University of Nottingham
School of Mathematical Sciences

Engineering Mathematics 2

Module Code: HG1M12

Credits: 10

Semester: Spring

Module Convenor: Dr Ciprian D. Coman

Contact hours:
There will be three contact hours/week, involving lectures, worked example classes and problem classes.
The problem classes, supported by staff and postgraduate demonstrators, will be held in alternate weeks.
An additional, optional supplementary clinic class will be held each week.

(Session 2017–2018)

Contents

Timetable

Lecture hours:	Tuesday	11.00–12.00	Pope C16
	Friday	9.00–10.00	Pope C16
Problem classes:	12.00–13.00 Pope C16	Feb 6, Feb 20, Mar 6, Mar 20	
Examples classes:	12.00–13.00 Pope C16	Feb 13, Feb 27, Mar 13, Mar 27, May 8	
Lecturer:	**Dr CD Coman**		

General Information

The School of Mathematical Sciences will be responsible for teaching virtually all of the mathematics you will meet. Nearly all engineering students are required, in their first and second years, to take compulsory modules in mathematics. Most courses allow an option choice during the third and/or fourth years. The mathematical topics you study have been carefully selected to meet with the requirements of the Engineering Schools. It is important to appreciate that some areas of each engineering discipline require a more extensive background in mathematics than others. However, as few students know in which areas they will finally specialise, or know the future mathematical requirements within their profession, it is important to have a wide and thorough basis.

Module Aims and Objectives

Together with module HG1M11, to provide students with both confidence and competence in a range of fundamental elementary mathematical techniques used in the analysis of engineering situations.

To understand the notion of a partial derivative and to apply this knowledge to consolidate the calculus of functions of two or more variables, with applications. To be able to classify and solve a range of first order ordinary differential equations. To develop an appreciation of vector algebra and to apply this to practical problems in geometry and engineering. To understand and use vector differential operators.

Pre-requisites for admission to the module

A basic mathematical education such as provided by a pass grade in A-level Mathematics or Pure Mathematics, BTEC level 4 or equivalent. Completion of HG1M11.

Methods of teaching

The module will have three contact hours per week, typically the third hour will be used in alternate weeks as a problem class. During lectures you will be introduced to mathematical techniques; details of importance will be written on the boards, or displayed on a projector, and **you are strongly recommended to attend all the lectures and take down notes for future reference**. A variety of illustrative examples will be given in lectures or the worked-example sessions, but the main way for students to comprehend fully the material is to attempt examples **outside the module contact hours.**

Working through exercises is the universally accepted method of learning mathematics. To aid this process, a selection of problem sheets is provided and a bi-weekly problem class is timetabled so that you can obtain some individual assistance on problems from the sheets or lecture material. You are urged to make use of this facility and are reminded that attendance is considered compulsory. Students will be expected to be engaged in work associated with the module.

Optional clinic classes will be held on Thursdays at 5pm in Physics B23.

In addition to working through the module problem sheets you should also practise corresponding examples from the set textbooks – your module lecturer can offer advice on appropriate work to undertake. You may also find it of benefit to study past examination papers – these, together with full worked solutions, and further learning material, may be accessed through Moodle (`http://moodle.nottingham.ac.uk`).

Details of your **lecturer's office hours** can also be found on Moodle. These may be subject to change throughout the term, so please check Moodle regularly for the latest information regarding your lecturer's availability.

Module Assessment

Formal assessment of the module is through:

- **Coursework Assignment (10%):**
  This will be set on **Tuesday 6th March**, and the submission deadline is **3:00pm** on **Tuesday 20th March**.
- **Multiple-Choice Class Test (10%):**
  This will be held on **Tuesday 1st May** at **12:00pm**.
- **End-of-Semester Examination (80%):**
  This examination has the same form as the HG1M11 examination. It is **two hours** in duration and consists of **two sections, equally weighted**. **Section A** contains **12 multiple-choice** questions, while **Section B** contains **3 longer questions, of which you should attempt 2**.

Re-assessment will be by examination **only** (ie 100% resit exam, no coursework).

Submission of Assessed Coursework

When you submit assessed work, you will be required to fill in a Submission of Assessed Coursework cover sheet and to staple it securely to your work. By submitting your work, you confirm have read and understood the guidelines on plagiarism (see later) and that the work submitted is your own and does not contain plagiarised material. **You must sign the cover sheet order to receive official credit for the work**.

