



**Contact**

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## Faculty of Science Mathematics Undergraduate Handbook

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### Disclaimer

Although every reasonable effort is made to ensure accuracy, the information in this document is provided as a general guide only for students and is subject to alteration. All students enrolling at The University of Auckland must consult its official document, the Calendar of The University of Auckland (see [www.auckland.ac.nz/calendar](http://www.auckland.ac.nz/calendar)), to ensure that they are aware of and comply with all regulations, requirements and policies.

# Welcome



The Department of Mathematics is one of the largest and most diverse departments within The University of Auckland, covering Applied Mathematics, Mathematics Education and Pure Mathematics. It has a strong international reputation and offers degrees and diplomas that enjoy widespread recognition with employers in New Zealand and internationally.

Staff of the Mathematics Department teach and research in many of the faculties of this University. It is possible to study Mathematics in combination with a very wide range of other subjects, especially in the Faculties of Arts, Commerce and Science for the degrees of BA, BCom or BSc. Mathematics is an ideal supporting subject for students of many other disciplines.

Those studying in this department will be introduced to the excitement of learning and exploring mathematics for its own sake and to the satisfaction of using mathematics to model and explain our world. They will be expected to use their skills and imagination on problems from old and emerging areas of mathematics, and from applied fields such as modelling the functions of the heart to waves in sea-ice.

The increased analytical ability, comprehension of abstract concepts and creative thinking that you gain from studying mathematics are highly valued in the business, industrial, social and academic worlds.

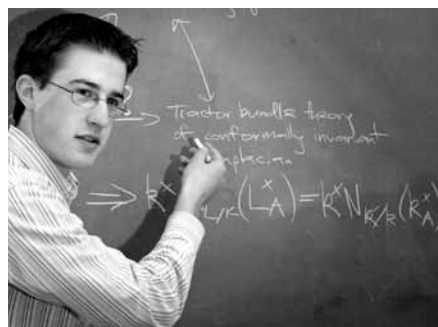
Graduates from the department take up positions in business, foreign affairs, industry, research teams, planning and environmental organisations, and a wide range of other areas.

If you are majoring in another subject but enjoy mathematics, you might like to consider a double major which includes mathematics. It is our experience that your future prospects and employability in any other field are enhanced with significant mathematical content in your degree.

Using mathematics as a supplement to your primary major will enhance your future career and professional life.

We will be pleased to welcome you as a student to the Department of Mathematics.

**JAMES SNEYD**  
Head of Department



"People with a knowledge of maths are in demand in all sorts of areas you might not expect, like the military or Department of Foreign Affairs, and in any branch of industry where processes need modelling. In its purest form, maths is the ability to think abstractly and analytically, and to solve problems, and those skills always have currency."

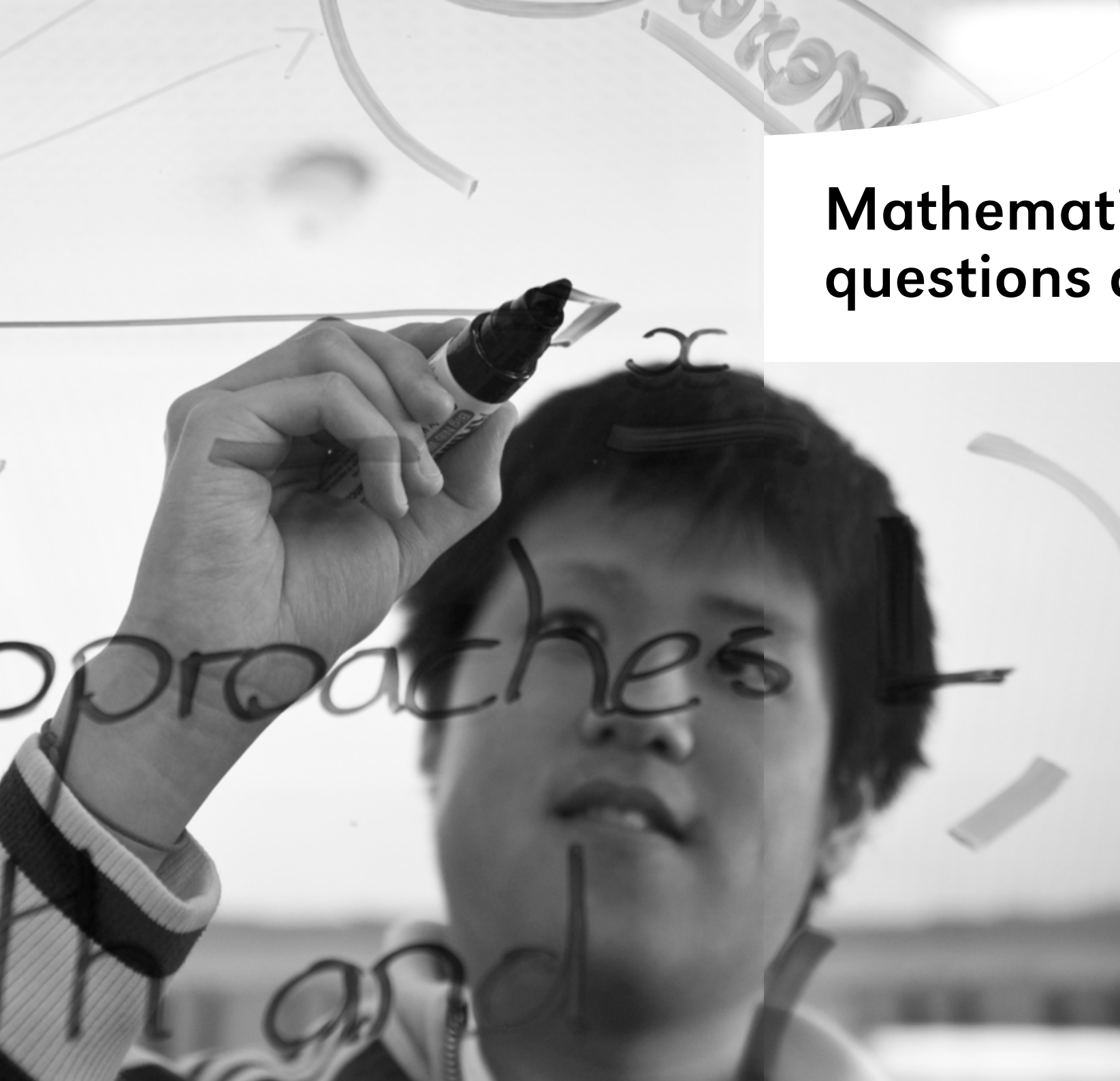
**SIMON MARSHALL**  
**BSc(Hons) in Mathematics, now PhD student at Princeton**



# Important dates

<b>Academic year 2010</b>	
<b>Summer School - 2010</b>	
Lectures begin	Tuesday 5 January
Auckland Anniversary Day	Monday 1 February
Deadline to withdraw from Summer school courses	1 week before end of lectures (Friday 5 February)
Waitangi Day	Saturday 6 February
Lectures end	Friday 12 February
Study break/exams	Monday 15 February - Wednesday 17 February
Summer School ends	Wednesday 17 February
<b>Semester One - 2010</b>	
Semester One begins	Monday 1 March
Mid-semester/Easter Break	Monday 5 April - Friday 16 April
ANZAC Day	Sunday 25 April
Graduation	Thursday 29 April - Friday 7 May
Deadline to withdraw from first semester courses	3 weeks before end of lectures (Friday 21 May)
Queen's Birthday	Monday 7 June
Lectures end	Saturday 5 June
Study break/exams	Saturday 5 June - Monday 28 June
Semester One ends	Monday 28 June
Inter-semester break	Tuesday 29 June - Saturday 17 July
<b>Semester Two - 2010</b>	
Semester Two begins	Monday 19 July
Mid-semester break	Monday 30 August - Saturday 11 September
Graduation	Tuesday 21 September - Thursday 23 September
Deadline to withdraw from second semester courses	3 weeks before end of lectures
Lectures end	Saturday 23 October
Labour Day	Monday 25 October
Study break/exams	Saturday 23 October - Monday 15 November
Semester Two ends	Monday 15 November
<b>Semester One - 2011</b>	
Semester One begins	Monday 28 February 2011

<b>Closing dates for applications for admission in 2010</b>	
1 December 2009	Deadline for new students to submit an Application for admission, if they wish to take Summer school courses in 2010
8 December 2009	Deadline for new students to submit an application for Admission if they plan to take only Semester One and Two courses. If you are a new student, only one Application for Admission is required. This form is due on either 1 December or 8 December, depending on whether you want to take Summer School courses as well. Applications received after these dates may be accepted if there are places available.



# Mathematics studies: questions and answers

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## Why study Mathematics?

### What makes mathematics different from other subjects?

The subject of Mathematics has many aspects: it can be challenging, beautiful, powerful, fascinating, even mysterious to some people, but above all it is useful.

Mathematics interacts with other disciplines and makes essential contributions to science, medicine and commerce, as well as to many important contemporary areas of technology such as communications, linguistics and genetics. Wherever problems need to be solved, mathematics has a role to play. In fact, many sciences rely so heavily on mathematics that their most important questions are, fundamentally, mathematical.

### What will a mathematics major do for me?

Mathematics leads to perhaps more diverse potential careers than any other discipline because it is the language through which nature, technology and reality are described. It is thus essential for almost every sphere of knowledge and activity in the modern world.

For these reasons, mathematics is a powerful and versatile major.

With a degree comprising quantitative methods courses (mathematics, statistics, operations research and computing) you will have many opportunities for careers in industry or government, computer development, insurance, meteorology, traffic engineering, systems analysis, computer programming, statistics, biometrics or operations research, and many other fields.

There is also a strong demand for mathematics teachers, in New Zealand and abroad. Mathematics majors are also strong candidates to pursue graduate studies in a variety of fields.

### What is the mathematics major structure?

Mathematics majors have a broad choice of courses and pathways. After completing a set of core courses, you will be able to choose from a variety of courses representing the main areas of mathematics.

First-year (Stage I) courses in mathematics are designed to provide you with a range of concepts, theoretical results, and analytical, computational and modelling skills that may be applied in a wide variety of areas - in the biological, information and physical sciences, economics, engineering and finance for example.

Stage II and III courses build on these, covering more advanced topics, with the aim of helping you to acquire a broader base of skills and a deeper understanding of the concepts involved.

### Will I have the opportunity to study topics I have a deep interest in?

Yes. Every year, undergraduate research Summer Scholarships are awarded to some of the top students in the department. This is an opportunity to experience the kind of research-related work that you could do at postgraduate level.

### What if I choose another major?

If you are majoring in Computer Science, Statistics, Finance, Economics, Physics, Psychology, or any other science, then you will find that the coursework in your major relies heavily on mathematics. In order to have the best opportunity to do well in those courses and absorb that material, it is very beneficial to identify and take the appropriate mathematics courses.

The courses offered by the Department of Mathematics have applications to many other fields.

### What about a double major?

If you are majoring in another subject but enjoy mathematics, you might like to consider a double major which includes mathematics.

Using mathematics as a supplement to your primary major will enhance your future career and professional life. It is our experience that your future prospects and employability in any other field are enhanced with significant mathematical content in your degree. The increased analytical ability, comprehension of abstract concepts and creative thinking that you gain from studying mathematics are highly valued in the business, industrial, social and academic worlds.

### What degrees may I get with a double major which includes mathematics?

Please refer to page 10 of the Handbook.

### What are the degree and major requirements?

You will find the requirements for various degrees that give you the opportunity to study mathematics:

- at [www.science.auckland.ac.nz/subjects/](http://www.science.auckland.ac.nz/subjects/) for Science degrees and diplomas
- at [www.arts.auckland.ac.nz/subjects/](http://www.arts.auckland.ac.nz/subjects/) for Arts degrees and diplomas

### Can I take mathematics courses even if I do not have a good math background?

Yes. There are entry-level Mathematics courses for various degrees of preparation. Please consult the information on pre-degree programmes (page 14) and on entry-level courses (pages 15-18).

### Can I fit mathematics into any degree?

Yes. Besides the regular entry level maths courses, another way of discovering Mathematics when you are majoring in Arts, Social Sciences, Business and Commerce, Humanities, Life or Physical Sciences, Communications or Languages, are two **General Education courses** (see the General Education section for details): MATHS 101G "Mathematics in Society" and MATHS 190G "Great Ideas Shaping our World".

### I am not sure what courses to choose: who can I talk to?

If you wish to discuss your major options, have problems enrolling in mathematics courses or any enquiries, please contact the Undergraduate Advisor at the Mathematics Department:

Jamie Sneddon  
Room 305 - Building 303  
**Phone:** ext 82121  
**Email:** [ugadvice@auckland.ac.nz](mailto:ugadvice@auckland.ac.nz)



## What are the main degrees with mathematics?

### Choosing a Degree

Mathematics can be studied as either a major or minor in any of the most popular degrees. The Faculty of Science offers degrees in Mathematics (this includes Mathematics Education courses) and Applied Mathematics. The Faculty of Arts offers degrees and diplomas in Mathematics (this includes Applied Mathematics and Mathematics Education courses). Your choice of degree depends upon what else you want to study.

### BSc (Bachelor of Science, 3 year programme)

For a major in Mathematics, as part of a Bachelor of Science, you can combine mathematics courses with courses in: computer science, statistics, physics, psychology, biological sciences, geography, chemistry, geology, or sports and exercise science.

You can also take mathematics courses as part of a specialisation in Bioinformatics, Logic and

Computation or Industrial Mathematics.

### BCom (Bachelor of Commerce, 3 year programme)

Take Mathematics along with courses in accounting, finance, economics, management, marketing, computer information systems.

### BA (Bachelor of Arts, 3 year programme)

For a major in Mathematics, combine mathematics courses with any of: statistics, geography, sociology, anthropology, politics, education, philosophy or any other Arts subject.

### Conjoint BCom/BSc or Conjoint BA/BCom (both give 2 degrees in a minimum of 4 years)

These are challenging programmes that permit a broader education and increased employment opportunities.

### Degrees and specialisations including Mathematics courses<sup>1</sup>

Degrees	Majors				
	Mathematics	Applied Mathematics	Industrial Mathematics	Logic and Computation <sup>2</sup>	Bioinformatics <sup>2</sup>
BA	★				
BSc	★	★	★	★	★
BSc(Hons)	★	★		★ <sup>2</sup>	★ <sup>2</sup>
GradDipSci	★	★			
PGDipSci	★	★		★ <sup>2</sup>	
MA	★				
MSc	★	★		★ <sup>3</sup>	★ <sup>3</sup>
PhD	★	★			

<sup>1</sup>See the Graduate Mathematics section (Page 25) and the Mathematics Postgraduate Handbook for explanation about graduate and postgraduate (post-Bachelor) degrees and diplomas. <sup>2</sup>Does not include a mathematics major, but require specialisations in these areas (including courses in topics other than mathematics). <sup>3</sup>Requires PGDipSci/BSc(Hons) in another subject than Mathematics.

## Mathematics and your career

A good mathematical background enhances and develops your problem-solving skills, comprehension of abstract concepts and analytical and creative thinking. These are valued qualities in technical roles and in positions of leadership and management. According to the US-based website [www.careercast.com](http://www.careercast.com), the job of mathematician is the "best" occupation out of a list of 200, with other maths-based jobs like statistician, actuary, accountant, computer scientist and economist also making the top twelve.

