

This is an important document. It contains all of the information you need about MATHS 108 in 2009 Summer School. Please keep it and refer to it regularly.

## Welcome

This course is designed as a general entry to university Mathematics, and covers topics in Calculus and Linear Algebra.

MATHS 108 is the main gateway to mathematics for students, including those taking this subject as part of other majors. It presents selected topics in algebra and calculus and their applications including: sets, real numbers, integers; linear algebra including matrices, linear functions, linear equations; functions, equations and inequalities; limits and continuity; differential calculus of one and two variables; integral calculus of one variable. These are studied in general settings using applications from science, commerce and information systems.

MATHS 108 (General Mathematics 1) is one of two courses designed for students continuing in Mathematics after Year 13 mathematics courses. It is for students who have achieved 12 credits in NCEA level 3 Mathematics with Calculus, or 18 credits in NCEA level 3 Mathematics with Statistics.

Where possible, students with 18 or more credits in NCEA level 3 Mathematics with Calculus (including some Merit credits) should instead enrol in MATHS 150 (Advancing Mathematics 1).

## Lecturers

MATHS 108 will be taught by Jamie Sneddon and Garry Nathan. Garry will teach from Feb 3rd to Feb 11th.

Garry Nathan — Room 311 — xt 84931 — [g.nathan@math.auckland.ac.nz](mailto:g.nathan@math.auckland.ac.nz)

Jamie Sneddon — Room 305 — xt 82121 — [sneddon@math.auckland.ac.nz](mailto:sneddon@math.auckland.ac.nz)  
(Course Coordinator)

Office hours will be announced in class and posted on our doors.

Please visit your lecturers in office hours if you have any questions or problems; we want to help you succeed!

## Timetable

Lectures are Tuesday 12–1 and Wednesday to Friday 12–2.

The lecture room(s) for MATHS 108 will be advised before lectures start through nDeva (<http://ndeva.auckland.ac.nz>).

Your tutorial is on Tuesday afternoon or Wednesday morning. The first tutorial is on Jan 13th or 14th — there are no tutorials in the first week.

Tutorial rooms will be announced in class and via Cecil.

## Prerequisites & Restrictions

The expected background of a student enrolling in MATHS 108 is 12 credits in NCEA level 3 Mathematics with Calculus or 18 credits in NCEA level 3 Mathematics with Statistics, or equivalent background, **such as:** a pass in MATHS 102, a D or better in Cambridge A2 Mathematics, a C or better in AS Mathematics, or a pass in International Baccalaureate Mathematics.

Students who are not prepared for MATHS 108 are **strongly** advised to enrol in MATHS 102 instead. Past results indicate that students without the expected background are likely to fail.

MATHS 108 is restricted against MATHS 150 and 153, ENGSCI 111, and PHYSICS 111 (and also the old courses MATHS 130 and 151). You cannot take MATHS 108 after passing any of these courses, or take any of these courses after passing MATHS 108. You may not take MATHS 101 or 102 concurrently with or after taking MATHS 108; but you can take MATHS 108 after these courses.

## Repeating

Departmental and Faculty approval is required for students to take any course a third time. Approval for a 3rd attempt at MATHS 108 will not be given unless you have passed MATHS 102.

## Aims of MATHS 108

- To introduce students to learning mathematics at university level.
- To set a mathematical platform that can be relied upon in all undergraduate courses, including:
  - accepted conventions of mathematical notation and representation;
  - algebraic manipulative skills; and
  - understanding of basic mathematical ideas.
- To build understanding of calculus by:
  - developing an understanding of the derivative;
  - developing an understanding of the anti-derivative and integration;
  - consolidating differentiation techniques;
  - consolidating and filling gaps in integration techniques.
- To develop understanding of algebra and linear algebra in a first course which includes:
  - the overall idea of linear algebra as sets of equations;
  - basic skills in matrices;
  - conceptualisation of matrices including vectors.

## Old and New

MATHS 108 changed in 2006. Before 2006, the topics covered in this course were different. Some topics have been removed, and other topics have been added. When studying from past tests and exams, look first at the more recent available material. If you are unsure about whether a topic is examinable, look for it in the lecture notes or ask a lecturer.

## Expectations & Workload

At Summer School, we expect students to use (at least) 20 hours per week studying for each of their courses.

Expect this to involve 7 hours of lectures, a 1 hour tutorial, 6 hours of lecture preparation (reading the textbooks), and 6 hours of work on assignments and/or preparing for the test and exam.

