

Code/Title EG 1204 Science and Engineering Mathematics 1 [B]

Faculty Science and Engineering

Department/School Engineering

Aims

To provide students with the necessary pre-requisite mathematical skills and knowledge to handle CEng level degree courses. To increase students confidence in using and understanding mathematics. To build on and advance the skills acquired in Science and Engineering Mathematics 1 [A]

Learning outcomes

To have developed knowledge, understanding and skills in the following areas of mathematics:

<i>Logarithms and exponentials</i>	<i>Base 10 and 2, other bases, laws of logarithms, change of base, powers of 10 and 2, a^x and e^x with inverses, equations involving logarithms and exponentials.</i>
<i>Further differentiation</i>	<i>Derivative of e^x, definition and differentiation of hyperbolic functions, product rule, quotient rule, derivatives of trigonometric functions, implicit differentiation including inverse functions, velocity and acceleration, related rates, linear approximations and small angle formulae.</i>
<i>Further integration</i>	<i>Guessing antiderivatives via chain rule, solving simple differential equations, method of substitution, integrals of trigonometric functions, use of partial fractions, integration by parts, calculation of areas, volumes of solids of revolution, and mean values.</i>
<i>Further trigonometry</i>	<i>Sec, cosec and cot, inverse trig functions, amplitude and phase. General solution of trigonometric equations.</i>
<i>Further algebra</i>	<i>Inequalities involving rational expressions, partial fraction expansion of rational functions, sequences, convergence and divergence, calculation of limits by inspection, series, sigma notation, arithmetic and geometric series, definition and properties of binomial coefficients, Binomial theorem.</i>
<i>Plane geometry</i>	<i>Distances, angles, elementary treatment of straight lines, circles and curves, application of calculus to tangents and normals.</i>
<i>Geometry of straight lines and planes</i>	<i>Equation of a straight line in the form $\mathbf{r} = \mathbf{a} + t\mathbf{b}$, intersection of two straight lines, skew lines, geometrical significance and algebraic properties of the scalar product of two vectors, angle between two vectors, orthogonal vectors, scalar and vector orthogonal projections of a vector, equation of a plane in the form $\mathbf{r} \cdot \mathbf{n} = d$, intersection of a straight line and a plane.</i>

Indicative content

Logarithms and exponentials, further differentiation, further integration, further trigonometry, further algebra, partial fractions, sequences and series, plane geometry, and the geometry of straight lines and planes in three dimensions.

Delivery mode

The module will be delivered by a series of lectures and workshops.

Duration / Period of teaching

[B]

SCOTCAT Credit rating

20 SCOTCAT points at Level 1

Pre-requisites / co-requisites

Satisfactory attendance in EG1104 *Science and Engineering Mathematics 1* [A]

Prohibited Combinations

MA1103 Mathematics 1 [A] or MA1203 Mathematics 1 [B]

Assessment

Exam in the Degree Examination Diet: 60%
Assessed Coursework: 40%

Examinations

One three hour examination at the Degree Examination Diet

Exemption scheme

None

Module leader/co-ordinator

Dr F.A. Davidson fdavidso@maths.dundee.ac.uk

MODULE SPECIFICATION: Part 2. TEACHING, LEARNING and ASSESSMENT**Methods of Teaching, Learning and Assessment.**

Lectures and workshops, marked homework, class tests and degree examination.

The Assessed Coursework will consist of four class tests, which will take place during the teaching period and will be 50 minutes each.

Module Organisation and Structure*Contact time*

- Lectures 44 at 4 per week
- Workshops 22 at 2 per week

Personal supporting study

Studying, reading. Preparation and write-up associated with workshops. Revision for tests and examinations. 7 hours of private study per week.

Staff resources

Two lecturers, plus assistance in workshops depending on student enrolment.

Learning resources

Lecture notes, recommended textbook, sheets of problems for workshops.

MODULE SPECIFICATION: Part 3. STUDENT GUIDANCE

Staff contact details

Dr F.A. Davidson, tel: (01382) 344692, Room 23-2-4 (Second Floor, 23-25 Perth Road)
e-mail: fdavidso@maths.dundee.ac.uk

Prof. T.N.T. Goodman, tel: (01382) 344488, Room 21-1-1 (Second Floor, 21 Perth Road)
e-mail: tgoodman@maths.dundee.ac.uk

Responsibilities of staff and students

Members of staff will be responsible for delivering the lectures and supervising the workshops.

Students should attend lectures and workshops on a regular basis. They should prepare homework and revise the content of the module every week. They should devote seven hours per week to private study, including homework and revision. Consult Dr. Davidson or Prof. Goodman if you require extra help or if you have any query relating to the Module.

Lectures and Workshops

Lectures will take place in the Carnelly Large Lecture Theatre at noon on Mondays, Tuesdays, Wednesdays and Thursdays. Two lectures a week will be given each by Dr Davidson (Mondays and Wednesdays) and Prof. Goodman (Tuesdays and Thursdays). You will be assigned to a workshop group, which will meet at 10 o'clock and noon on Fridays.

You will be expected to take notes at the lectures. Try to understand the mathematics being described by the lecturer **and** take notes at the same time. Usually the lecturer will write on the blackboard what he considers to be an understandable account of the topic. Sometimes you will find it useful to add a few of your own remarks to your account of the lecture, either during the lecture or when looking over your notes before the next lecture.