For more information about how mathematics studies could enhance your career, see [www.math.auckland.ac.nz/wiki/Careers](http://www.math.auckland.ac.nz/wiki/Careers)

### Our graduates have made careers in:

- Academia
- Analysis with Policy Focus
- Biostatistics
- Biotechnology (USA)
- Cartography
- Chemistry
- Commercial Banking
- Ecological modelling (AgResearch)
- Electrical or Computer Engineering
- Insurance Risk Assessment (Vero)
- Information systems or Computer science
- Investment banks
- Meteorology (Metservice)
- Ministry of Defence
- Operations Research
- Research (Crown and private institutions)
- Software Programming
- Statistical analysis (eg. Statistics NZ)

- Teaching
- Traffic Analysis and Engineering
- Sustainability Analysis (Landcorp)

or as

- Actuary
- Business Analyst
- Information Analyst (MSD)
- Neuroscientist (Harvard)
- Resource Accounting Analyst (Landcorp),
- Scientist-Modeller/Statistician (NIWA)
- Telecommunications consultants (Telecom)

Further possible careers include:

- Aeronautics
- Airline scheduling
- Automobile industry consultants
- Brain modelling and imaging
- Circuit design
- Cryptography (including internet and telecommunication security)
- Data mining
- Drug development
- Internet traffic-routing
- Military intelligence
- Oceanography/Fisheries
- Soil-remediation
- Seismic exploration
- Space missions
- Stock-market brokers

... applied mathematicians have even been consultants to chocolatiers!

# Undergraduate Mathematics Studies



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## Introduction to undergraduate studies

Most students coming to The University of Auckland study towards a degree. The most common is a Bachelor's degree, such as a Bachelor of Science (BSc), Bachelor of Arts (BA) or Bachelor of Commerce (BCom). A degree is also known as a programme.

It usually takes three years of full time study to complete a BSc. Each year at university, students should take 8 courses if they are doing a full time programme – 4 courses per semester.

As progress is made through the degree, the courses become more specialised. To illustrate this, courses are divided into three levels of difficulty – Stage I, II and III. Sometimes, students need a preparation to Stage I courses: several pre-degree programmes exist for them.

Some Stage I and II courses need to be taken before some other Stage II and III courses. The former are called prerequisites. Some courses cannot be taken if other courses are taken. These are known as restrictions.

A student needs to take at least 4 courses (60 points) at Stage III for a major or a specialisation.

A BSc in Mathematics can be in Mathematics or in Applied Mathematics. Mathematics can also be taken as a major for the Bachelor of Arts (BA). Mathematics courses are also included as part of other programmes such as: the Bachelor of Technology and the Bachelor of Commerce.

A good starting point for essential information about enrolment and degrees is the Faculty of Science Prospective students webpage at [www.science.auckland.ac.nz/uoq/science/for/prospective/prospective.cfm](http://www.science.auckland.ac.nz/uoq/science/for/prospective/prospective.cfm)

The present handbook should be read in conjunction with the 2010 University of Auckland Calendar. See [www.auckland.ac.nz/calendar](http://www.auckland.ac.nz/calendar).



Particularly, students should refer to the Calendar to ensure they comply with all degree requirements. The Calendar is the legal reference document of The University of Auckland. It sets out details of general University and programme-specific regulations and provides detailed course information. It can be accessed online, or via Faculty offices or at the University's various libraries. Details on courses and their requirements can be found in the "Regulations for the Degree of Bachelor of Science" (or in the "Regulations for the Degree of Bachelor of Arts") sections.

# Pre-degree programmes

## Superstart refresher course

Superstart aims to boost skills and understanding in order to make a pass in the standard entry-level mathematics courses more achievable. (Please see the table on page 13 for advice on enrolling in the appropriate entry-level courses.)

Superstart makes a big difference specifically to students planning to enrol in: MATHS 108, MATHS 150 or ENGSCI 111 and who:

- have a low level of achievement in Year 13 Calculus: eg. NCEA Level 3 Calculus (average below merit), or C or less in CIE A2
- have gaps in their preparation
- have studied Statistics rather than Calculus at Level 3,
- have 7th form equivalent maths qualifications, but have not studied maths for some time.

Students falling into the categories above can expect real difficulty in the first year entry level Mathematics courses (MATHS 108, ENGSCI 111).

Students who have 18 credits at Level 3 mainly in Statistics and who wish to study MATHS 150 (Advancing Mathematics 1) should consider enrolling in Superstart for its calculus content.

### 10 day course

(recommended for most students)

**Date:** 15 - 26 February, 2010

**Course fee:** \$250

### 7 day course

(recommended only for students with strong algebra and a good understanding of functions but gaps in calculus and/or trigonometry)

**Date:** 18 - 26 February 2010

**Course fee:** \$185

For further information see:

[www.math.auckland.ac.nz/Wiki/Superstart/](http://www.math.auckland.ac.nz/Wiki/Superstart/)

## MAX (Mathematical Acceleration and eXtension)

A course designed for high-school students who have shown themselves to be able mathematicians and who can handle a solid workload. For further details see [www.math.auckland.ac.nz/Teaching/Max/](http://www.math.auckland.ac.nz/Teaching/Max/) or contact:

Wendy Stratton  
Room 413

**Phone:** ext 85757

**Email:** [w.stratton@math.auckland.ac.nz](mailto:w.stratton@math.auckland.ac.nz)

## Tertiary Foundation Certificate Programme (TFC)

The Tertiary Foundation Certificate Programme (TFC) is recommended for students who need skills, confidence and a qualification, to equip them for university study. It is a full-year programme covering a range of subjects where Mathematics and English are compulsory. The Mathematics section prepares students for MATHS 101 or MATHS 102 the following year. Further information is available from the Programme Secretary:

Gill Stringer  
English Department  
Arts 1 Building  
Room A 403

**Phone:** ext 84145

**Email:** [g.stringer@auckland.ac.nz](mailto:g.stringer@auckland.ac.nz)

For information on the Mathematics component contact:

Moira Statham or Sheena Parnell  
Room 324 - Mathematics Department

**Phone:** ext 85750

**Email:** [parnell@math.auckland.ac.nz](mailto:parnell@math.auckland.ac.nz)  
or [statham@math.auckland.ac.nz](mailto:statham@math.auckland.ac.nz)

# Selecting Stage I mathematics courses

The Mathematics Department has a variety of entry-level courses in Mathematics, depending upon a student's mathematical background.

Enrolment in Stage I courses is largely determined by NCEA results, or equivalent. Students should consult course diagrams and descriptions in this handbook and choose the courses they feel will suit them best. Enrolment choices can be revised during the first two weeks of each semester.

Background	Course	Notes
No Level 3 Mathematics or Statistics and fewer than 12 credits in Mathematics at Level 2.	MATHS 101/101G Mathematics in Society	For students with little or no school mathematics preparation. Can also be taken as General Education course.
At least 18 credits in Mathematics at NCEA Level 2 (or equivalent) and fewer than 12 credits in Calculus or Statistics at NCEA Level 3; or less than C in Mathematics CIE AS.	MATHS 102 Functioning in Mathematics	Covers much of the content of NCEA Level 3 Calculus.
At least 12 credits in NCEA Level 3 Calculus, or at least 18 credits in NCEA level 3 Statistics; C or D in CIE A2 or C or better in CIE AS; or MATHS 102. May not be taken after MATHS 150	MATHS 108 General Mathematics 1	Extends Level 3 Calculus.
At least 18 credits in Calculus at NCEA Level 3, including at least 6 credits at merit or excellence (or equivalent); or B or better in CIE A2 Mathematics; or B+ in MATHS 102, or a pass in MATHS 108 ;or equivalent	MATHS 150 Advancing Mathematics 1	Students considering a major in Mathematics, Economics, Physics or Computer Science should take this core course.
Students also need to be enrolled in MATHS 108 or 150.	MATHS 162 Modelling and Computation	Applied Mathematics majors should take this core course.
Enrolment requires permission from Department. See MAX brochure or <a href="http://www.math.auckland.ac.nz/wiki/MAX">www.math.auckland.ac.nz/wiki/MAX</a>	MATHS 153 Accelerated Mathematics	For Year 13 High-School students only. UoA students should take MATHS 150.
No prerequisites or restrictions. Please refer to General Education Schedule.	MATHS 190/190G Great Ideas Shaping our World	Can be taken either as a General Education course or as part of a BSc/BA.

# Stage I Courses

Key	
MATHS	Mathematics courses
SS	Summer School
S1	Semester 1
S2	Semester 2
C	City Campus
E	Epsom Campus
M	Manukau Institute of Technology
91 - 94	Tertiary Foundation Certificate Courses
100 - 199	Stage I /100-level courses
200 - 299	Stage II/200- level courses
300 - 399	Stage III/300- level courses

Textbooks are available from the University Bookshop (UBS) in the Kate Edger Commons building, City Campus.

Study Guides and other resource materials are available at the Student Resource Centre (SRC) in Room G16, on the ground floor of the Science Centre, Building 303, 38 Princes St, Auckland.



## MATHS 101/ MATHS 101G (15 points) Mathematics in Society

**Recommended Preparation:** For students who have not studied mathematics at NCEA level 3 (or equivalent) or have no formal mathematical background. This course may not be taken with or after any other Mathematics course at Stage I or above.

MATHS 101 and the General Education Mathematics course, MATHS 101G, are taught as a single course. They are aimed to build confidence using Mathematics while demonstrating the role Mathematics plays in understanding and guiding human activity. The course is taught thematically and students experience how fundamental mathematical ideas occur in modelling diverse features of our society, such as our environment (e.g. air pollution) or medicine (e.g. burns, drugs dosages).

MATHS 101/101G Timetable		
S1 C	4:00PM to 5:00PM + tutorial	Mon Tue Wed
S2 E	10:30AM to 12:20PM	Mon Wed
S2 M	9:00AM to 12:00PM 8:30AM to 10:00AM	Tue Wed

**Text required:** Course Resource Pack from Student Resource Centre

**For advice:** Dr Maxine Pfannkuch  
m.pfannkuch@math.auckland.ac.nz

**Following course:** MATHS 102

## MATHS 102 (15 points) Functioning In Mathematics

**Recommended Preparation:** For students who have achieved fewer than 12 credits in Calculus or Statistics at NCEA Level 3, or who have achieved at least 18 credits in Mathematics at NCEA Level 2 (or equivalent) and fewer than 12 credits in Calculus or Statistics at NCEA Level 3

**Restriction:** MATHS 102 may be taken with or after MATHS 190, or after MATHS 101. It may not be taken with or after any other Mathematics course at Stage I or above.

This introduction to calculus focuses on the development of mathematical skills and concepts leading up to calculus, through active participation in problems using functions to model real life contexts. It prepares students for further study, for instance, MATHS 108, 150.

MATHS 102 Timetable		
SS C	10:00AM to 12:00PM 10:00AM to 11:00AM + tutorial	Tue Wed Thu Fri
S1 C	10:00AM to 11:00AM + tutorial	Mon Tue Thu
S2 C	2:00PM to 3:00PM + tutorial	Mon Tue Thu

**Recommended Text:** Coursebook from University Book Shop or download from Cecil

**For advice:** Garry Nathan  
nathan@math.auckland.ac.nz or  
Hannah Bartholomew  
hannahb@math.auckland.ac.nz

**Following courses:** MATHS 108 or MATHS 150 with B+ or better

## MATHS 108 (15 points) General Mathematics 1

**Recommended Preparation:** MATHS 102 or at least 12 credits in NCEA level 3 Calculus or at least 18 credits in NCEA level 3 Statistics (or equivalent)

A general entry to mathematics for commerce and the social sciences, following year 13 mathematics. Selected topics in algebra and calculus and their applications including: sets, real numbers, integers; linear functions, linear equations and matrices; 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.

**Restriction:** ENGSCI 111, MATHS 130, 151, 153, 208, 250, PHYSICS 111, 210; May not be taken after MATHS 150

## MATHS 108 Timetable (each stream has also a set of tutorials to choose from)

SS C	12:00PM to 2:00PM 12:00PM to 1:00PM 1:00PM to 2:00 PM	Mon Thu Fri Tue Wed
S1 C	8:00AM to 9:00AM	Mon Wed Fri
S1 C	10:00AM to 11:00AM	Mon Wed Fri
S1 C	3:00PM to 4:00 PM	Mon Wed Fri
S2 C	12:00PM to 1:00PM	Mon Wed Fri
S2 C	2:00PM to 3:00PM	Mon Wed Fri
S2 C	5:00PM to 6:00PM	Mon Wed Fri

### Texts required:

- Anton, H., Bivens, I., Davis, S. "Calculus" (8th Edition). Wiley.
- Anton, H., & Busby, R.C. "Contemporary Linear Algebra". Wiley.

**Recommended Text:** Coursebook from the University Book Shop (UBS).

**For advice:** Julia Novak  
novakj@math.auckland.ac.nz

### Following courses

- MATHS 208
- MATHS 250 with A or better
- MATHS 270 with MATHS 162

## MATHS 150 (15 points) Advancing Mathematics 1

**Prerequisites:** B+ in MATHS 102, or MATHS 108, or 18 credits in NCEA Mathematics with Calculus including at least 6 credits at merit or excellence, or B in CIE A2 Mathematics, or equivalent

The gateway to further mathematics courses, for students intending to major in mathematics, statistics, physics, economics, finance or mathematical biology. It gives an introduction to the use of careful mathematical language and reasoning applied to univariate optimisation, matrix methods for linear equations, integration techniques and the solution of differential

equations, and builds a strong foundation for further mathematical study.

Recommended preparation for MATHS 250.

**Restriction:** MATHS 109, 151, 130, 250, ENGSCI 111, PHYSICS 111, 210

MATHS 150 Timetable		
S1 C	3:00PM to 4:00PM + tutorial	Tue Thu Fri
S2 C	2:00PM to 3:00PM + tutorial	Mon Tue Thu

**Texts required:**

- Anton, H., Bivens, I., Davis, S. "Calculus" (8th Edition). Wiley
- Anton, H & Busby, R.C. "Contemporary Linear Algebra". Wiley.

**For advice:** Wendy Stratton  
stratton@math.auckland.ac.nz

**Following courses**

- MATHS 208, 250, 260, COMPSCI 225
- MATHS 270 with MATHS 162

**MATHS 153 (15 points)  
Accelerated Mathematics**

A version of MATHS 150 for high achieving Year 13 students.

**Note:** Enrolment requires consent of Department.

**Restriction:** MATHS 108, 109, 130, 150, 151, ENGSCI 111, PHYSICS 111

MATHS 153 Timetable		
First lecture	4:30PM to 7:00PM	Tue 16 February
S1 C (during school terms)	4:30PM to 7 :00PM (mid-February to early June) (tutorial 5:30PM to 6:10 PM)	Tue

**Materials required:** Lecture Notes and a CD (also available free as web download).

**Texts recommended:**

- Anton, H, Bivens, I & Davis, S "Calculus" 8th Edition
- Anton, H & Busby, R "Contemporary Linear Algebra", Wiley.

