University of Dundee Mathematics Division

MA11001: Mathematics 1A Guide 2007 - 2008

Organisation

The MA11001 module contains components of Calculus and Algebra which run concurrently for 11 teaching weeks. The members of the teaching team are

Calculus :	Dr David Griffiths, Mathematics Division, Room 23/1/1, 23 Perth Road.	***Algebra :***	Prof Tim Goodman Mathematics Division Room 21/1/1, 21 Perth Road.
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who are responsible for the entire organisation and teaching. The Module Leader is Dr Griffiths.
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 MA11001 and MA12001 will act as class representative to sit on the Staff–Student Committee; their name will be posted on BlackBoard.

Timetable

The lectures for the Calculus components of MA11001 will be held on Mondays and Wednesdays at 1.00 p.m. and the lectures on the Algebra and Geometry components on Tuesdays and Thursdays at 1.00 p.m. The meetings at 11.00 a.m. on Fridays will be shared between Calculus and Algebra and be used for Workshops and mid–term Tests.
You will be required to attend workshops or computer practical sessions for one hour on Monday or Tuesday afternoons. You will be asked to do homework exercises and be required to undertake and report on a small project. The investigations for the project will be carried out in groups but the reports will be written individually.
There will be 4 class tests each of one hour duration held in the examination period at the end of the semester.

Your Commitment

You should attend all lectures and workshops except on medical grounds or with the special permission of the lecturer concerned. If you are absent from a Class Test on account of medical problems, you should submit a medical certificate to your Faculty Office.
You should also complete the project and all the homework exercises and keep a record of all your work at Computer Practical sessions to build up a portfolio which should be handed in at the end of the 10th week of the semester. 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 the Workshops. You may also obtain help from the Maths Base (see BlackBoard for details); from your lecturers or your Personal Tutor.

Syllabus

In order to take this course you should have at least a B pass at Higher, or equivalent qualification.
You will be introduced to the basic ideas of Calculus, Algebra, Trigonometry and Geometry. The mathematics covered in secondary school will be consolidated and extended to provide a secure base on which to develop later mathematics modules.
This module involves 170 hours of student effort, including 66 contact hours (44 lectures and 22 other meetings for workshops and tests).

Calculus component

Functions (6)

Number systems ($\mathbb{N}$, $\mathbb{Z}$,$\mathbb{Q}$,$\mathbb{R}$). Open & closed intervals.
Elementary functions, domain, range, composition, inverse.
Inequalities.
Idea of a limit for functions and for sequences.
Standard limits, including $\lim_{x\to 0}(\sin x)/x$, $\lim_{n\to\infty} r^n$, $\lim_{x\to a} \frac{x^n-a^n}{x-a}$.
Mention of algebra of limits.

Differential Calculus (16)

Derivatives, tangents and rates of change.
Simple derivatives by first principles (such as $1,\ x,\ x^2,\ 1/x, \sin(x)$ etc.).
Treatment of $(f+g)'$, $(fg)'$, $(f/g)'$, $(f\circ g)'$ and inverse functions.
Hence derivatives of all elementary functions.
Higher order derivatives. Implicit Differentiation (including conics in standard form).
Revision of index laws and log to base a.
Definitions and elementary properties of exp and ln
Solution of equations involving exponential and logarithmic functions.
Differentiation of functions involving exponential and logarithmic functions (for example, $x^n, \mathrm{e}^{ax}, x^n\ln(x), \mathrm{e}^{ax}\sin bx$ etc.).
Logarithmic differentiation (simple examples including a^x).
Tangents and Normals to curves.
Increasing and decreasing functions.
Critical points (including stationary points, points where f' is not defined, points of inflection, and extremes at ends of interval).
Curve sketching (including asymptotes).

Algebra and Trigonometry component

Polynomials (8)

Quadratic polynomials
Algebra and geometric representation of complex numbers.
Division algorithm.
Remainder theorem.
Roots of polynomials.
Techniques of partial fraction decomposition.

Series (4)

Series as sequences of partial sums.
Summation of series and sigma notation.
Convergence of series, geometric series.
Examples of finite and infinite series.
Binomial theorem.

Trigonometry (7)

Definitions and properties of the six trigonometric functions, including formulae for $\sin(A+B)$, $\sin A \sin B$, $\sin A + \sin B$, etc.
Solution of trigonometric equations (including $a\cos(x) + b\sin(x) = c$).

Conics (3)

Classification, standard forms, parametric representations.

Assessment

There will be Homeworks, Class Tests, a Project and a Portfolio of Practical work. These contribute to the overall assessment as shown in the Table below. Marks in these assessments will be deducted for work if the presentation is deemed unsatisfactory or if it is handed in after the specified deadline (usually at the Workshop on the Friday of each week).

6 Homeworks	Weeks 2, 3, 4, 7, 8 & 9	15%
Portfolio of Computer Practical Work	Handed in Week 10	10%
2 Mid-semester Tests	Weeks 5 & 6	20%
Project	Issued week 6, Due week 12	15%
4 Final Tests	Weeks 12 & 13	40%

To pass this module in December it is necessary to gain at least 40% in the overall assessment **and** hand in all work requested **and** attempt all class tests. There will be penalties for late submission of work.
For those who fail the module in December there will be a two-hour examination paper at the August Examination diet. The overall assessment will be based on 85% of the mark gained at the resit examination with the remaining 15% coming from the project mark.

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 text for the Calculus component of the module is:
WIE Calculus Early Transcendentals (Brief), 7th Edition
by Howard A. Anton, Irl Bivens, Stephen Davis
Publisher: John Wiley & Sons, New York.

Many similar textbooks may be found in the University Library.

There is no recommended book for the Algebra and Trigonometry component of this module. However, you will find it helpful to have access to a mathematics dictionary such as
The Penguin Dictionary of Mathematics,
Edited by D. Nelson.
Publisher: Penguin Books (2003) (£6.99)
or
The Concise Oxford Dictionary of Mathematics
Edited by Christopher Clapham
Published by Oxford University Press
New Edition, 1996, ISBN: 0-19-280041-8 (£6.99).

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. We suggest you use Google or some other search engine.

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