The deadline for submitting your coursework is **3 pm on the submission day**. To submit your coursework, you are required to use the **Maths coursework box** in the **University Park East Student Service Centre**. Please note that 3 pm is a strict deadline, even coursework submitted at 3:01 pm will be regarded as submitted one day late.

Any application (from an individual student) for an extension to a mathematics assessed coursework deadline should be made to the module convenor, but will only be considered if it is accompanied by a completed Extenuating Circumstances Form (ECF) recording the circumstances giving rise to the request and signed by the student's tutor. **An ECF must be submitted within one week of the assessment affected by the extenuating circumstances**. The module convenor will decide whether or not to grant any extension and indicate a new deadline (if appropriate) on the coursework script.

A student who is unhappy with the module convenor's decision with respect to any (or no) extension may appeal to the Director of Mathematics Service Teaching, currently Dr M Kurth (e-mail `martin.kurth@nottingham.ac.uk`).

School of Mathematical Science
Guidelines on Plagiarism
Mathematics Modules for Engineers and Scientists

As a student taking a module in the School of Mathematical Sciences, you should ensure that you understand what is meant by the term plagiarism, and in particular as it applies in mathematics. Plagiarism is a serious academic offence and could, in certain circumstances; result in termination of your university degree course.

It is an academic offence for a student to use another person's work and to submit it with the intent that it should be taken as his or her own. Work which is not undertaken in an Examination Room under the supervision of an invigilator (such as assessed coursework, essays, project work, experiments and other similar work) but which is nevertheless required work forming part of the degree, diploma or certificate assessment, must be the candidate's own and must not contain any plagiarised material.

Copying another student's solution to a question (or part of a question) and submitting it as your own work will be treated as plagiarism by the School of Mathematical Sciences.

Discussion and working with colleagues and friends is often a productive way of studying and learning. However, mathematics is a practical subject and to become proficient at it, you must work at the lectures, examples sheets and coursework. Remember, you will be assessed (especially in examinations) on your ability and on what you understand.

Copying another student's solutions is not only plagiarism, but is educationally misguided.

Submission of Assessed Coursework
Assessed coursework must be submitted with an attached official cover/receipt sheet. This sheet also contains a statement that you have read and understood the guidelines on plagiarism and that the work submitted is your own and does not contain plagiarised material.

You must sign this statement in order to receive official credit for the work.

Action taken:
Where a member of staff suspects an offence of plagiarism or the fabrication of results in any work which forms part or all of a unit of assessment for a module, he or she shall report the matter to the Head of the School of Mathematical Sciences.

Where the student is registered in a different School, the Head of that School shall also be informed.

The Head of the School of Mathematical Sciences is required to interview the student and write a report.

Full details on plagiarism can be found in the Quality Manual at:

`http://www.nottingham.ac.uk/academicservices/qualitymanual/assessment/academic-misconduct.aspx`

Syllabus

1. **Vectors**

   Addition, subtraction and products of vectors; applications to three–dimensional problems in geometry and engineering. Differentiating scalar and vector products.

2. **Calculus of functions of multiple variables**

   3-D co-ordinate systems; First and second order partial derivatives; Taylor series, with applications to stationary points (maxima, minima and saddle points) of surfaces and to the assessment of small errors. Total derivatives, change of variables in 2D, integration of partial differential equations.

3. **First order ordinary differential equations**

   First-order ODE's (including linear equations, with boundary/initial conditions and exact equations).

4. **Vector calculus**

   Derivatives of vector valued functions; scalar and vector fields; vector differential operators: gradient, divergence, curl; combinations of grad, div, curl; irrotational and solenoidal vector fields.

Recommended Texts

Author	*Title*	*Publisher*	*Library No*
Module Text			
Glyn James	Modern Engineering Mathematics	Addison-Wesley	TA330
Alternative Text			
DW Jordan & P Smith	Mathematical Techniques (3rd Edition)	OUP	TA330
Reference Texts			
Glyn James	Advanced Modern Engineering Mathematics	Addison-Wesley	TA330
E Kreyszig	Advanced Engineering Mathematics	Wiley	TA330

The George Green Library contains numerous copies of many books on the subject of Engineering Mathematics. Most have the library number TA 330. You are encouraged to investigate these other books – they will provide you with further mathematical and engineering examples. The lecturer of the module will offer further advice on textbooks if asked to do so.