**For advice:** Wendy Stratton  
stratton@math.auckland.ac.nz

**Following courses:**

- MATHS 208, 250, 260, COMPSCI 225
- MATHS 270 with MATHS 162

**MATHS 162 (15 points)  
Modelling and Computation**

**Corequisite:** One of MATHS 108, 150, 153, ENGSCI 111, ENGGEN 150, PHYSICS 111

In this introduction to mathematical modelling and scientific computing, students will learn how to formulate mathematical models and how to solve them using numerical and other methods. A core course for students who wish to advance in Applied Mathematics.

MATHS 162 Timetable		
S1 C	1:00PM to 2:00PM + tutorial	Mon Thu Fri
S2 C	1:00PM to 2:00PM + tutorial	Mon Thu Fri

**Text recommended:** Coursebook from University Book Shop or as pdf file on Cecil

**For advice:** Allison Heard  
heard@math.auckland.ac.nz

**Following course:** MATHS 270, with MATHS 108 or 150

**MATHS 190/ MATHS 190G (15 points)  
Great Ideas Shaping Our World**

Mathematics contains many powerful and beautiful ideas that have shaped the way we understand our world. This course explores some of the grand successes of mathematical thinking. No formal mathematics background is required, just curiosity about topics such as infinity, paradoxes, knots and fractals and cryptography.

MATHS 190/190G Timetable		
S1 C	12:00PM to 1:00PM + tutorial	Mon Wed
S2 C	12:00PM to 1:00PM + tutorial	Mon Wed

**Text required:** E. Burger and M. Starbird, "The Heart of Mathematics" (2nd edition), to be ordered directly from publisher.

**For advice:** Claire Postlethwaite  
c.postlethwaite@math.auckland.ac.nz



# Stages II and III

## Stage II

There are two levels of courses at Stage II. The first level, MATHS 208 (General Mathematics 2) and MATHS 250 (Advancing Mathematics 2), follow on from their Stage I equivalents, MATHS 108 and 150. Students with A or A+ in MATHS 108 are encouraged to progress to MATHS 250.

MATHS 270 (Numerical Computation) follows on from MATHS 162 (Modelling and Computation) and is required for a major in Applied Mathematics.

COMPSCI 225 (Discrete Structures in Mathematics and Computer Science) is also a mathematics course. It follows on from MATHS 108 or 150.

Beyond MATHS 208 and 250 come MATHS 253 (Advancing Mathematics 3), MATHS 255 (Principles of Mathematics) and MATHS 260 (Differential Equations).

**Mathematics majors should take all three of these courses.**

**Applied Mathematics majors should take MATHS 253, 260 and 270.**

Entrance to MATHS 253 and 255 requires MATHS 250 (Advancing Mathematics 2) or A in MATHS 208.

## Stage III

There are several pathways into many of the Stage III courses. Stage III Pure Mathematics courses often require MATHS 255 as a prerequisite.

At Stage III, a major in Applied Mathematics must contain MATHS 361 and 340; it is recommended that it also contain 362 and 363. A major in Mathematics (sometimes referred to as Pure Mathematics) has less restrictions. It should contain MATHS 332 and 320 or MATHS 328 if you are considering postgraduate study.

# Stage II Courses

## MATHS 202 (15 points) Tutoring in Mathematics

**Prerequisite:** 30 points from courses in Mathematics and Departmental consent required

This is a mainly practical course in which selected students learn tutoring skills that are put to use in MATHS 102 tutorials. In a small interactive class, students learn to mark, to question strategically and to facilitate learning. The theory and issues of Mathematics Education as a research field is also introduced.

It will normally be expected that students will have passed at least 90 points at Stage 1 including at least 30 points in Mathematics, and that they are enrolling in at least one other Stage II Mathematics course.

### MATHS 202 Timetable

S1 C	2:00PM to 3:00PM	Mon Tue Wed
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**Text required:** CD accompanying the MATHS 102 course is available from the SRC.

**For advice and enrolment:** Greg Oates  
oates@math.auckland.ac.nz

**Following course:** MATHS 302

## MATHS 208 (15 points) General Mathematics 2

**Prerequisite:** 15 points from ENGSCI 111, PHYSICS 111, MATHS 108, 130, 150, 151, 153

**Restriction:** Cannot be taken, concurrently with, or after, MATHS 250, 253, PHYSICS 210, 211

This sequel to MATHS 108 features applications from the theory of multi-variable calculus, linear algebra and differential equations to real-life problems in statistics, economics, finance, computer science, and operations research. *Matlab* is used to develop analytical and numerical methods of solving problems.

### MATHS 208 Timetable (each stream has also a set of tutorials to choose from)

SS C	12:00PM to 2:00PM 12:00PM to 1:00PM 1:00PM to 2:00PM	Mon Tue Wed Thu
S1 C	2:00PM to 3:00PM	Tue Wed Thu
S1 C	5:00PM to 6:00PM	Tue Wed Thu
S2 C	8:00AM to 9:00AM	Wed Thu Fri
S2 C	1:00PM to 2:00PM	Wed Thu Fri

#### Texts recommended:

- Anton, H., Bivens, I., Davis, S. "Calculus" (8th Edition). Wiley.

Anton, H & Busby, R.C. "Contemporary Linear Algebra". Wiley.

**For advice:** Alastair McNaughton  
a.mcnaughton@math.auckland.ac.nz  
Bill Barton barton@math.auckland.ac.nz

#### Following courses:

- MATHS 150
- MATHS 250 with B+ or better
- MATHS 260, 269
- MATHS 253, 255 with A or better

## MATHS 250 (15 points) Advancing Mathematics 2

**Prerequisites:** 15 points from ENGSCI 111, MATHS 150, 153, PHYSICS 111, or A pass in MATHS 108, or B+ in MATHS 208

**Restriction:** MATHS 109, 152, 230, PHYSICS 112, 210

This preparation for advanced courses in mathematics is intended for all students who plan to progress further in mathematics. Covers topics from multivariable calculus and linear algebra that have many applications in science, engineering and commerce, including vector spaces, eigenvalues, power series, least squares and improper integrals. The emphasis is on both the results and the ideas underpinning these.

### MATHS 250 Timetable

S1 C	2:00PM to 3:00PM + tutorial	Mon Tue Thu
S2 C	1:00PM to 2:00PM + tutorial	Tue Wed Fri

#### Texts required:

- Anton, H., Bivens, I., Davis, S. "Calculus" (8th Edition). Wiley.
- Anton, H & Busby, R.C. "Contemporary Linear Algebra". Wiley.

**For advice:** David Gauld  
gauld@math.auckland.ac.nz or  
Wendy Stratton  
stratton@math.auckland.ac.nz

**Following courses:** MATHS 253, 255, 260, 269

## MATHS 253 (15 points) Advancing Mathematics 3

**Prerequisites:** 15 points from MATHS 152, 250, PHYSICS 112, 210, or an A pass in MATHS 208

#### Restrictions:

 PHYSICS 211

The standard sequel to MATHS 250. It covers topics in linear algebra and multi-variable calculus including linear transformations, quadratic forms, double and triple integrals and constrained optimisation. It is a preparation for a large number of Stage III courses in mathematics and statistics, and for many advanced courses in physics and other applied sciences.

All students intending to advance in mathematics should take this course.

### MATHS 253 Timetable

S1 C	1:00PM to 2:00PM + tutorial	Tue Thu Fri
S2 C	3:00PM to 4:00PM + tutorial	Mon Tue Fri

#### Texts required:

- Anton, H., Bivens, I., Davis, S. "Calculus" (8th Edition). Wiley.
- Anton, H & Busby, R.C. "Contemporary Linear Algebra". Wiley.

**For advice:** Alastair McNaughton  
a.mcnaughton@math.auckland.ac.nz

#### Following courses:

- MATHS 340
- MATHS 320 with A- or better
- MATHS 361, 362 with MATHS 260
- MATHS 332 with MATHS 255 or A- in MATHS 260

## MATHS 255 (15 points) Principles of Mathematics

**Prerequisites:** 15 points from MATHS 152, 250, PHYSICS 112, 210, or an A pass in MATHS 208

An introduction to mathematical thinking and communication: how to organise arguments logically and prove results. Rigorous notions are developed using topics that are central to the foundations of algebra and analysis including set theory, logic, abstract vector spaces and elementary number theory. An essential course for all students advancing in pure mathematics.

### MATHS 255 Timetable

S1 C	9:00AM to 10:00AM + tutorial	Mon Tue Fri
S2 C	3:00PM to 4:00PM + tutorial	Mon Tue Wed

**Text required:** Geoff Smith, "Introductory Mathematics: Algebra and Analysis", Springer 2004

**For advice:** Jianbei An  
an@math.auckland.ac.nz or  
Warren Moors  
moors@math.auckland.ac.nz

#### Following courses:

- MATHS 315, 320, 326, 328
- MATHS 332 with MATHS 253

### MATHS 260 (15 points) Differential Equations

**Prerequisite:** One of MATHS 150, 153, 208, 250, PHYSICS 111, ENGGEN 150, ENGSCI 111, or at least A- in MATHS 108

The study of differential equations is central to mathematical modelling of systems that change. Develops methods for understanding the behaviour of solutions to ordinary differential equations. Qualitative and elementary numerical methods for obtaining information about solutions are discussed, as well as some analytical techniques for finding exact solutions in certain cases. Some applications of differential equations to scientific modelling are discussed. A core course for applied mathematics.

MATHS 260 Timetable		
S1 C	11:00AM to 12:00PM + tutorial	Mon Tue Fri
S2 C	11:00AM to 12:00PM + tutorial	Mon Tue Fri

**Text required:** Blanchard, Devaney and Hall, "Differential Equations", (1st or 2nd edition).

**For advice:** Vivien Kirk  
kirk@math.auckland.ac.nz

#### Following courses:

- MATHS 361, 362 with MATHS 253
- MATHS 332 with B+ or better and MATHS 253
- MATHS 363 with B+ or better, or with MATHS 270

### MATHS 269 (15 points) Mathematics of Money

**Prerequisite:** One of MATHS 150, 153, 208, 250, PHYSICS 111

An introduction to the mathematics of the personal finance of saving and investment. Topics include interest, inflation, annuities, bonds, shares, mortgages and pension plans. Aspects of KiwiSaver will be covered. This course will provide a useful introduction to STATS 370 but is not a prerequisite.

MATHS 269 Timetable		
S1 C	3:00PM to 4:00PM tutorial	Mon Tue Wed

**Text required:** D Lovelock, M Mendel, and A Larry Wright, An introduction to the mathematics of money - saving and investing, Springer, 2007. (available through the UoA Library as an e-Resource)

**For advice:** Allison Heard  
heard@math.auckland.ac.nz and  
Robert Chan  
chan@math.auckland.ac.nz

**Following course:** STATS 370

### MATHS 270 (15 points) Numerical Computation

**Prerequisite:** One of MATHS 108, 150, 153, PHYSICS 111, ENGGEN 150, ENGSCI 111, and one of MATHS 162, COMPSCI 101, 105, INFOSYS 110, 120 (recommended MATHS 162)

**Restrictions:** MATHS 267

**Text required:** Lecture notes are available online.

Many mathematical models occurring in science and engineering cannot be solved exactly using algebra and calculus. Students are introduced to computer based methods that can be used to find approximate solutions to these problems. The methods covered in the course are powerful yet simple to use. This is a core course for students who wish to advance in applied mathematics.

MATHS 270 Timetable		
S1 C	4:00PM to 5:00PM + tutorial	Mon Tue Fri
S2 C	9:00AM to 10:00AM + tutorial	Wed Thu Fri

**For advice:** Allison Heard  
heard@math.auckland.ac.nz and  
Robert Chan  
chan@math.auckland.ac.nz

**Following course:** MATHS 363 with MATHS 260

### COMPSCI 225 (15 points) Discrete Structures in Mathematics and Computer Science

**Prerequisite:** 15 points from MATHS 108, 150 or 153 or COMPSCI 101, PHIL 101

**Restriction:** Cannot be taken after MATHS 255

Introduction to logic, principles of counting, mathematical induction, recursion, relations and functions, graphs and trees, and algorithms. This course is especially suited for students of computer science and others who are interested in logic and the foundations of mathematics.

COMPSCI 225 Timetable		
S1 C	10:00AM to 11:00AM	Mon Wed Thu Fri
S2 C	9:00AM to 10:00AM	Tue Wed Thu Fri

**For advice:** Eamonn O'Brien  
obrien@math.auckland.ac.nz

#### Following courses:

- MATHS 315
- MATHS 326: B+ in either MATHS 208 or 250
- MATHS 328: B+ in COMPSCI 225 and one of MATHS 208, 250, 253



# Stage III Courses

## MATHS 302 (15 points) Teaching and Learning Mathematics

**Recommended preparation:** at least 45 points from courses in Mathematics or Statistics

For people interested in thinking about the social, cultural, political, economic, historical, technological and theoretical ideas that influence Mathematics Education, who want to understand the forces that shaped their own Mathematics Education, or who are interested in teaching. Students will develop their ability to communicate ideas in essay form.

### MATHS 302 Timetable

S1 C	4:00PM to 6:00PM	Mon Wed
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#### Texts recommended:

- “Mathematics Education: A Handbook for Teachers, Volume 1”, edited by J. Neyland, published by The Wellington College of Education, Wellington.
- “Mathematics in the New Zealand Curriculum”, Ministry of Education, 1992.

**For advice:** Judy Paterson  
paterson@math.auckland.ac.nz

## MATHS 310 (15 points) History of Mathematics

**Corequisite:** At least 30 points at Stage III in Mathematics.

This study of some topics occurring in the history of Mathematics which facilitate understanding of modern Mathematics. Topics include concepts of number, geometry, algebra and differential and integral calculus.

### MATHS 310 Timetable

S2 C	5:00PM to 6:00PM	Mon Tue Wed Thu
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**For advice:** Garry Tee  
tee@math.auckland.ac.nz

## MATHS 315 (15 points) Mathematical Logic

**Prerequisite:** COMPSCI 225 or MATHS 255 or PHIL 222

Logic addresses the foundations of mathematical reasoning. It models the process of mathematical proof by providing a setting and the rules of deduction. Builds a basic understanding of first order predicate logic, introduces model theory and demonstrates how models of a first order system relate to mathematical structures. The course is recommended for anyone studying high level computer science or mathematical logic.

### MATHS 315 Timetable

S2 C	3:00PM to 4:00PM + a tutorial	Mon Tue Wed
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**For advice:** Sina Greenwood  
sina@math.auckland.ac.nz

**Following course:** MATHS 713 Logic and Set Theory with B+ or better

## MATHS 320 (15 points) Algebraic Structures

**Prerequisites:** MATHS 255 or 328, or an A-pass in MATHS 253

This is a framework for a unified treatment of many different mathematical structures. It concentrates on the fundamental notions of groups, rings and fields. The abstract descriptions are accompanied by numerous concrete examples. Applications abound: symmetries, geometry, coding theory, cryptography and many more. This course is recommended for those planning graduate study in pure mathematics.

### MATHS 320 Timetable

S2 C	11:00AM to 12:00 + tutorial	Mon Thu Fri
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**Text required:** Gallian, J.A., “Contemporary Abstract Algebra”, Houghton Mifflin Company.