Stay on top of the course material as it is covered. If you get behind it can difficult to catch up. Make use of the help available; ask for help as soon as you need it.

## Text Books

[1] *Calculus: Early Transcendentals*, 8th Edition, by H. Anton, I. Bivens, S. Davis (Wiley).

[2] *Contemporary Linear Algebra*, H. Anton, R. Busby (Wiley).

These books are sold packaged together at the University Book Shop (UBS), and are widely available second-hand.

## Resources

All announcements made in class will be made on Cecil ([www.cecil.auckland.ac.nz](http://www.cecil.auckland.ac.nz)). You can download the assignments and other resources from Cecil. Cecil is also used to generate the quizzes.

A course book containing the lecture slides is available from UBS. The PDF files of this book will be available for download from Cecil.

Lectures may be recorded for you to access later. We cannot guarantee that the technology will behave itself, so some lectures may not be available. These should be used as an additional resource, not as a replacement for lectures. Past data shows that the more lectures you attend in person, the higher your final grade. Student who skip lectures intending to watch a recording but don't get around to it do not perform well.

## Matlab

The Department of Mathematics uses the software package Matlab for most undergraduate courses. Matlab knowledge is also useful for all subsequent mathematics courses. The basics of Matlab are easy to understand and a valuable skill to gain. Matlab is an important part of this course; it is a component of most assessments, including the test and exam.

Matlab resources are available on Cecil. Matlab is available for use in the computer laboratories in building 303 and also in the Student Commons (although the process to gain access is a little involved). Access Matlab via the Start Menu of the computer. The Mathematics and Statistics laboratories have tutors who are able to assist you.

## Calculators

You are permitted to use a calculator in the MATHS 108 test and examination. Any standard scientific calculator (e.g. Casio FX82) is sufficient, but many students prefer a programmable (graphics) calculator. In tests and examinations you must be able to show that the memory of your programmable calculator has been cleared.

## Assessment

There is **no plussage** in MATHS 108. This means that all components of the assessment count toward your final grade. Attempt all of the assessments, even if what you submit is incomplete.

3 Assignments	9%	(3% each)
5 Tutorials	5%	(1% each)
4 Quizzes	4%	(1% each)
2 Matlab Worksheets	2%	(1% each)
Test	20%	
Exam	60%	

**Assignments** will be due on the following days. They will be posted on Cecil at least 8 days before they are due. Assignments **will** require the use of Matlab. All are due at 4pm.

9%

A1 Fri Jan 16th

A2 Fri Jan 30th

A3 Wed Feb 11th

**Tutorials** are weekly on Tuesday afternoons or Wednesday mornings, starting in week 2 (Jan 13th or 14th).

5%

Be sure to write your name and ID number on the collaborative tutorial sheet each week to have your participation mark recorded.

**Quizzes** are run online through Cecil. Quizzes start at the end of the first 4 topics, and run for 1 week. 4pm. The quizzes will run as follows:

4%

Q1 Fri Jan 9th  
to Fri Jan 16th  
(Topic 1)

Q2 Fri Jan 16th  
to Fri Jan 23rd  
(Topic 2)

Q3 Wed Jan 28th  
to Wed Feb 4th  
(Topic 3)

Q4 Wed Feb 4th  
to Wed Feb 11th  
(Topic 4)

**Matlab Worksheets** are to be completed in the computer labs, at any time. The first is due near the start of the course, and is an introduction to Matlab. The second is due at the end of the course, and covers the Matlab related to Topics 1 to 4. Both are due at 4pm.

2%

M1 Thu Jan 15th (Introduction to Matlab)

M2 Fri Feb 13th (Topics 1 to 4)

The **Test** will in lecture time on **Wed Jan 21st**, covering Topics 1 and 2. The lecture on the preceding Tuesday will be used for revision.

20%

The **Exam** will be in the exam period. The exact date is not available until around the middle of semester; it will be between Mon Feb 16th and Wed Feb 18th.

60%

Please note that Formulae Sheets are not provided in the test or exam. As noted previously, programmable calculators are permitted in the test and exam with their memory cleared.

**Once more, please note that ALL components of the assessment will count toward your final grade.** Attempt all of the assessments, even if what you submit is incomplete.

## Getting Help

- Ask questions in lectures or in the tutorials, and visit your lecturers during their office hours.
- Get help and advice from the tutors in the Assistance Room in room G16 on the ground floor of Building 303.
- Join the Student Learning Centre, in the Kate Edger Commons; a mathematics tutor will be available. Workshops on each Topic may be run, according to demand.
- A limited amount of free one-to-one help can be booked at the Maths Department office (303.303) each week.

