F	
	<b>NS</b>	Non-submission of work by published deadline or non-attendance for examination						

**Module Requirements**

Prerequisites for Module	EN2901 Mathematics 2 or equivalent.
Corequisites for module	None.
Precluded Modules	None.

**INDICATIVE BIBLIOGRAPHY**

- 1 KREYSZIG, A., 2011. Advanced Engineering Mathematics. 10th ed. J Wiley.
- 2 STROUD, K.A. and BOOTH, D.J., 2011. Advanced Engineering Mathematics. 5th ed. Palgrave.