**For advice:** Jianbei An  
an@math.auckland.ac.nz

#### Following courses:

- MATHS 714 Number Theory with B+ or better
- MATHS 715 Graph Theory and Combinatorics
- MATHS 720 Group Theory
- MATHS 721 Representations and Structure of Algebras and Groups
- MATHS 725 Lie Groups and Lie Algebras, with MATHS 320

## MATHS 326 (15 points) Combinatorial Computing

**Prerequisite:** MATHS 255, or COMPSCI 225 and a B+ in either MATHS 208 or 250

Combinatorics is a branch of mathematics that studies collections of objects that satisfy specified criteria. An important part of combinatorics is graph theory, which is now connected to other disciplines including bioinformatics, electrical engineering, molecular chemistry and social science. The use of combinatorics in solving counting and construction problems is covered using topics that include algorithmic graph theory, codes and incidence structures, and combinatorial complexity.

### Timetable

S1 C	12:00 to 1:00PM + tutorial	Mon Thu Fri
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**Following course:** MATHS 715 Graph Theory and Combinatorics

**For advice:** Jamie Sneddon  
sneddon@math.auckland.ac.nz

## MATHS 328 (15 points) Algebra and Applications

**Prerequisite:** MATHS 255, or B+ pass in COMPSCI 225 and one of MATHS 208, 250, 253

**Text required:** “Algebra and Applications” is available from the SRC.

The goal of this course is to show the power of algebra and number theory in the real world. It

concentrates on concrete objects like polynomial rings, finite fields, groups of points on elliptic curves, studies their elementary properties and shows their exceptional applicability to various problems in information technology including cryptography, secret sharing, and reliable transmission of information through an unreliable channel.

### Timetable

S1 C	9:00AM to 10:00AM + tutorial	Mon Tue Fri
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**For advice:** Arkadii Slinko  
slinko@math.auckland.ac.nz

#### Following courses:

- MATHS 320
- MATHS 714 Number Theory, with B+ or better

## MATHS 332 (15 points) Real Analysis

**Prerequisite:** MATHS 253 and 255, or 253 and a B+ in MATHS 260

A standard course for every student intending to advance in pure mathematics. It develops the foundational mathematics underlying calculus, it introduces a rigorous approach to continuous mathematics and fosters an understanding of the special thinking and arguments involved in this area.

The main focus is analysis in one real variable with the topics including real fields, limits and continuity, Riemann integration and power series.

### Timetable

S1 C	2:00PM to 3:00PM	Mon Tue Wed
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**For advice:** Rod Gover  
gover@math.auckland.ac.nz

#### Following courses:

- MATHS 333
- MATHS 730 Measure Theory and Integration
- MATHS 731 Functional Analysis

- MATHS 725 Lie Groups and Lie Algebras, with MATHS 320
- MATHS 735 Analysis on Manifolds and Differential Geometry
- MATHS 740 Complex Analysis
- MATHS 750 Topology

### MATHS 333 (15 points) Analysis in Higher Dimensions

**Prerequisite:** MATHS 332

**Strongly Recommended:** MATHS 253, 255

By selecting the important properties of distance many different mathematical contexts are studied simultaneously in the framework of metric and normed spaces. Examines carefully the ways in which the derivative generalises to higher dimensional situations. These concepts lead to precise studies of continuity, fixed points and the solution of differential equations. A recommended course for all students planning to advance in pure mathematics.

Timetable		
S2 C	9:00AM to 10:00AM	Tue Wed Thu Fri

**For advice:** Shayne Waldron  
waldron@math.auckland.ac.nz

**Following courses:**

- MATHS 731 Functional Analysis
- MATHS 730 Measure Theory and Integration
- MATHS 725 Lie Groups and Lie Algebras, with MATHS 320
- MATHS 740 Complex Analysis
- MATHS 750 Topology

### MATHS 340 (15 points) Real and Complex Calculus

**Prerequisite:** MATHS 253

**Restriction:** MATHS 347

Calculus plays a fundamental role in mathematics, answering deep theoretical problems and allowing us to solve very practical

problems. Extends the ideas of calculus to two and higher dimensions, showing how to calculate integrals and derivatives in higher dimensions and exploring special relationships between integrals of different dimensions. It also extends calculus to complex variables.

**Text required:** Michael Greenberg, Advanced Engineering Mathematics (2nd edition)

Timetable		
S1 C	1:00PM to 2:00PM + tutorial	Mon Tue Wed
S2 C	2:00PM to 3:00PM + tutorial	Wed Thu Fri

**For advice:** Bruce Calvert  
calvert@math.auckland.ac.nz or  
Robert Chan  
chan@math.auckland.ac.nz

**Following courses:**

- MATHS 740 Complex Analysis
- MATHS 761 Dynamical Systems
- MATHS 762 Nonlinear Partial Differential Equations
- MATHS 763 Advanced Partial Differential Equations
- MATHS 769 Applied Differential Equations
- MATHS 770 Advanced Numerical Analysis

### MATHS 361 (15 points) Partial Differential Equations

**Prerequisite:** MATHS 260 and 253, or PHYSICS 211

Partial differential equations are used to model many important phenomena in the real world (such as heat flow and wave motion). An introductory course on methods of solution for linear partial differential equations in one, two and three dimensions.

Timetable		
S1 C	10:00AM to 11:00AM + tutorial	Wed Thu Fri

**Text required:** Michael Greenberg, Advanced Engineering Mathematics (2nd edition)

**For advice:** Jari Kaipio  
kaipio@math.auckland.ac.nz

**Following courses:**

- MATHS 761 Dynamical Systems
- MATHS 762 Nonlinear Partial Differential Equations
- MATHS 763 Advanced Partial Differential Equations
- MATHS 769 Applied Differential Equations
- MATHS 770 Advanced Numerical Analysis

### MATHS 362 (15 points) Methods in Applied Mathematics

**Prerequisite:** MATHS 260 and 253, or PHYSICS 211

**Recommended preparation:** MATHS 340 and 361

**Restriction:** MATHS 347

Techniques such as variational methods, Green's functions, and perturbation analysis are a crucial part of the applied mathematician's toolbox. Covers a selection of such advanced topics in detail, and is suitable for those students intending to advance in applied mathematics or physics.

Timetable		
S2 C	10:00AM to 11:00AM + tutorial	Mon Tue Fri

**Recommended texts:**

- Holmes "Introduction to perturbation methods"
- Stakgold "Green's functions and boundary value problems"

Tang "Mathematical Methods for Engineers and Scientists 3 Fourier Analysis, Partial Differential Equations and Variational Methods"

**For advice:** Mike Meylan  
meylan@math.auckland.ac.nz

### MATHS 363 (15 points) Advanced Modelling and Computation

**Prerequisite:** MATHS 260 and 270

Much of modern research in applied mathematics, physics and engineering relies heavily on the construction and numerical solution of mathematical models. Covers the theory and practice of such computational approaches, including the study of numerical linear algebra and differential equations, and bifurcations in ordinary differential equations. *Matlab* is used extensively.

Timetable		
S2 C	12:00PM to 1:00PM + tutorial	Mon Thu Fri

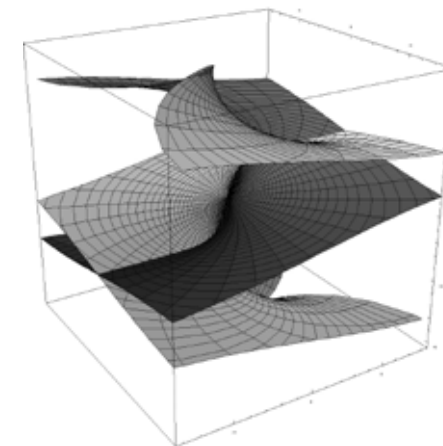
**Recommended reading:**

- Holmes "Introduction to Numerical Methods in Differential Equations"
- Strogatz "Nonlinear Dynamics and Chaos"
- Blanchard, Devaney and Hall "Differential Equations"
- Haberman "Applied Partial Differential Equations"

**For advice:** Steve Taylor  
taylor@math.auckland.ac.nz

**Following course:**

- MATHS 770 Advanced Numerical Analysis



# Branches of Mathematics

## Pure Mathematics

Pure mathematics is mathematics which is studied because of its intrinsic beauty and usefulness within the subject, rather than mathematical techniques (sometimes called applied mathematics) which are developed to attack specific problems arising outside the field of mathematics. Much pure mathematics was developed completely without regard to its applicability outside mathematics, but has since proved to be absolutely indispensable in many and varied applications, and underlies all applied mathematics.

A degree with a focus on pure mathematics is an excellent qualification for a career in teaching or research, but also in many other domains. Taking additional courses in applied mathematics, computer science and statistics can open career opportunities in government, insurance, banking and communications. A degree grounded in pure mathematics provides a good base for further study towards a masters degree or PhD in mathematics, or in other branches of the mathematical and information sciences.

Pure mathematics may be classified broadly into the areas of Algebra, Analysis, Combinatorics, Geometry, Logic, Number theory and Topology. There are many interconnections between these areas and this adds to their beauty and strength.

**Analysis** is the subject that grew out of Newton's discovery of calculus, although concepts as convergence and limit can be traced back to Greek mathematicians of Antiquity, while the first works on infinite series are due to Indian mathematicians of the Middle Ages. Analysis studies such topics as continuity, integration, differentiability, including the study of ordinary differential equations, partial differential equations and probability theory. All these subjects are critical to the applications of analysis to physics, engineering, finance, statistics, biology,

genetics and almost anything that has a quantitative component.

**Algebra** is concerned with the study of structure, relation and quantity. It is a pure field but has a wide variety of applications, from understanding the Rubik's cube to classifying crystal structures and designing algorithms. A recent powerful application is to communications security: How do you communicate securely over an insecure network (eg. the Internet)? This problem has been around in a simpler form for centuries and its solution (found in the late 1970s) is used every time you use your browser for secure transmission, such as banking transactions. The solution, part of what is now called public-key cryptography, is described completely using mathematical ideas which are presented in MATHS 328. You can even easily make your own code.

**Topology** is sometimes called rubber sheet geometry, because it concerns itself with the spatial properties that are preserved after shapes are stretched or deformed without breaking. It does not distinguish between a square and a circle (as a rubber band circle can be stretched into a square) and it ignores distances (so that two different sized circles are equivalent in the topological universe). Topology studies global characteristics of shapes and surfaces and quantifies the differences algebraically, then uses those algebraic tools to further explore these characteristics and related ideas. The Poincaré Theorem (a long standing conjecture whose last case - in 3-dimensions - was proved by Grigori Perelman) is one of the most famous topological results. In a simplified version (from 1904) it states that if any loop on the surface of a 3-dimensional shape can be shrunk to a point (as a loop can do on the 3-D sphere), then the shape is just a 3-D sphere. This theorem has implications in a variety of fields such as astronomy and relativity theory. Topology has

strong connections to abstract algebra, analysis and geometry, and has applications to physics, genetics (eg. understanding the knotting and unknotting of DNA) and computer science. A recent development, the topological quantum field theory, can be used for breaking cryptographic systems based on integer factorisation, widely used in banking encryptions. "People say pure mathematicians are just playing games with a bunch of rules", says Prof. D. Gauld, whose research topic is topology. "The amazing thing is that, so often, 10 or 50 years later, these great applications arise. When I first heard about topological quantum field theory, in 1994, there was no mention of their connection with banking encryptions."

**Geometry** arose as the field of knowledge dealing with spatial relationships. It was one of the two fields of pre-modern mathematics, the other being the study of numbers. It appeared (more than 2500 years ago) as a collection of techniques dealing with the lengths, angles, areas, and volumes of physical objects, both on earth and in the sky. Greek mathematicians made it into a tool for developing logical arguments, abstract reasoning and investigating the nature of space and time. Euclid's Elements is the most famous geometry book of the Antiquity, since it presents geometric knowledge of that time through a set of axioms, which later came to be known as Euclidean geometry. Geometric thinking became a means to find the most efficient way to model a given phenomenon, after abstracting it from its particular instances. After the development of the calculus and the theory of differential equations, geometry was expanded to cover situations in which the classical lines, planes, and spheres were replaced by 'shortest paths on a surface' (or higher dimensional objects), 'minimal surfaces' (like soap films), and 'constant mean curvature surfaces' (like soap bubbles). In fact, all sorts of problems in which the solution was a configuration that minimized some quantity (such as mass, energy, volume, etc.) were seen to be special cases of a new 'differential' geometry and this launched a revolution in the study of partial differential

equations that is continuing today. Einstein's theory of relativity and modern quantum theory (including string theory and its generalizations) are all part of differential geometry's wide scope. Its applications include not only theoretical physics, but computer modelling of shape (eg. computer models of the brain), graphical representations, heat flow, optimization and control theory, and understanding properties of partial differential equations and their transformation rules.

The four courses MATHS 150, 250, 253 and 255 form a core that should normally be taken by students wishing to advance to courses in Pure Mathematics at Stage III or beyond.

## Applied Mathematics

Modern science relies absolutely on applied mathematics. Any student interested in physics, biology, Earth sciences, engineering, medicine, chemistry, economics, or many other areas, will find the study of applied mathematics not only useful, but vitally important.

It is the job of an applied mathematician to show how mathematical techniques can be applied to science and technology to answer interesting questions. Our goal is usually to use mathematical equations to study real-world problems rather than to study equations for their own sake. In our department we use mathematics to study such diverse areas as physiology, ice flow, floating runways, astronomy, quantum chemistry, nonlinear systems, the human genome and many other areas. Elements of these research areas are incorporated into our courses wherever possible.

The first year course MATHS 162 provides an introduction to applied mathematics, and it is strongly recommended that all students with interests in applied mathematics take this course. Pure mathematics courses are also very important for applied mathematics and should be included in any course of study in applied mathematics.

## 2010 Undergraduate Courses Diagram

Please consult the Undergraduate Advisor for a personalised study plan.



### Courses availability:

S = Summer Semester  
1 = Semester One  
2 = Semester Two,

\*Course only available at Epsom Campus and Manukau Institute of Technology Campus

All other courses are offered at the City Campus.

Students taking applied mathematics will often also be taking another science major. Indeed, we encourage this, as this gives a breadth of training that students will find useful.

For further information contact the Undergraduate Advisor,  
Dr. Jamie Sneddon  
Room 305 - Building 303  
**Phone:** ext 82121  
**Email:** [sneddon@math.auckland.ac.nz](mailto:sneddon@math.auckland.ac.nz)

or Vivien Kirk  
Room 423 - Building 303  
**Phone:** ext 88792  
**Email:** [kirk@math.auckland.ac.nz](mailto:kirk@math.auckland.ac.nz)

### Mathematics Education

Mathematical thinking is behind almost every type of activity in society, and there is thus a permanent need for mathematics graduates who are adept at passing on mathematical knowledge and techniques.

Some mathematics graduates will take up careers in secondary teaching, some will tutor individuals or groups, and some will enter a university as lecturers. Mathematics education is a basic study for any of these activities. Mathematics teaching is an extremely satisfying occupation. It involves: helping people to overcome their fears of mathematics and appreciate the beauty of the subject; helping others gain mathematical understanding and a new power over their environment; and sharing ideas with other people.

The Mathematics Education Unit within the Department of Mathematics offers courses which examine the teaching and learning of the subject. These can be taken by anyone studying mathematics, but are particularly suitable for those who are thinking about teaching, tutoring, or lecturing mathematics as a career. The courses require a reasonable background in mathematics, and they will contribute to a student's own understanding of mathematics while providing an opportunity to reflect upon how mathematics is learnt.