You will receive a sheet of problems that you should work through during a workshop. You should work out solutions to these problems, which illustrate the current topic, and you should seek whatever help you need from either a fellow student or a tutor. There will be at least one tutor available to sort out any difficulty that arises during a workshop. Ask for help and keep your tutor busy for fifty minutes. **It is essential that you bring relevant lecture notes to the workshops.**

Earlier in the week, usually on Monday, the lecturer will have distributed copies of a problem sheet to the class. You should attempt all the problems in your own time and prepare solutions to the questions for handing in later in the week. Your solutions will be marked and returned to you the following week.

You should use the workshops to get help from your tutor in respect of any problem that you have found difficult in recent days. It is in your best interests to ask for help at the workshop. You can be fairly sure that there will be other members of your group who have experienced the same difficulty.

You should work consistently week by week and you should seek whatever help you need. That is the best advice that we can offer you.

Attendance

You are expected, and are strongly recommended, to attend all the lectures. You are required to attend all the workshops. Records of your attendance at workshops will be kept. In addition, there will be a record kept of the marks you gain for the weekly homework.

If you are unable to attend an element of assessment (such as a Class test or an examination held in the Degree Examination Diet) because of illness, **you must supply a medical certificate** covering the relevant period to your Faculty Office (Science and Engineering situated on the first floor of the Carnegie Building in the Geddes Quadrangle and Arts and Social Sciences situated on the ground floor of the Tower Building). If illness prevents you from attending other meetings of the class, please keep your Faculty Office informed of the reasons for your absence.

Recommended Book

“Mathematics for Engineers”
by Anthony Croft and Robert Davison (Addison-Wesley, ISBN 0-201-87752-X)

University Library

You may be able to borrow a copy of the recommended book for short periods.

At the end of each week, the lecturer will deposit copies of the solutions to the workshop problems and the homework problems in the University Library. The files containing the solutions can be borrowed for short periods. Consult the assistants at the short-term loan section of the issue desk. You will be fined if you keep a file too long. Read the library regulations carefully. Some students find it convenient to make a Xerox copy of some of the solutions. There are copying machines near the issue desk.

Maths Base

You will be able to obtain extra help with any mathematics problem by dropping into Maths Base where you will be able to consult a member of staff. Maths Base, located in room 23-2-8 on the second floor of 23-25 Perth Road, takes place between two o'clock and four o'clock on Wednesday and Thursday afternoons, beginning in week 2.

An additional copy of the solutions to the workshop problems and the homework problems will be available in the Maths Base

Calculators

You will need to supply yourself with a scientific calculator. The one that you used at school will probably be suitable.

You will not be allowed to use a graphics calculator or a calculator that is capable of doing computer algebra (i.e. symbolic manipulation) during a Class Test or a Class Examination or an examination held during a Degree Examination Diet.

You may use any calculator, for example a graphics calculator that you have used at school, in connection with your workshop or homework problems.

Assessment

There will be four Class Tests. You will have to answer questions similar to those that you will have done in the preceding three weeks. Your answers will be marked and the Class Tests will be part of your assessment. These tests will allow you to see how well you are coping with university mathematics. The dates and times of the Class Tests will be well publicised. If in any doubt, check with Dr. Davidson or Prof. Goodman.

There is no Class Examination for this course.

There will be an examination lasting three hours in the Degree Examination Diet. You will be asked to attempt questions covering all the topics discussed in the Module.

The assessment in June will be based on the following elements:

- 40% based on the marks scored in the four Class Tests and
- 60% based on the mark scored in the examination held in the June Degree Examination Diet.

The assessment in September will be based on the following elements:

- 40% based on the marks scored in the four Class Tests and
- 60% based on the mark scored in the examination held in the August/September Degree Examination Diet.

The pass mark will be 40%.

When considering borderline cases, the examiners will have available a record of attendance at workshops, together with a record of the marks awarded for homework done throughout the session.

Past Examination Papers

The examination papers set in session 1999-2000 for the corresponding module (which had the code MA1252) are included in this course guide.

Withdrawal from a Module

If your attendance at workshops is irregular **or** if the quality of your homework is unsatisfactory, you will receive a warning from the Module Leader. Your Adviser of Studies and your Personal Tutor will be notified of this warning and a copy of the warning will be deposited in your file in the Faculty Office. If there is no subsequent improvement, you will not be allowed to sit the examination in the Degree Examination Diets in the relevant module during the current session. This is sometimes described as having your DP certificate withheld. Note that “DP” stands for “Duly Performed”, which is a term that appears in the Degree Regulations. In effect, you have failed the module.

Any warning issued should be treated very seriously. A student receiving such a warning should seek help immediately. If you were to find yourself in receipt of a written warning, you should consult your Adviser of Studies or your Personal Tutor or the Student Advisory Service as soon as possible.

Student comment and feedback

During Teaching Block A, you may pass comments regarding the Module to either Dr. Davidson or Professor Goodman (who is the Head of the Department of Mathematics).

Towards the end of the Module you will have the opportunity to complete a questionnaire, which forms an important part of the Faculty's Academic Standards Procedures.