

MA22001: Mathematics 2B Guide 2011 – 2012**Organisation**

The MA22001 module contains components of Calculus and Algebra which run concurrently for 11 teaching weeks. The members of the teaching team are

<i>Calculus</i> :	Dr Niall Dodds, Mathematics Division, Room 1.43F, Old Hawkhill	<i>Algebra</i> :	Dr Alan Terry Mathematics Division Room 1.43K, Old Hawkhill.
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The Module Leader is Dr Dodds.

You may bring matters of concern about the course to the attention of the Mathematics Division Staff/Student Committee, which meets once each semester. A volunteer from MA21001 and MA22001 will act as class representative to sit on the Staff–Student Committee; their name will be posted on BlackBoard.

Your Commitment

You should attend all class meetings except on medical grounds or with the special permission of the lecturer concerned. A medical certificate should be submitted to your School Office to account for any absence at lectures, workshops or tests on account of medical grounds.

About 13 hours per week of your study time, including timetabled hours, should be devoted to this module.

Study Support

If you are having difficulty with the course work you are encouraged to seek help at an early stage at Maths Base, at the Workshops, or from your lecturers.

Syllabus

This module contains the second half of the basic algebra and calculus required for intending honours students. The module may also be taken by science and arts students not intending to proceed to an honours mathematics degree. This module involves 170 hours of student effort, including 66 contact hours (44 lectures and 22 other meetings for workshops).

Calculus component**Multivariable Calculus (16)**

- Definitions and notations, including polar coordinates.
- Partial Derivatives.
- Tangent planes.

Revision of the Chain Rule in one dimension.
The Chain Rule.
Taylor series.
Stationary points for functions of two variables.
Jacobian, chain rule.
Double integrals, change of order, change of variables.
Infinite and improper integrals.

Series (6)

Tests for convergence of series of numbers.
Convergence of power series, radius of convergence. Application to Taylor & Maclaurin series (mention of Taylor's Theorem).

Algebra component

General vector spaces and subspaces (6-7 lectures)

\mathcal{P}_n , \mathbb{C}^n and other vector spaces.
Span, linear dependence/independence, bases
Reduction to row-echelon form, relation to linear independence
Intersections, unions and direct sums of subspaces
Range and nullspace of a matrix

Inner products (5-6)

Definition of inner products and inner product spaces
Gram-Schmidt orthogonalisation

Eigenvalues and eigenvectors (5-6)

Definitions and examples
Complex and repeated eigenvalues, algebraic and geometric multiplicity
Diagonalization of matrices
The Cayley-Hamilton theorem

Linear mappings (4-5)

Definitions and matrix representations
Composition of linear mappings
Kernel and image

Assessment

There will be Homeworks, Class Tests and a Degree Examination in the May diet of examinations. These contribute to the overall assessment as shown in the Table below.

Homeworks	20%
Mid-semester Tests (Weeks 6 & 7)	20%
Degree Examination	60%

Marks in these assessments will be deducted for work if the presentation is deemed unsatisfactory or not handed in by the deadline given.

To pass this module in May it is necessary to gain at least 40% in the overall assessment **and** at least 30% in the final exam. The Head of Division may debar a student not performing at a satisfactory level in the continuous assessments from entering the Degree Examination in May.

For those who fail the module in May there will be a two-hour examination paper at the August Examination diet. The overall assessment at resit will *usually* be based 100% on this resit exam.

Awards

A medal may be awarded to the best student in the class.

Feedback

At the end of each section of the module you will be asked to complete a confidential questionnaire regarding the content and presentation of the module. This is an important element in the University's Academic Standards procedures.

Recommended Books

The main texts for this module are:

WIE Calculus Early Transcendentals (Brief), 8th Edition
by Howard A. Anton, Irl Bivens, Stephen Davis
Publisher: John Wiley & Sons, New York.

Linear Algebra by David Poole
(Brooks/Cole, ISBN 0-53434174-8).

Many similar textbooks may be found in the University Library.

Web Resources

Advance@Dundee <http://www.dundee.ac.uk/advancedundee/>

This is the University of Dundee Transferable Skills Website and is divided into eight key skill areas and over 60 specific topics giving access to hundreds of interlinked articles about personal transferable skills. The eight skill areas include pages on Basic Maths & Stats. There are many other resources available on the web that are relevant to these modules.

Study Skills online: <http://people.brunel.ac.uk/~mastmmg/ssguide/sshome.htm>

A useful set of pages written by Martin Greenhow of Brunel University.

We suggest you use Google or some other search engine to discover further web resources.