**Please note that MATHS 302 is a recommended preparation for all graduate mathematics education courses.**

To become a secondary mathematics teacher you need at least one Stage III mathematics or statistics course in your degree and to have completed the one year Graduate Diploma in Teaching (Secondary) programme.

Interested students are invited to discuss their programmes with:

Judy Paterson  
Room 322 - Building 303  
**Phone:** ext 88605  
**Email:** [paterson@math.auckland.ac.nz](mailto:paterson@math.auckland.ac.nz)

or Mike Thomas  
Room 327 - Building 303  
**Phone:** ext 88791  
**Email:** [m.thomas@math.auckland.ac.nz](mailto:m.thomas@math.auckland.ac.nz)

### Mathematics with Statistics

Mathematics is the foundation for statistical theory and practice. A strong background in calculus and linear algebra provides ideal mathematical training for the budding statistician. Statistics is an indispensable tool for a wide range of mathematical applications, in areas as diverse as Industrial Mathematics, Operations Research, Financial Mathematics, biological modelling, Physics and Chemistry.

Statisticians work in the following sorts of areas: banks, Crown research institutes, Crown health enterprises, finance companies, government departments (eg. Treasury, Statistics N.Z., AgResearch, MAF etc.), industry, insurance companies, local bodies, market research companies, universities and technical institutes. In all of these jobs they are designing studies, analysing data, making projections and helping to make decisions.

Statistics courses at The University of Auckland are designed not only for future statisticians, but for all students to help them become better accountants, applied mathematicians, market

researchers, psychologists, biologists, geographers, engineers and so on.

In addition to general Statistics, courses in Operations Research (OR) are offered. OR is the application of mathematical and scientific methods to solve certain classes of problems in the design and management of large or complex systems found in business, industry and government. Basic OR techniques can be grouped broadly into two classes, namely optimization methods such as linear and non linear programming, Markovian decision theory, deterministic and stochastic dynamic programming, optimal control and inventory control; and modelling techniques such as computer simulation, queuing theory, Markov processes and time series analysis.

For further information contact:  
David Smith  
Rm 226 - Mathematics Department  
**Phone:** ext 85590  
**Email:** [dsmith@stat.auckland.ac.nz](mailto:dsmith@stat.auckland.ac.nz)

or Ilze Ziedins  
Rm 211 - Statistics Department  
**Phone:** ext 85051  
**Email:** [ilze@stat.auckland.ac.nz](mailto:ilze@stat.auckland.ac.nz)

### Industrial Mathematics

Industrial Mathematics may be taken as a specialisation in the 3-year BSc programme. This will enable students to advance in problem-solving methodology across a broader front than possible within the present subject majors. Many first-degree graduates need to be acquainted with an appreciation of, and skills in, mathematical methods, deterministic and stochastic modelling, data analysis, numerical and computational mathematics, and operations research. This is not possible within a single major, yet this broad approach will be an attractive option for many students intending to do a three year degree only.

For further information contact:  
Shixiao Wang  
Rm 408 - Mathematics Department  
**Phone:** ext 87316  
**Email:** [wang@math.auckland.ac.nz](mailto:wang@math.auckland.ac.nz)

### Mathematics with Computer Science

The disciplines of mathematics and computer science are strongly linked and have had considerable influence on each other over the past four decades. Each new application of computers and each technological advance in their design brings a new set of associated questions in mathematics. graph theory, the study of network arrangements, is studied because of its usefulness in modelling many practical problems which can be solved by computers, and its relationship to other branches of mathematics such as topology, abstract algebra and linear algebra. An increasingly important problem-solving skill in computing is the ability to count or enumerate objects using techniques in combinatorics. Logic is one of the foundations of mathematics in terms of proof, and also now used as a tool for proving the correctness of computer programs, defining procedural meanings for computations, and extracting programs from specifications.

The courses COMPSCI 225 (Discrete Structures in Mathematics and Computer Science), MATHS 315 (Mathematical Logic) and MATHS 326 (Combinatorial Computing) have been developed to meet the demand for skills in these areas, and also to enhance the mathematical maturity of students taking computer science programmes. The blend of skill and knowledge developed during such a programme is valued by employers in a number of fields including portfolio forecasting, actuarial science and Internet marketing.

For further information contact:  
Jamie Sneddon  
Rm 305 - Mathematics Department  
**Phone:** ext 82121  
**Email:** [j.sneddon@math.auckland.ac.nz](mailto:j.sneddon@math.auckland.ac.nz)

# Furthering your studies



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## Graduate Mathematics

If you wish to further your studies after a BSc, BA, BCom or BEng, there are 4 programmes with mathematics that you can choose from.

The information below summarises the regulations for the degrees and diplomas with a mathematics or applied mathematics major.

For details on graduate programmes and courses, please consult the

- Mathematics online Postgraduate Handbook at [www.math.auckland.ac.nz/wiki/PGHB](http://www.math.auckland.ac.nz/wiki/PGHB) and the
- University of Auckland Calendar at [www.auckland.ac.nz/calendar](http://www.auckland.ac.nz/calendar)

If you require further information, please contact

Steve Taylor  
 Graduate Advisor for all graduate programmes (except PhD)  
 Room 306 - Mathematics Department  
**Email:** [pgadvice@math.auckland.ac.nz](mailto:pgadvice@math.auckland.ac.nz)

### Graduate Diploma in Science (GradDipSci)

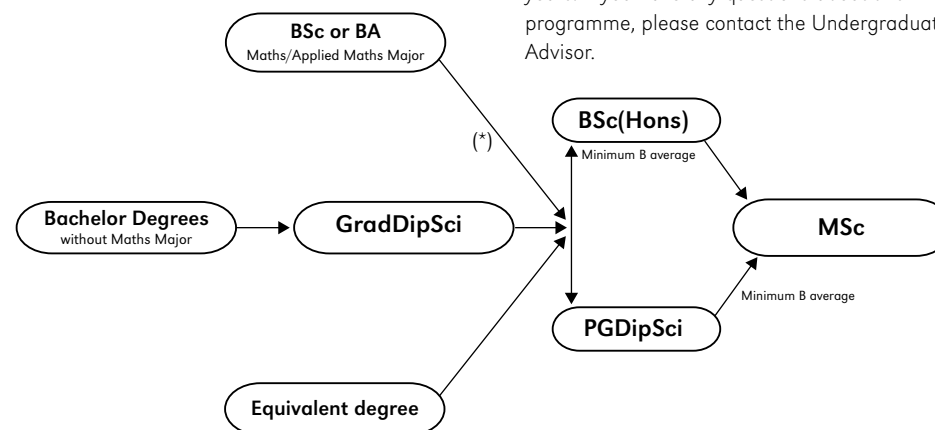
If you do not have a major in Mathematics or Applied Mathematics but wish to add a mathematical edge to your degree and enhance your careers perspectives, this is the programme you need.

Before you can enrol in a GradDipSci you must have a BSc or an equivalent degree. You must be ready to take Stage II courses, as Stage I courses cannot be included in this diploma.

We offer the GradDipSci in Mathematics or Applied Mathematics. If you have BSc/BA with a Mathematics major, you can study towards a GradDipSci in Applied Mathematics, and viceversa.

To complete a GradDipSci, you must pass 120 points at Stage II and above, with at least 75 points (of the 120) at Stage III or above. 45 points are from the Mathematics or Applied Mathematics major; the remaining 30 points come from any Science subject (possibly your previous major).

A GradDipSci can be taken part-time over four years. If you have any questions about this programme, please contact the Undergraduate Advisor.



(\*) A Mathematics Major BSc/BA can continue with an Applied Mathematics PGDipSci and vice versa.

## Bachelor of Science or Arts (Honours) (BSc(Hons) / BA(Hons))

### BSc(Honours)/BA(Honours) in Mathematics

**Prerequisite:** A major in Mathematics including (either MATHS 320 or MATHS 328) and MATHS 332 and at least 90 points at Stage III (These courses need not all be in Mathematics or Applied Mathematics.)

**Requirement:**

- 30 points: MATHS 776 (Dissertation in Mathematics or Applied Mathematics)
- and either
- 90 points in 700-level Mathematics courses or
  - at least 45 points in 700-level Mathematics courses and up to 45 points, subject to approval by the Head of Department, from 700-level courses in a related subject

### BSc(Honours) in Applied Mathematics

**Prerequisite:** A major in Applied Mathematics and at least 90 points at Stage III

**Note:** Mathematics Education students may substitute MATHS 302 for one of these courses

**Requirement:**

- at least 45 points from MATHS 761, 762, 763, 764, 769, 770, PHYSICS 701, 707
- 30 points: MATHS 776 Dissertation in Mathematics or Applied Mathematics
- up to 45 points from approved 700-level courses in Mathematics or related subjects with approval of the Head of Department.

You can do an Honours degree either full-time over one year or part-time over two years.

## Postgraduate Diploma in Science (PGDipSci)

### PGDipSci in Mathematics

**Prerequisite:** A major in Mathematics, including (either MATHS 320 or 328) and MATHS 332, or an equivalent

**Note:** Mathematics Education students may substitute MATHS 302 for one of these courses

**Requirement:**

- at least 75 points in 700 level Mathematics courses
- up to 45 points from approved 600 or 700 level courses in Mathematics or related subjects, with the approval of the Head of Department

### PGDipSci in Applied Mathematics

**Prerequisite:** A major in Applied Mathematics, or equivalent

**Requirement:**

- at least 60 points from MATHS 761, 762, 763, 764, 769, 770, PHYSICS 701, 707
- up to 60 points from approved 700 level courses in Mathematics or related subjects with approval of the Head of Department. If your average marks for the courses of your PGDipSci are sufficiently high, you will be awarded the degree with distinction or merit.

## Master of Science (MSc) and Master of Arts (MA)

Before you can enrol in an MSc/MA you must have a BSc(Hons)/BA(Hons) or PGDipSci with sufficiently high marks in the required major. To enroll in an MSc/MA, you must find a supervisor, decide together on a project topic, and either complete a 120 point thesis or a 90 points research portfolio and 30 points of approved 700-level courses.

You can do an MSc/MA in Mathematics (this includes Mathematics Education) or an MSc in Applied Mathematics. Staff in the Department can also supervise Bioinformatics or Logic and Computation masters. A MSc can be done part-time over two years.

## 2010 Postgraduate Courses

MATHS	Title	Point value	Prerequisites or Recommended preparation
<b>Summer Semester</b>			
701	Research Skills in Mathematics Education	15	Department approval
<b>Semester 1</b>			
705	Social Issues in Mathematics Education	15	Department approval
712	Mathematics and Learning	15	Department approval
715	Graph Theory and Combinatorics	15	MATHS 326 or 320
720	Group Theory	15	MATHS 320
730	Measure Theory and Integration	15	MATHS 332, Rec. MATHS 333
740	Complex Analysis	15	MATHS 332, Rec. MATHS 333, 340
750	Topology	15	MATHS 332 or 353, Rec. MATHS 333
763	Advanced Partial Differential Equations	15	MATHS 340 and 361
764	Mathematical Biology	15	Department approval
769	Applied Differential Equations	15	MATHS 340 and 361
770	Advanced Numerical Analysis	15	MATHS 270 and one of MATHS 340, 361, 363
<b>Semester 2</b>			
703	Theoretical Issues in Mathematics Education	15	Department approval
713	Logic and Set Theory	15	MATHS 315 or PHIL 305
714	Number Theory	15	B+ in MATHS 328 or 320
721	Representations and Structure of Algebras and Groups	15	MATHS 320
731	Functional Analysis	15	MATHS 332 and MATHS 333. Rec. MATHS 730, 750
735	Analysis on Manifolds and Differential Geometry	15	MATHS 332. Rec. MATHS 333 and 340
761	Dynamical Systems	15	MATHS 340 and 361
762	Nonlinear Partial Differential Equations	15	Recommended: MATH 340 and MATH 361
	Various special topics and advanced topics courses, in Mathematics, Applied Mathematics and Mathematics Education are also available	15 or 30	Require a supervisor and Department approval

# Department and University information



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## Facilities for new students

### Superstart

This is a two weeks preparation course for MATHS 108 and MATHS 150, available during the summer semester. For details see the section on Pre-degree programme (page 14) or [www.math.auckland.ac.nz/wiki/Superstart](http://www.math.auckland.ac.nz/wiki/Superstart)

### The Student Learning Centre

The Student Learning Centre (SLC) can help you achieve academic success. Workshops and consultations are offered by academically qualified and experienced tutors.

Once you are registered with the SLC, you can use the SLC's services for the whole academic year.

Appointments for individual consultations are available and can be made by contacting the SLC.

The Centre has mathematics skills workshops for those students who do not have the background knowledge normally assumed for MATHS 102 or MATHS 108. You may register for workshops, or make individual appointments with tutors at the SLC office.

SLC (City Campus)  
Level 3, Kate Edger Information Commons  
**Phone:** +64 9 373 7599 ext 88850

### International Students

Mathematics courses at all levels are available to international students who are admitted into a degree or diploma programme, say Bachelor of Arts (BA) or Bachelor of Science (BSc). Bachelor of Commerce (BCom), Bachelor of Engineering (BEng), etc..

Information about minimum entry requirements for the various degree programmes, application procedures and tuition fees is available from:

Auckland International  
**Phone:** +64 9 373 7513  
**Fax:** +64 9 373 7405  
**Email:** [int-questions@auckland.ac.nz](mailto:int-questions@auckland.ac.nz)  
**Web:** [www.auckland.ac.nz/international](http://www.auckland.ac.nz/international)

The International Student Information Centre is located at the back of Old Choral Hall near the University Library on 7 Symonds Street, Auckland.

**Opening Hours:**  
Monday to Friday, 8.30am - 5.00pm



# Organising your studies and getting help

## Further information about a mathematics course

Prospective students are invited to consult the Department of Mathematics webpages at [www.math.auckland.ac.nz](http://www.math.auckland.ac.nz), which provides study guides for courses, as well as some other course-related information.

Current (enrolled) students should use Cecil ([www.cecil.auckland.ac.nz](http://www.cecil.auckland.ac.nz)), the main repository for course-related information: coursebooks, lecture notes, assignments, class announcements, etc.

## Lectures, tutorials, assignments

### Lecture and tutorial rooms

Each course gets its lecture and tutorial rooms allocated one or two weeks prior to the beginning of the semester. Log into the student administration server, nDeva, [www.auckland.ac.nz/ndeva](http://www.auckland.ac.nz/ndeva) in order to check the venues of their classes. For certain popular classes, you need to choose a stream and a time that suits your schedule.

### Timetable

Lectures and tutorial timetable are available online on nDeva: [www.auckland.ac.nz/ndeva](http://www.auckland.ac.nz/ndeva). You either login or enter as a Guest, then use the Class search function.

### Time allocation per course

In addition to time spent attending lectures, laboratories or tutorials, you should plan a minimum of six hours per week studying notes and working on assignment problems. Approximately 10 hours per week over one

semester, or 20 hours per week over Summer School should be devoted to a 15-point course taught over one semester.

### Study guides

During the initial lectures of Mathematics courses, a Study Guide for the course will be distributed. This contains the name(s) of the person(s) teaching the course, their office number, hours when they are available for help, assignment due dates, procedures for handing in and collecting assignments, semester test dates, textbooks required, coursework requirements etc. It is your responsibility to obtain a Study Guide (use Cecil [www.cecil.auckland.ac.nz](http://www.cecil.auckland.ac.nz) or the Department website if you missed the hand-out), read it carefully, and then follow the information in it.

