MODULE TITLE	**Engineering Mathematics**	**CREDIT VALUE**	**30**
MODULE CODE	**ECM1110**	**MODULE CONVENER**	**Ms Aileen MacGregor (Coordinator)**

DURATION: TERM	**1**	**2**	**3**
DURATION: WEEKS	**11 weeks**	**11 weeks**	**0**

Number of Students Taking Module (anticipated)	**195**

DESCRIPTION - summary of the module content

This module gives you the chance to go deeper into mathematics than you have likely gone before, and covers topics that are fundamental to engineers in their professional careers.
In particular, there will be a strong emphasis on the direct application of mathematics to engineering problems. Furthermore, you will have the opportunity to use a mathematical software package such as Matlab, which will improve your ability to apply quantitative methods and computer software, in order to solve engineering problems.

AIMS - intentions of the module

This module will improve your mathematical skills to the extent necessary for you to complete a BEng or MEng engineering degree programme, and your further developed skills should come in useful in your future career. You will develop a knowledge and understanding of mathematical principles necessary to underpin your education in a number of engineering disciplines, and to enable you to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems.
Furthermore, this module will improve your understanding of engineering principles and the ability to apply them to analyse key engineering processes. It will also enhance your ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques. Finally, it will increase your understanding and ability to apply a systems approach to engineering problems.

INTENDED LEARNING OUTCOMES (ILOs) (see assessment section below for how ILOs will be assessed)

The learning outcomes for this module have been mapped to the output standards required for an accredited programme, as listed in the current version of the Engineering Council's 'Accreditation of Higher Education Programmes' document (AHEP-V3).
This module contributes to learning outcomes: **SM1p, SM1m, SM2p, SM2m, G1p, G1m, G2p, G2m, G3p, G3m**
A full list of the referenced outcomes is provided online: http://intranet.exeter.ac.uk/emps/subjects/engineering/accreditation/
The AHEP document can be viewed in full on the Engineering Council's website, at http://www.engc.org.uk/
On successful completion of this module, **you should be able to**:
Module Specific Skills and Knowledge: SM1p, SM1m, SM2p, SM2m

1 work with functions in one, two or three variables, exhibiting skills in differentiation, integration, partial differentiation and multiple integration;
2 demonstrate an understanding of the concepts of complex number and analytic functions;
3 use vector algebra to analyse problems involving lines and planes, apply the scalar (dot) product and vector (cross) product to vectors;
4 perform basic arithmetic operations on matrices, including eigenvalues and eigenvectors of a matrix.
5 solve first and second order ordinary differential equations and apply them to simple problems in mechanics, electrical circuit theory and evolution problems (e.g. radioactive half-life);

Discipline Specific Skills and Knowledge: SM1p, SM1m, EA3p, EA3m

6 use mathematical software, (Matlab) to solve a mathematical problem.

Personal and Key Transferable/ Employment Skills and Knowledge: G1p, G1m, G2p, G2m, G3p, G3m

7 apply mathematical principles to systematically analyse problems;
8 extract the essential mathematics from real-world problems and to begin to be able to model such problems in familiar mathematical language;
9 communicate mathematical concepts and processes coherently, both orally and in writing, using correct notation.

SYLLABUS PLAN - summary of the structure and academic content of the module

- algebra and functions;
- differential calculus and applications;
- vector algebra;
- complex numbers;
- integration;
- first and second order ordinary differential equations;
- matrices;
- partial differentiation;
- vector calculus

- multivariable integral calculus;

LEARNING AND TEACHING

LEARNING ACTIVITIES AND TEACHING METHODS (given in hours of study time)

Scheduled Learning & Teaching Activities	100.00	**Guided Independent Study**	200.00	**Placement / Study Abroad**	0.00

DETAILS OF LEARNING ACTIVITIES AND TEACHING METHODS

Category	Hours of study time	Description
Scheduled learning and teaching activities	66	Lectures - four per week in term one, two per week in term two
Scheduled learning and teaching activities	22	Tutorials
Scheduled learning and teaching activities	12	Matlab exercises
Guided independent study	200	Lecture and assessment preparation, private study

ASSESSMENT

FORMATIVE ASSESSMENT - for feedback and development purposes; does not count towards module grade

Form of Assessment	Size of Assessment (e.g. duration/length)	ILOs Assessed	Feedback Method
Tutorial Worksheets		1-5, 7-9	Informal feedback provided in tutorials

SUMMATIVE ASSESSMENT (% of credit)

Coursework	20	Written Exams	80	Practical Exams	0

DETAILS OF SUMMATIVE ASSESSMENT

Form of Assessment	% of Credit	Size of Assessment (e.g. duration/length)	ILOs Assessed	Feedback Method
Written exam – closed book May	50	3 hours	1-5, 7,8,9	Annotated scripts
Written exam - closed book January	25	1.5 hours	1-5,7,8,9	Annotated scripts
Coursework – On-line assessments and written coursework	25	12 x 2 hours 2 x 6 hours	1-9	Annotated scripts with oral feedback

DETAILS OF RE-ASSESSMENT (where required by referral or deferral)

Original Form of Assessment	Form of Re-assessment	ILOs Re-assessed	Time Scale for Re-reassessment
All above	Written exam (100%)	All	August Ref/Def period

RE-ASSESSMENT NOTES

If a module is normally assessed entirely by coursework, all referred/deferred assessments will normally be by assignment.

If a module is normally assessed by examination or examination plus coursework, referred and deferred assessment will normally be by examination. For referrals, only the examination will count, a mark of 40% being awarded if the examination is passed. For deferrals, candidates will be awarded the higher of the deferred examination mark or the deferred examination mark combined with the original coursework mark.

RESOURCES

INDICATIVE LEARNING RESOURCES - The following list is offered as an indication of the type & level of information that you are expected to consult. Further guidance will be provided by the Module Convener

Basic reading:

ELE: http://vle.exeter.ac.uk

Web based and Electronic Resources:

Other Resources:

Reading list for this module:

Type	Author	Title	Edition	Publisher	Year	ISBN	Search
Set	Stroud, K.A	Engineering Mathematics	7th	Macmillan	2013	978-1-137-03120-4	[Library]
Set	Stroud K.A. & Booth Dexter J.	Advanced Engineering Mathematics	5th	Palgrave Macmillan	2011	978-0-230-27548-5	[Library]
Set	James, G	Modern Engineering Mathematics	4th with MyMathLab	Addison Wesley	2010	027373413x	[Library]
Set	James, G	Advanced Modern Engineering Mathematics	4th	Addison Wesley	2011	000-0-201-59621-0	[Library]
Set	Croft Daivison et al	Engineering Mathematics	4th	Pearson	2013	978-0-273-71977-9	[Library]

CREDIT VALUE	30	ECTS VALUE	15

PRE-REQUISITE MODULES	None
CO-REQUISITE MODULES	None

NQF LEVEL (FHEQ)	4	AVAILABLE AS DISTANCE LEARNING	No
ORIGIN DATE	Wednesday 11 November 2015	LAST REVISION DATE	Tuesday 24 January 2017

KEY WORDS SEARCH	Differentiation; integration; Matlab; vectors