## Collaborating & Cheating

You are encouraged to discuss problems with one another and to work together on assignments, but you must not copy another person's assignment. Assignment and quiz marks contribute to the final mark you receive in this course, and must reflect your own work, not the work of others. We view cheating on assignment and quiz work as seriously as cheating in an examination. If you are unsure about whether your collaboration is OK please discuss it with your lecturer. If you think that your actions may be viewed as cheating, you are probably correct.

Acceptable forms of collaboration are:

- getting help in understanding from staff and tutors;
- discussing assignments and methods of solution with other students.

Unacceptable forms of collaboration ('cheating') are:

- copying all or part of another student's assignment, or allowing someone else to do all or part of your assignment for you;
- completing a quiz with, or for, another student;
- allowing another student to copy all or part of your assignment, or doing all or part of an assignment for somebody else.

## Harassment & Complaints

Complaints about marking should be taken to your lecturers who are in a position to do something immediately. More general complaints can be taken up by your class representative. You may also approach the Head of Department or the Departmental Manager for Mathematics.

Harassment on any grounds, such as racial, sexual, religious and academic is totally unacceptable. Complaints about harassment are best taken to the University Mediator (extension 87478) or to any member of the Resolve Network whose names are displayed on posters around campus.

## Lecture Timetable & Assessment Plan

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	Jan 5th	Jan 6th LEC 1	Jan 7th LEC 2 LEC 3	Jan 8th LEC 4 LEC 5	Jan 9th LEC 6 LEC 7
2	Jan 12th	Jan 13th LEC 8	Jan 14th LEC 9 LEC 10 T1	Jan 15th LEC 11 LEC 12 M1	Jan 16th LEC 13 LEC 14 A1 Q1
3	Jan 19th	Jan 20th REVISION	Jan 21st IN CLASS T2 TEST	Jan 22nd LEC 4 LEC 5	Jan 23rd LEC 6 LEC 7 Q2
4	Jan 26th AUCKLAND ANNIVERSARY DAY	Jan 27th LEC 19	Jan 28th LEC 20 LEC 21 T3	Jan 29th LEC 22 LEC 23	Jan 30th LEC 24 LEC 25 A2
5	Feb 2nd	Feb 3rd LEC 26	Feb 4th LEC 27 LEC 28 T4 Q3	Feb 5th LEC 29 LEC 30	Feb 6th WAITANGI DAY no lectures
6	Feb 9th	Feb 10th LEC 31	Feb 11th LEC 32 LEC 33 T5 A3 Q4	Feb 12th LEC 34 LEC 35	Feb 13th REVISION M2

LEC 1: Introduction and Motivations

### Topic 1 – Functions and Limits

LEC 2: Relations and Functions

LEC 3: Using Functions

LEC 4: Trigonometric Functions

LEC 5: Limits Intuitively

LEC 6: Computing Limits

LEC 7: Continuity

### Topic 2 — Vectors, Lines and Planes

LEC 8: Scalars and Vectors

LEC 9: Vector Arithmetic

LEC 10: Dot Product

LEC 11: Lines

LEC 12: Planes

LEC 13: Intersections

### Topic 3 — Linear Systems and Matrices

LEC 14: Systems of Linear Equations

LEC 15: Reduced Row Echelon Form

LEC 16: Types of Solutions

LEC 17: Matrix Arithmetic

LEC 18: Matrix Inverses

LEC 19: Solving Systems with Matrices

LEC 20: Determinants

LEC 21: Cross Product

### Topic 4 — Differentiation

LEC 22: Differentiation as a Limit

LEC 23: Differentiation Rules

LEC 24: Implicit Differentiation

LEC 25: Curve Sketching

LEC 26: First Derivative Test

LEC 27: Second Derivative Test

### Topic 5 — Integration and Functions of 2 Variables

LEC 28: Indefinite Integrals

LEC 29: Integration by Substitution

LEC 30: Integration by Parts

LEC 31: Definite Integrals

LEC 32: Functions of 2 Variables

LEC 33: Tangent Planes

LEC 34: Combining Concepts 1

LEC 35: Combining Concepts 2

Note that LEC 34 and LEC 35 are new; they are not in the course-book, but handouts of the lecture slides will be provided. They are examinable.

Revision classes will be held for the test and exam.