### Coursework and assignments

Coursework consists of tests and assignments. Credit is given for coursework as well as for final exams; the proportion for each course varies. Details of this, test dates and assignment due dates are given in the Study Guide. Due to the volume of assignments to be processed, and the mechanism for distributing them to the markers, it is not possible to accept late assignments.

All assignments are to be submitted in the drop-off boxes of the Student Resource Centre (see next page), unless otherwise indicated by the Study Guide.

### Sickness or bereavement

If you know you will be unable to sit a test you should approach your lecturer as soon as possible. The lecturer may be able to arrange another time to sit the test, or make other arrangements.

If temporary illness, injury, or exceptional circumstances beyond your control prevent you from sitting an examination or seriously impair your examination preparation or performance, you may be eligible to apply for aegrotat or compassionate consideration.

### Applications for Aegrotat and Compassionate consideration

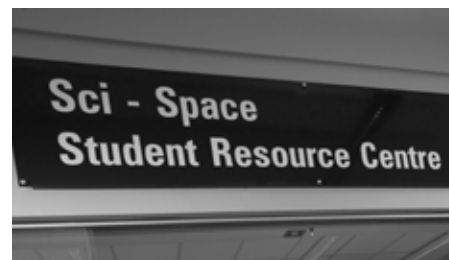
An application may be made for Aegrotat or Compassionate consideration by candidates who may have been prevented from being present at an examination, or who consider that their preparation for or performance in an examination has been seriously impaired by temporary illness or injury or exceptional circumstances beyond their control. This also applies to tests, but not assignments.

Application forms are available online or from the relevant campus Student Health and Counselling Services and Examinations Office.

The application form must be submitted to the University Health and Counselling Service within one week of the date that the examination affected took place, or if more than one examination has been affected, then within one week of the last of those examinations.

Following the decision of Senate on an application for Aegrotat or Compassionate Consideration, a student may apply for reconsideration of that decision no later than four weeks after the student is notified of Senate's decision.

Please refer to The University of Auckland Calendar for the official regulations.



## Getting help

There are several ways of obtaining help with mathematical problems. Given the large numbers of students in first and second year courses it is your responsibility to seek help when needed. This help will be more effective if you seek it after first trying to read the relevant parts of the text and lecture notes and identifying the specific questions you would like to ask.

### The Student Resource Centre (SRC)

The main point of contact for undergraduate students on the City Campus.

Where: SciSpace (Room G16), Ground level, Science Centre, Building 303, 38 Princes Street, City Campus.

The Centres deals with student-related activities, as follows:

- assignment collection and returns after marking
- updating student records such as assignment and test marks
- locker hire, property lost in the building, student stationery such as CDRs, graph paper, transparencies, *Matlab* software.

If you don't know where to submit your assignment, have submitted it in the wrong box, if your marks do not show up, or have been entered incorrectly, please enquire at the SRC.

### Assistance Room

The Mathematics Department operates an assistance room in the City Campus, to help with undergraduate mathematics courses.

Room G16 is situated on the Ground floor of Building 303, Science Centre. The assistance room is primarily for Stage I students, with some help available for Stage II and III students.

The assistance room is staffed from 10am to 4pm, Monday to Friday during semesters, and available for reduced hours during the study breaks. Tutors wearing blue sashes are available

to help you with problems arising with assignments or the understanding of a course.

The Mathematics Assistance Room is coordinated by:

Wendy Stratton

Room 413 - Building 303

**Phone:** ext 85757

**Email:** stratton@math.auckland.ac.nz

### **Māori and Pasifika (Tuākana) tutorial rooms**

Māori and Pasifika students taking a mathematics course are invited to participate in the Tuākana Mathematics Programme. The programme provides additional assistance and support in mathematics and an opportunity to work with our senior Māori and Pasifika students. The programme will be based in Room 124, level 1, Building 303, 38 Princes street.

In particular, students who take Stage I courses in mathematics, and some Stage II students will be contacted by the start of Semester One. If you are not contacted by the end of the first week, please contact:

Gary Nathan

Room 315 - Building 303

**Phone:** ext 84931

**Email:** g.nathan@math.auckland.ac.nz

### **Office hours: individual assistance from the teaching staff**

Lecturers designate several hours (office hours) per week when they will be available in their office to assist you with mathematical questions. These times are usually posted on their office door and announced either in the Study Guide or during lectures, as well as on the department website. Most lecturers will also give assistance at other times when they are free.

### **Extra Tutorials**

These are offered for some courses during the week and in weekends when there is demand, and especially immediately prior to semester tests and examinations.

### **One-to-one Tutoring**

Individual assistance for Stage I courses can be obtained by filling in an appointment sheet. The one-to-one tutoring appointment sheet is available from the Student Resource Centre (Room G16, Building 303). You can book a 30 minute slot of one-to-one tutoring every week.

### **Study groups**

If you wish to organise a study group for your class, or be part of such a group, please contact your class representative.

### **Buying Textbooks**

Most textbooks and coursebooks are available at the University Bookshop in the Kate Edger Information Commons. Coursebooks and other resources prepared by the Department are also available online, as pdf files, via Cecil [www.auckland.ac.nz/cecil](http://www.auckland.ac.nz/cecil). Texts for some courses are in the Short Loan Collection at the Kate Edger Information Commons.

### **Calculators**

Some courses prohibit or restrict the use of calculators in tests and examinations. Restrictions may include such capabilities as:

- alphanumeric keys,
- storage of formulae,
- programming capability,
- communication capability.

The Study Guide for each course indicates whether calculators are to be used and what restrictions, if any, are to be placed on them.

### **Computer access**

Many students have their own computers. It is not, however, necessary to own a computer to do mathematics, statistics or computer science. The laboratory facilities of the departments are available for you. Computing packages unlikely to be found on most home computers are available on the laboratory machines which are. Laboratories are open during work hours, and

also on some evenings, weekends and holidays.

### **Using the Computer Laboratories**

The Department shares three 120 machine computer laboratories with the Departments of Statistics and Computer Science. These are located in the Science Centre, Building 303S.

All students enrolled in science courses have access to these laboratories. The login name is their NetAccount name - the NetAccount password is also used. Student ID cards are needed to use a computer laboratory.

Mathematics students have booking privileges in the basement laboratory, but may use the other two laboratories when they are not being used by Computer Science students. Because the Laboratories are used by a large number of students and will be very busy around assignment due dates, students are strongly encouraged to work on their assignments early. Students who leave their work to the last day may find all the machines are booked!

Handouts are available on topics like using a PC, An Introduction to the Undergraduate Lab, Getting Started Using UNIX.

Demonstrators are rostered in the laboratories and they are available to assist you. They can be easily identified by the bright orange or yellow sashes they wear. Their role is not to do assignments for students, but rather to assist students to gain a better understanding of the computer packages being used, and of course to cope with technical problems. Specifically, if the computer being used is, or becomes, faulty, do NOT attempt to remedy the fault personally but ask a demonstrator.

The Computing Laboratory Coordinator for the Department is:

Dr Allison Heard

Room 414 - Building 303

**Phone:** ext. 88816

**Email:** heard@math.auckland.ac.nz

More information about labs (including opening hours and online computer bookings) can be found at [www.scl.ec.auckland.ac.nz](http://www.scl.ec.auckland.ac.nz)

### **Matlab**

Almost all first and second year courses will be using the computer algebra system *Matlab* and its *Symbolic Math* toolbox in both teaching and assessment. The program is available in the undergraduate computer lab and for purchase from the Student Resource Centre. For more information and a tutorial on getting started with Matlab go to the webpage at [www.math.auckland.ac.nz/matlab](http://www.math.auckland.ac.nz/matlab)

### **Communication and Student Representation**

Each class elects a representative each semester to attend meetings to discuss matters concerning students and the department. Generally two meetings are scheduled each semester. Those meetings are attended by the elected student representatives and departmental staff. Any problems affecting students may be raised at these meetings. Students are able to approach their class representatives if they want a matter raised. Student representatives also attend meetings of the Science Faculty, the Board of Studies of Mathematical and Information Sciences and the Mathematics Department. The departmental coordinator is:

Alastair McNaughton

Room 330 - Building 303

**Phone:** ext 85244

**Email:** a.mcnaughton@math.auckland.ac.nz

Any student with a complaint about the way he or she has been treated by the department is invited to discuss the matter with the Head of Department. If the prospect of approaching the HOD is daunting, other avenues for complaint are through the class representative, or the Departmental Manager for Mathematics, Lynda Pitcaithly (Rm 336, Ext 88063), or any approachable lecturer. Complaints like inaccurate marking of tests or assignments are usually best dealt with by the course coordinator..

# Admission and enrolment procedures

## New students

If you are not enrolled at The University of Auckland, apply online at [www.auckland.ac.nz/apply\\_now](http://www.auckland.ac.nz/apply_now). If you are unable to access our website, please call 0800 61 62 63 or visit the Student Information Centre at 22 Princes Street, Auckland. This is open Monday to Friday from 8am – 6pm and Saturday 9am – 12noon during peak times.

Student Information Centre  
Room 112, Level 1 (Ground Floor)  
The ClockTower Building, 22 Princes Street  
Auckland City Campus

**Phone:** + 64 9 373 7599 ext 88199

**Fax:** + 64 9 367 7104

**Email:** [studentinfo@auckland.ac.nz](mailto:studentinfo@auckland.ac.nz)

The closing date for most undergraduate Science applications is 8 December 2009.

If you want to take courses at Summer School, or wish to apply to Sport and Exercise Science or the Bachelor of Optometry, applications close 1 December 2009.

Only one application is required.

## After submitting your application:

Your application will be acknowledged by post, and you will receive your Net ID, password and a list of items required to evaluate your eligibility to be admitted to the University and to your chosen programme/s (if you are submitting a hard copy application form, you are required to include relevant documentation at the time of submission). When all documentation requirements have been met, your application will be assessed by the Admissions Office and relevant faculties. If your application is approved, you will receive an offer of place.

Your Net ID and password allow you to access the University's nDeva site, enabling you to monitor the progress of your application and check if further documentation is required.

Once you have accepted an offer of place, you will gain access to the Enrolment module on nDeva and you can then proceed to enrol in courses online. Postgraduate students may need to contact their department for enrolment to be completed.

## Returning students

If you are currently enrolled at The University of Auckland in 2009, and would like to change your existing programme (for example MSc after completion of BSc(Hons)), you should apply on nDeva ([www.auckland.ac.nz/nDeva](http://www.auckland.ac.nz/nDeva)) by logging on and clicking on Add/Change programme.

You will be able to enrol via nDeva, but if you would like help, please call 0800 61 62 63 or visit the Student Information Centre or the Faculty of Science Student Centre (Ground Floor, Building 301, 23 Symonds Street). Postgraduate students may need to contact their department for enrolment to be completed.

The University of Auckland is open for enrolment from November 2009 to the end of February 2010. You are welcome to attend at any time during normal office hours to seek academic or enrolment advice or assistance in completing your enrolment.

Room 112, Level 1  
The ClockTower, 22 Princes Street  
Auckland City Campus

**Phone:** 64 9 373 7599 ext 88199

**Fax:** 64 9 367 7104

**Email:** [studentinfo@auckland.ac.nz](mailto:studentinfo@auckland.ac.nz)

For advice on enrolling in Mathematics courses, please contact the Undergraduate Advisor at the Mathematics Department:

Jamie Sneddon

**Phone:** ext 82121

Room 305 - Building 303, 38 Princes Street

**Email:** [ugadvice@auckland.ac.nz](mailto:ugadvice@auckland.ac.nz)

## Changing Enrolment

Choose carefully at the beginning. It is however, possible to add and delete courses within the first two weeks of each semester without penalty (i.e. tuition fees are refunded for deletions). After this time, you may not enrol in new courses for that semester, and if you are unable to continue a course a 'withdrawal' from courses can be done with consultation of the Associate Dean (Undergraduate Students) until the third week before the end of lectures. However, tuition fees are not refundable in these cases. The regulations for changing courses are outlined in the latest version of The University of Auckland Calendar. Staff at the Student Information Centre in the Clock Tower Building, at the City Campus and at the Student Resource Centre on the Tamaki Campus have the necessary forms to fill in for change of programme or course. The Departmental Graduate Coordinator should be consulted for changes to Masters or Diploma Programmes.

## Warning

Students who fail the recommended preparation for a course are strongly advised to repeat the failed course (or courses) rather than continue with their proposed programme. For example, if you have enrolled for MATHS 250 in the second semester but fail MATHS 150 in the first semester you should cancel your enrolment in MATHS 250 and re-enrol for MATHS 150. It will be assumed that students who continue with MATHS 250 have mastered the earlier material.

## Academic Programme Structure

### Points Structure

From 2006, all courses were changed to a different points value. Students enrolled in a normal full time course of study now complete 120 points per year. The courses in most undergraduate degrees carry a value of 15 points and a normal full time enrolment is eight courses per year.

### Transition Points Structure

Transition regulations apply to all students who have continued enrolment during the transition period having commenced study in their programme at this university prior to the 2006 academic year. They also apply to students who commence study in an undergraduate degree in the 2006 academic year having commenced but not completed study in a different undergraduate programme at this university between 2001 and 2005.

The Transition regulations were written to ensure that students are able to complete their qualification without disadvantage in terms of duration of study or the proportion of their qualification to be completed.

Transition regulations are available in the Transition Regulations Handbook. This handbook is available from the Science Faculty Student Centre, the Short Loans Library and online at [www.auckland.ac.nz/currentstudents/academiclife](http://www.auckland.ac.nz/currentstudents/academiclife).

### General Education

The University of Auckland is the only New Zealand university to include a General Education component in its undergraduate degrees. Courses in the programme are designed to give you a greater understanding of New Zealand and its place in the world, an opportunity to mix with students from different disciplines, and expose you to cross-disciplinary research.

BSc students must take two General Education courses (30 points) in their degree. These can be taken at any time during the degree, but it may be preferable to take these in Year 2 and 3.

Students will choose General Education courses from schedules which list courses available to their particular degree. The schedules have been developed so that students will take General Education courses that allow them to explore areas of interest outside of their degree subjects. The General Education schedules are:

- A) Music, Art and Contemporary Issues
- B) Humanities and Social Sciences
- C) Business and Society
- D) Life Sciences
- E) Physical Sciences
- F) Mathematical and Information Sciences
- G) Communication
- H) Languages

The courses available to BSc students will depend on the subjects in which they are enrolled. For example, students enrolled in a Mathematics course will not be able to take General Education courses from Schedule F Mathematical and Information Sciences.

In some cases, courses are available both as part of the General Education programme and as part of the portfolio of regular degree courses. If students are taking a dual purpose course as part of the General Education programme, they will enrol in the G version of the course (e.g. HISTORY 103G). The classes and programme of study will be the same for all students.

A General Education website, [www.auckland.ac.nz/generaleducation](http://www.auckland.ac.nz/generaleducation) can be accessed from the University webpage and enables students to view

the courses available to them and provides the information needed for course selection.

The requirement for General Education applies to students who enrol at The University of Auckland from 2006 to begin their first undergraduate degree. Transition students are not required to include General Education as part of their degree. Special arrangements will apply to students transferring from another tertiary institution with credit.

Students are encouraged to seek advice on General Education in their degree from the Science Students' Centre.



### Postgraduate Programmes

Masters programmes are one year degrees preceded by either a one year Bachelor Honours degree or a Postgraduate Diploma.

### Doctoral Students

Doctoral degrees remain essentially the same in structure and duration. The structure of the PhD is now recorded on the academic transcript in new points in accordance with the 120 points system.

For named doctorates which include courses with points, the courses have been re-weighted as part of the 120 point structure.

## Undergraduate Enrolment - where to from here?

### Enquire

Visit [www.auckland.ac.nz](http://www.auckland.ac.nz) or contact our student advisers for any information you need.  
**Phone:** 0800 61 62 63 | **Email:** [studentinfo@auckland.ac.nz](mailto:studentinfo@auckland.ac.nz)  
**Student Information Centre:** Room 112, ClockTower, 22 Princes St, Auckland



### Apply for a place in a programme(s)

Do you have internet access, or can you come on to campus to our help labs?



#### Yes

- Log on to [www.auckland.ac.nz](http://www.auckland.ac.nz)
- Click on Apply Now.
- Complete the online Application for a place in your programme(s) of choice.
- You will receive an acknowledgement letter asking you to provide specific certified documents (and in some cases to complete other requirements\*) before your application can be assessed. The letter will also tell you how to access the University's nDeva system to complete the next steps.

#### No

**Phone:** 0800 61 62 63  
 (or +64 9 308 2386 if overseas)  
**Email:** [studentinfo@auckland.ac.nz](mailto:studentinfo@auckland.ac.nz)  
 The ClockTower Call Centre will forward required information to you.



### Offer

Your application will be assessed and, if successful, an "Offer of a place in a programme" letter will be mailed to you. This normally happens from mid January.\*\*



### Accept

Accept or decline your offer of a place in a programme online. Remember - you still need to enrol in your courses!



### Enrol in your choice of courses

For help with choosing courses you can:

- talk to staff for advice, and listen to talks on various programmes at Courses and Careers day in late August or the Orientation Day in late February
  - refer to [www.science.auckland.ac.nz](http://www.science.auckland.ac.nz) or to publications relating to your programme, or to The University of Auckland Calendar. For programme publications call 0800 61 62 63. The Calendar is for sale in bookshops or can be accessed from [www.auckland.ac.nz](http://www.auckland.ac.nz) Click on "Current Students" then "University Calendar" in the Quick Links box
  - check the timetable for your chosen courses at [www.auckland.ac.nz/ndeva](http://www.auckland.ac.nz/ndeva)
  - for more information visit the Faculty of Science Student Centre, Ground Floor, Building 301, 23 Symonds Street
  - or call 0800 61 62 63.
  - consult [www.math.auckland.ac.nz](http://www.math.auckland.ac.nz) or email [ugadvice@math.auckland.ac.nz](mailto:ugadvice@math.auckland.ac.nz)
- Enrol in courses via the online nDeva system, using your login and password.  
 Pay your tuition fees.

*\* For some programmes, you may be required to submit supplementary information (eg, a portfolio of work, referee reports, an online form) or to attend an interview/audition. If you have not already done this, any outstanding requirements will be explained in the acknowledgement letter - ensure that you follow them up as quickly as possible.*

*\*\* You can also check the status of your application online using your login and password (if you don't know these, check the instructions on your acknowledgement letter). If you are not offered a place in the programme(s) of your choice, you will receive a letter outlining alternative options. Please follow the advice on the letter or get in touch with the ClockTower Call Centre. Your final offer of a place is dependent both on you gaining admission to the University (which for school leavers may be dependent on your final school results) and assessment by the faculty offering the programme.*



**You are now a University of Auckland student. Congratulations!**

## Improve your English language skills

All first-year students are required to undertake an assessment that enables us to identify your level of academic English. This free assessment is available via DELNA.

### Diagnostic English Language Needs Assessment (DELNA)

DELNA is only available to students who have accepted a place and enrolled at The University of Auckland. It cannot be used to exclude you from a particular programme and the results do not appear on your academic record.

The Screening - a 30 minute compulsory assessment includes a vocabulary task and a text editing task. It enables us to quickly identify whether or not you need assistance with the demands of academic English. If you do require assistance, you will undertake the second part of the assessment.

You can book your screening assessment during Orientation Week or the first week of semester by going online to: [www.delna.auckland.ac.nz/](http://www.delna.auckland.ac.nz/) booking

The Diagnosis - is only necessary if your screening results suggest you need assistance with academic English language skills. This two-hour assessment includes a listening, reading and writing task. It enables us to recommend appropriate English language enrichment options.

If you do need to improve your skills, you will be invited to discuss your needs with the DELNA Language Adviser and guided to sources of effective English language enrichment within the University.

For more information visit [www.delna.auckland.ac.nz](http://www.delna.auckland.ac.nz)

### English Language Self Access Centre (ELSAC)

ELSAC provides free services to improve your academic English skills, including tailored support from a Language Advisor and language learning materials. Get help with academic writing, listening skills, and pronunciation and more. ELSAC is located in the Kate Edger Information Commons.

### ELSAC

Level 1, Kate Edger Information Commons

Phone: +64 9 373 7599 ext 82134

Email: [elsac@auckland.ac.nz](mailto:elsac@auckland.ac.nz)

For more information visit [www.elsac.auckland.ac.nz](http://www.elsac.auckland.ac.nz)

## Academic honesty, cheating and plagiarism

Cheating is viewed as a serious academic offence by The University of Auckland. The University will not tolerate cheating, or assisting others to cheat. Penalties are set by the Discipline Committee of the Senate and may include suspension or expulsion from the University.

### What is cheating?

Cheating, in the context of University coursework and examinations, is the act of attempting to gain an unfair advantage by violating the principle that lies behind all University work - that of intellectual and scholarly integrity.

Work submitted for grading - in coursework and examinations - must ultimately be your own work, reflecting your learning and performance. To cheat is to be intellectually dishonest by passing off as your own, work that has been done by someone else. It is also unjust in that it devalues the grades and qualifications gained legitimately by other students.

All staff and students have a responsibility to prevent, discourage and report cheating.

Examples of forms of cheating

- Copying from another student during a test or examination, whether or not there is collusion between the students involved;

- Using the work of other scholars or students when preparing coursework and pretending it is your own by not acknowledging where it came from. This is called plagiarism. Course coordinators, lecturers or tutors are the appropriate people with whom you should discuss how to use and acknowledge the work of others appropriately;
- Making up or fabricating data in research assignments, or the writing up of laboratory reports;
- Impersonating someone else in a test or examination, or arranging such impersonation;
- Submitting the same, or a substantially similar, assignment that you have done, for assessment in more than one course;
- Misrepresenting disability, temporary illness/injury or exceptional circumstances beyond one's control, then claiming special conditions;
- Using Material obtained from commercial essay or assignment services, including web-based sources.

### Group work

On the whole, the University requires assessment of the work of individual students. On those rare occasions where the work of a group of students is assessed, group members need to make sure that the workload is shared equally. Course coordinators will determine their own procedures for dealing with cases where the final piece of work reflects unequal participation and effort.



### Student support

Typically students cheat because they are having difficulty managing workloads, feel that the course content is too difficult or experience difficulties with the language of the course. None of these reasons are justification for cheating. There are many people and services at the University to assist students. Besides the possibilities listed on page 41 (Getting help section), options of people to approach include:

- the course convenor/coordinator, lecturer, tutorial head, lab demonstrator
- Head of Department
- faculty-level official
- Student Learning Centre or Library staff
- AUSA or other students' association representatives
- health and counselling services staff.

Students should also consult the University's major academic referencing resource: [www.cite.auckland.ac.nz](http://www.cite.auckland.ac.nz)

The following website provides further information about the key principles and practices underlying academic honesty, and related resources:

<http://www.auckland.ac.nz/uoa/home/about/teaching-learning/honesty/>

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## Students Association

Auckland University Students' Association (AUSA) offers many services to support students and to provide discounted goods. AUSA runs training workshops for Class Representatives throughout the year and publishes a monthly newsletter available through the Department. Students may also contact a Student Advocate, the AUSA Education Coordinator or the Education Vice President regarding academic concerns. If interested in creating a club and receiving funding, contact the AUSA Clubs Liaison Officer. Phone 309 0789 or visit the AUSA House, 4 Alfred Street, across from the General Library on City Campus.

## Students with disabilities

Students with disabilities are encouraged to attend and accomplish at The University of Auckland. If you are living with an impairment, if you suspect that you have an impairment, please contact the Disabilities Office Coordinators. They will assist you in accessing services and resources or put you in touch with the right people to help.

Disabilities Office Coordinators are located in Room 036, Basement Level, ClockTower, 22 Princes Street  
 Phone: +64 3737599 88808,  
 Fax:+64 9 308 2354  
 Email: disabilities@auckland.ac.nz

## Harassment

In the large and complex society of the University it is possible that students may encounter problems with the behaviour of staff or fellow students. If this behaviour is unwanted, unacceptable or offensive it may be harassment. University policy is that harassment on any grounds - including, but not restricted to sexual, racial, religious, and academic - is totally unacceptable. For informal and confidential assistance in dealing with harassment problems, students may approach any member of the Resolve Network (a list of their names can be found on posters displayed around campus) or the Mediator. For information and contact details, visit [www.auckland.ac.nz/uoa/about/uoa/run/policies/antiharrass.cfm](http://www.auckland.ac.nz/uoa/about/uoa/run/policies/antiharrass.cfm).



## W.A.V.E

### Welfare. Advocacy. Voice. Education.

WELFARE is a welfare referral service. If you're stressed, hungry or have exhausted your overdraft - we try to help! We have an onsite foodbank and hardship funds that you can apply for. We can also put you in contact with the right people and agencies to provide you with the resources you need.

ADVOCACY is the run by Advocacy Manager with support from the Advocacy Assistant and the Student Advocacy Network (SAN). If you feel you have been treated unfairly or have a grievance with the university, WAVE provides a confidential, free service available to all students. They can advise on student rights and university procedures, assist in resolving disputes involving students or staff, and provide information and referrals. They can also provide general legal advice on issues such as tenancy, employment and many other areas of law. SAN hours are 10am - 12 noon every weekday during semester. You can also contact the Advocacy Manager and Advocacy Assistant on Phone 309 0789 ext 202 or 251.

VOICE is student representation - Class Reps and students on University committees. WAVE offers class rep training, class party funding, a class rep handbook and quarterly newsletters. They also organize the election, training and support of University Committee Reps. University committees set the direction for The University of Auckland, drafting policy and regulations. You can have your say through student committee reps. Check out their website at [www.ausa.org.nz/wave](http://www.ausa.org.nz/wave) for more details!

The EDUCATION Vice President (EVP) acts on wider educational issues that affect you. This may include submissions to the University and to central Government. Their role involves bringing concerns about education matters to the wider community.

WAVE is located in AUSA House, 4 Alfred Street (across from the General Library).  
Phone: +64 9 309 0789 ext 251  
Email: [advocate@auckland.ac.nz](mailto:advocate@auckland.ac.nz)  
Web: [www.auckland.ac.nz/wave](http://www.auckland.ac.nz/wave)

### Careers advice

A science degree from The University of Auckland will give you a foundation of knowledge and skills that can lead to a wide range of career opportunities. Our graduates begin their careers in research organisations, local government, central government, universities, commerce and industry, international and community organisations. You may begin your career in a science position, or in a position that is not directly science related but where your science knowledge and skills are of benefit.

The University Careers Centre can assist you with your career planning and job search throughout the course of your studies. The Careers Centre provides assistance to science students through careers information and advice, job search and career research workshops in the Careers Centre, plus seminars and a drop-in service at a variety of times and locations in the Science faculty. For more details please see our website [www.auckland.ac.nz/careers](http://www.auckland.ac.nz/careers).

### Careers.Sci

Make sure you visit Careers.Sci, an online career planning programme customised for Science students that will allow you to manage and plan your career. Log on to Cecil ([cecil.auckland.ac.nz](http://cecil.auckland.ac.nz)) and check it out!

[www.auckland.ac.nz/careers](http://www.auckland.ac.nz/careers)

For job vacancies and information on current graduate career opportunities, visit <http://careerhub.auckland.ac.nz>, which also advertises employer presentations on campus. Also go to the Science@Work careers fair in August/September each year.

Student Service	Location	Contact details
Accommodation and Conference Services	O'Rorke Hall, 16 Mount Street	+64 9 373 7599 ext 87691 <a href="mailto:accom@auckland.ac.nz">accom@auckland.ac.nz</a> <a href="http://www.auckland.ac.nz/accommodation">www.auckland.ac.nz/accommodation</a>
Careers Centre	Room 001, The ClockTower	+64 9 373 7599 ext 88727 <a href="mailto:careers@auckland.ac.nz">careers@auckland.ac.nz</a> <a href="http://www.auckland.ac.nz/careers">www.auckland.ac.nz/careers</a>
Early childcare services	28 Park Avenue Grafton	+64 9 373 7599 ext 85894
Chaplain's Office	18 Princes Street	+64 9 373 7599 ext 87731 <a href="mailto:chapelsec@auckland.ac.nz">chapelsec@auckland.ac.nz</a>
Disability Services	Room 036, The ClockTower (South Wing)	+64 9 373 7599 ext 82936 <a href="mailto:disabilities@auckland.ac.nz">disabilities@auckland.ac.nz</a>
Mediator's Office		+64 9 373 7599 ext 88905 <a href="mailto:mediation@auckland.ac.nz">mediation@auckland.ac.nz</a> <a href="http://www.auckland.ac.nz/mdr">www.auckland.ac.nz/mdr</a>
Equal Opportunities	Level 1, The ClockTower (East Wing)	+64 9 373 7599 ext 84923 <a href="http://www.eo.auckland.ac.nz">www.eo.auckland.ac.nz</a>
Student Finance	Room 108, ClockTower	+64 9 373 7599 ext 84422 <a href="http://www.auckland.ac.nz/fees">www.auckland.ac.nz/fees</a>
Health Services (including Counselling)	Level 3, Student Commons	+64 9 373 7599 ext 87681
Dental Services	Level 3, Student Commons	+64 9 373 7599 ext 83860
International Students' Information Centre	Auckland International, Old Choral Hall	+64 9 373 7513 <a href="mailto:int-questions@auckland.ac.nz">int-questions@auckland.ac.nz</a> <a href="http://www.auckland.ac.nz/international">www.auckland.ac.nz/international</a>
Recreation Centre	Building 314 17 Symonds Street	+64 9 373 7599 ext 84788 <a href="http://www.auckland.ac.nz/recreation">www.auckland.ac.nz/recreation</a>
Scholarships Office	Room 012, The ClockTower	+64 9 373 7599 ext 87494 <a href="mailto:scholarships@auckland.ac.nz">scholarships@auckland.ac.nz</a>
Student Advocacy Network	AUSA House 3 Alfred Street	+64 9 309 0789 ext 215 <a href="mailto:advocate@auckland.ac.nz">advocate@auckland.ac.nz</a> <a href="http://www.auckland.ac.nz/wave">www.auckland.ac.nz/wave</a>
Student Information Centre	Room 112, The ClockTower	0800 61 62 63 +64 9 373 7599 ext 88199 <a href="mailto:studentinfo@auckland.ac.nz">studentinfo@auckland.ac.nz</a>
Student Learning Centre	Level 3, Information Commons	+64 9 373 7599 ext 88850
Student loans and allowances	StudyLink	0800 88 99 00 <a href="http://www.studylink.govt.nz">www.studylink.govt.nz</a>
Student Resource Centre	Room G16, Science Centre, Building 303	+64 9 373 7599 ext 85510 or 89378 <a href="mailto:src@math.auckland.ac.nz">src@math.auckland.ac.nz</a>
Students' Association	AUSA 4 Alfred Street	+64 9 309 0789 <a href="mailto:ausa@auckland.ac.nz">ausa@auckland.ac.nz</a> <a href="http://www.ausa.auckland.ac.nz">www.ausa.auckland.ac.nz</a>
Tuākana Mathematics Programme	Room 124, Science Centre, Building 302	+64 9 923 4931 <a href="mailto:nathan@math.auckland.ac.nz">nathan@math.auckland.ac.nz</a> <a href="http://www.math.auckland.ac.nz/wiki/Tuakana">www.math.auckland.ac.nz/wiki/Tuakana</a>
University Bookshop (UBS)	Kate Edger Building	+64 9 306 2700 <a href="http://www.ubsbooks.co.nz">www.ubsbooks.co.nz</a>

# Important Locations

## Information Commons

Designed as information hubs, the Information Commons give you computer access and learning support, as well as proving group and individual study areas. You'll find these facilities at our City, Grafton and Epsom campuses.

At the Kate Edger Information Commons on the City Campus you will find computer training rooms, the Student Learning Centre, a Disabilities Resource room, the Library's Short Loan service and the English Language Self-Access Centre (ELSAC).

The IC Helpdesks provide walk-in, roaming, email and telephone support with all aspects of student computing resources and services.

Information Commons

Phone: 373 7599 ext 82333

Email: [ichelpdesk@auckland.ac.nz](mailto:ichelpdesk@auckland.ac.nz)

[www.information-commons.auckland.ac.nz](http://www.information-commons.auckland.ac.nz)



## Facilities and support for all students

Refer to the general University Prospectus or the University website [www.auckland.ac.nz](http://www.auckland.ac.nz) for a more extensive list of services in place for students.

## Mathematics Department Office

The administrative offices for the Mathematics Department at City Campus are located in:

Room 303, Science Centre  
Building 303, 38 Princes Street  
Phone: 373 7599 Ext 85886

**Email:** [enquiries@math.auckland.ac.nz](mailto:enquiries@math.auckland.ac.nz)

**Website:** [www.math.auckland.ac.nz](http://www.math.auckland.ac.nz)

## Offices of Mathematics Department Lecturers

These are located along the main corridor of the third and fourth floors of the Science Centre Building 303, at 38 Princes Street.

## Mathematics and Statistics Computer Laboratories

Basement and ground floor of the Building 303S.

## Student Resource Centre

Students' primary contact with the Mathematics Department will be through this service. The Student Resource Centre is located in G16 (within SciSpace), ground floor of the Science Centre, Building 303, on the City Campus. See page 41 for details.

## Assistance Room for Stage I and II Maths Students

The Assistance Room is located on the Ground floor of the Science Centre, Building 303 in room G16, past the Student Resource Centre.

## Tuākana Rooms

The Tuākana programme rooms for Stage I and II Māori and Pacific Islands students are located the first level of the Science Centre, Building 303 in rooms 122 (tutors office), 124 (tutorial room) and 125 (study room).

# University Library | Te Tumu Herenga

The University Library consists of the General Library and 12 subject-specific libraries with over 2.2 million items, 4700 study spaces and 1100 computers.

## General Library

Most science serials are now available electronically. The majority of the science book collection is shelved on Level M where you will also find printed serial collections for biology, marine science, chemistry, computer science, food science, geology, physics, mathematics and statistics. Geography, computer science and psychology serials are shelved with the book collection.

## Courses, tours and training

Tours and hands-on courses will give you the confidence to use the University Library, its Information Commons service and all its resources. If you are a new student, the following courses are recommended:

- Library and Resources Overview: an introduction to the University Library resources and services.
- Database Searching: how to choose and use databases.
- Uni IT Essentials: covers University IT facilities, Netaccount and NetID, Cecil, Webmail, wireless and other electronic resources.

To book a Library course visit [www.library.auckland.ac.nz/booking](http://www.library.auckland.ac.nz/booking)

## Services

Visit the subject librarians in Science Information Services on level M. Consultation sessions are available during visits made by the Subject Librarian to the Departments.

Other Library services include Ask a Librarian Service, Enquiry Desk, Information Commons



Help Desk, Inter-Campus Library Delivery Service, Interlibrary Loan and Document Delivery and the Short Loan Collection.

## Subject Librarians

Visit the subject librarians in Science Information Services on Level M. Consultation sessions are available during visits made by the Subject Librarian to the Departments.

## Mathematics Subject Librarian

Michael Parkinson  
Room M13, Level M, General Library  
Phone: 373 7599 ext 85858  
Email: [m.parkinson@auckland.ac.nz](mailto:m.parkinson@auckland.ac.nz)

## Borrowing and accessing resources

Your student ID card is your Library card. Use it to access the photocopiers, printers and to borrow items. You also have 24-hour access via the Library website

General Library  
5 Alfred Street, City Campus  
Phone: 373 7599 ext 88044  
[www.library.auckland.ac.nz](http://www.library.auckland.ac.nz)

## Lecture Theatre Locations

### Building 303 (includes most common Mathematics tutorial rooms)

114 (301.114)	Mathematics tutorial room , (first floor)
B08	Postgraduate lecture room (basement)
B10	Small tutorial room (basement)
B25	Mathematics tutorial room (basement)
B75 (BTL)	Basement Teaching Lab (basement, south wing)
B90	Another Computer Lab (basement, south wing)
G16	SciSpace, Student Resource Centre and Mathematics and Statistics Assistance Area (ground floor)
MLT 1	Large Mathematics Lecture Theatre (ground floor)
MLT 2	Mathematics Lecture Theatre 2 (first floor)
MLT 3	Mathematics Lecture Theatre 3 (first floor)
PLT1	Large Physics Lecture Theatre 1 (ground floor)
PLT2	Physics Lecture Theatre 2 (ground floor)
PLT3	Physics Lecture Theatre 3 (basement)
SLT1	Science Lecture Theatre 1 (ground floor)

### Other buildings

301.242	Geol242: Small lecture/tutorial room in the Chemistry/Geology Building
301.248	Geol248: Tutorial room in the Chemistry/Geology Building (301.248)
ALR	Architecture Lecture Room, Architecture Building, 22 Symonds Street
Arts	Arts1 Building, 14A Symonds Street
BLT100	Biology Building Room 100, 5 Symonds Street
BLT204	Biology Building Room 204, 5 Symonds Street
CA, CB, CC	Commerce A, 3A Symonds Street; Commerce B, 5 Symonds Street; Commerce C, 18 Symonds Street
Chem	Chemistry Building, (corner Symonds and Wellesley Streets) 23 Symonds Street) contains the Large and Medium Lecture Theatres (LgeChem, MedChem)
Conf Cen	Conference Centre, 22 Symonds Street Eng Engineering School, 20 Symonds Street HSB
Lib B10, Lib B15, Li bb28	Library Building Basement Theatre 10, 15 and 28 respectively, 5 Alfred Street
Law	Law Buildings, 5-17 Eden Crescent contains Stone, Algje, Northey and Small Lecture Theatres
LargeChem	Large Lecture Theatre, Ground Floor Chemistry Building
MedChem	Medium Lecture Theatre, Ground Floor Chemistry Building
OCH	Old Choral Hall, corner Symonds and Alfred Streets, 7 Symonds Street
OldGovLT	Old Government House Lecture Theatre, 3A Symonds Street
OGGB 3/4/5	Owen G Glenn Building, 12 Grafton Road
F&PAA	Fisher and Paykel Appliances Auditorium, 12 Grafton Road
HSB 1/2	Human Sciences Building, 10 Symonds Street



## Faculty of Science

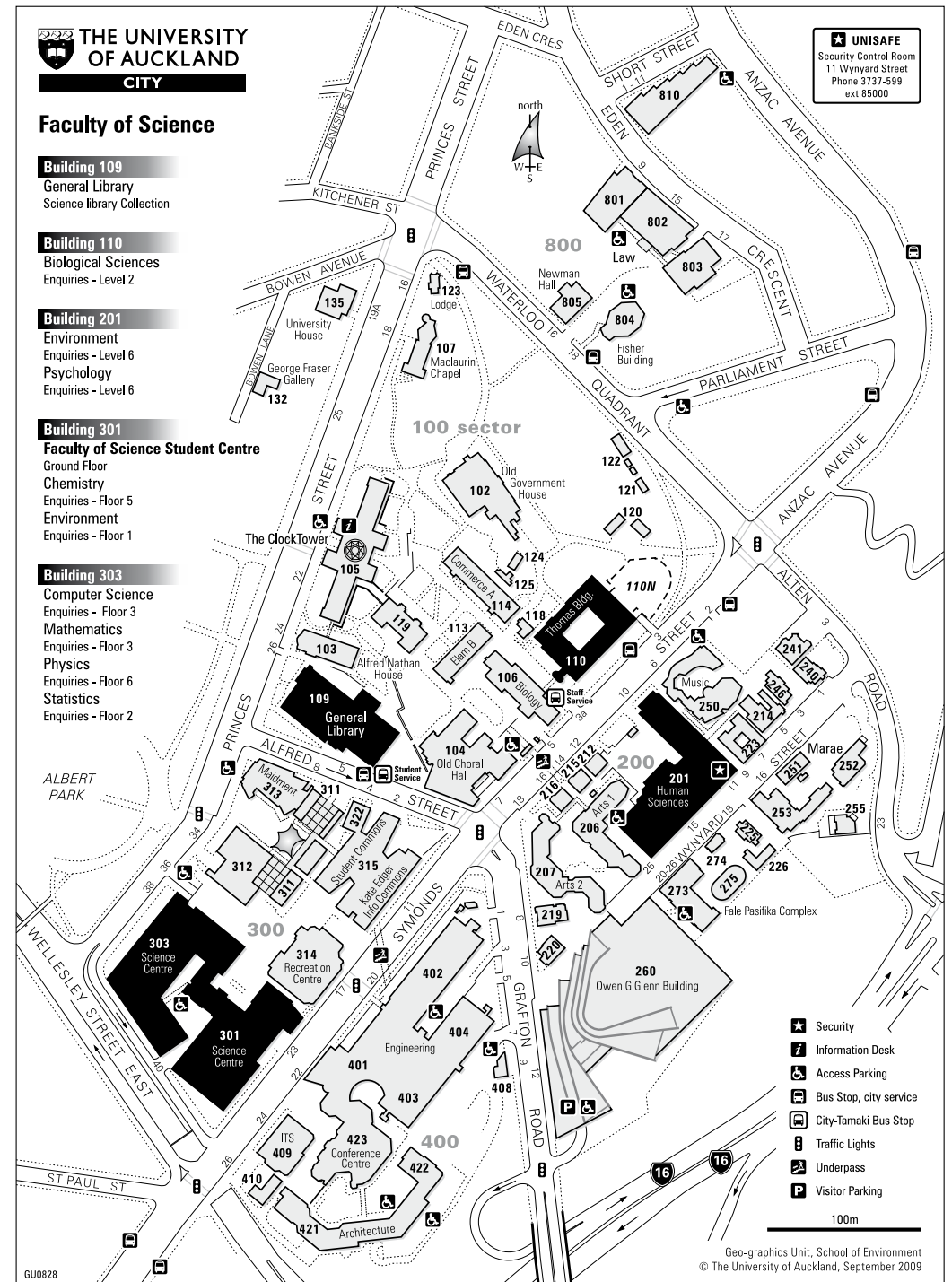
**Building 109**  
General Library  
Science library Collection

**Building 110**  
Biological Sciences  
Enquiries - Level 2

**Building 201**  
Environment  
Enquiries - Level 6  
Psychology  
Enquiries - Level 6

**Building 301**  
Faculty of Science Student Centre  
Ground Floor  
Chemistry  
Enquiries - Floor 5  
Environment  
Enquiries - Floor 1

**Building 303**  
Computer Science  
Enquiries - Floor 3  
Mathematics  
Enquiries - Floor 3  
Physics  
Enquiries - Floor 6  
Statistics  
Enquiries - Floor 2



## Lecturing staff - Mathematics Department

Name	Ext	Room	Email
An, A/Prof Jianbei	88773	307	an@math.auckland.ac.nz
Bartholomew, Dr Hannah	84239	308	h.bartholomew@math.auckland.ac.nz
Barton, Prof Bill (Associate Head - Academic, Head Mathematics Education Unit)	88779	312	b.barton@auckland.ac.nz
Bryant, A/Prof David	88763	365	d.bryant@math.auckland.ac.nz
Calvert, A/Prof Bruce	88780	314	calvert@math.auckland.ac.nz
Chan, Dr Robert	85212	312	chan@math.auckland.ac.nz
Conder, Prof Marston (NZIMA Co-director)	88879	319	conder@math.auckland.ac.nz
Galbraith, Dr Steven	88778	tba	s.galbraith@math.auckland.ac.nz
Gauld, Prof David	88697	432	gauld@math.auckland.ac.nz
Gover, Prof A. Rod (Head Analysis, Geometry, Topology)	88792	423	gover@math.auckland.ac.nz
Greenwood, Dr Sina	88776	404	sina@math.auckland.ac.nz
Heard, Dr Allison (Computer Labs Coordinator)	88816	414	heard@math.auckland.ac.nz
Kaipio, Dr Jari	88818	412	j.kaipio@math.auckland.ac.nz
Kirk, Dr Vivien (Head Applied Mathematics Unit)	88812	406	kirk@math.auckland.ac.nz
McKenzie, Helen (Tertiary Foundation Certificate)	88789	325	h.mckenzie@math.auckland.ac.nz
McNaughton, Dr Alastair (Tutors & Markers Coordinator; Students-Staff Liaison Committee Coordinator)	85244	330	a.mcnaughton@auckland.ac.nz
Meylan, Dr Mike	85865	407	meylan@math.auckland.ac.nz
Moors, Dr Warren (Associate Head - Research)	84746	332	moors@math.auckland.ac.nz
Nathan, Garry (Tuākana Programme Coordinator)	84931	118	g.nathan@math.auckland.ac.nz
Novak, Julia	84747	321	novakj@math.auckland.ac.nz
Oates, Greg	88605	322	oates@math.auckland.ac.nz
O'Brien, Prof Eamonn (Head Algebra and Combinatorics)	88819	411	obrien@math.auckland.ac.nz
Parnell, Sheena (TFC)	85750	324	sheena@math.auckland.ac.nz
Paterson, Dr Judy	88605	322	paterson@math.auckland.ac.nz
Pfannkuch, Dr Maxine	88794	310	pfannkuc@math.auckland.ac.nz
Postlethwaite, Dr Claire	88817	414	c.postlethwaite@math.auckland.ac.nz
Sharp, Dr Philip (Deputy Head)	88884	329	sharp@math.auckland.ac.nz
Slinko, A/Prof Arkadii	85749	409	slinko@math.auckland.ac.nz
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