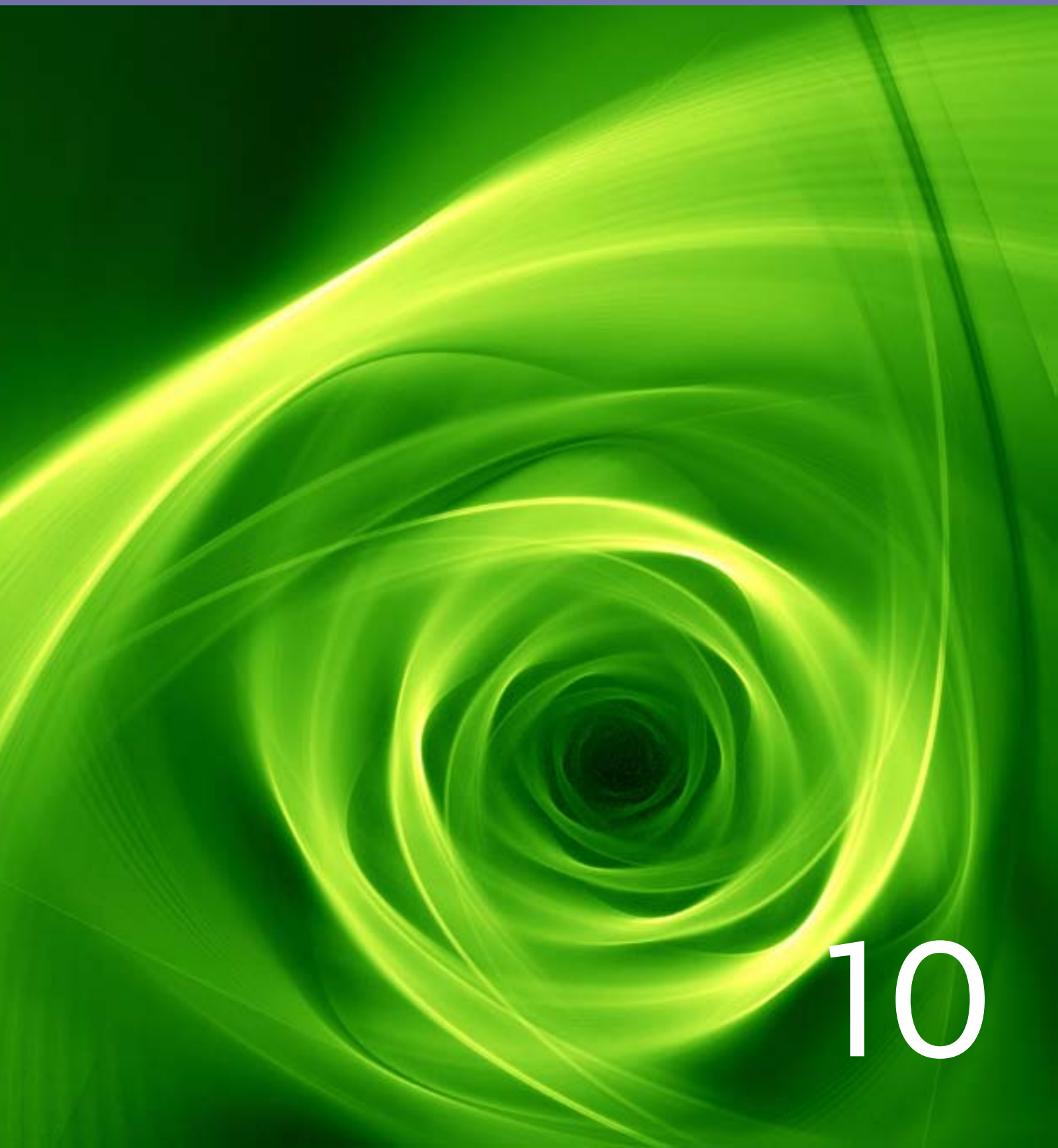
College of Engineering

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Mathematics and Statistics



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What is Mathematics? What is Statistics?

Why should I study those subjects?

Mathematics and Statistics are living subjects with new processes, techniques and theories constantly being devised, tested and explored. The extensive use of computers in a wide range of academic areas has led to an increasing demand for statistical and mathematical analysis in many new fields. This means that mathematicians and statisticians are being asked to develop new tools and techniques to deal with problems in areas from business management to biology, as well as considering new insights being opened up in the more traditional areas of physical science and engineering. All this activity leads not only to new applications of mathematics and statistics, but also to new theoretical work on the structure of the mathematics involved.

Members of the department are engaged in research in a number of fields within Mathematics and Statistics. The department has a research centre, the Biomathematics Research Centre, and research interests in the Centre for Bioengineering and the Allan Wilson Centre for Molecular Ecology and Evolution. We have strong links to other departments, especially to Computer Science, Physics, Business and Economics, and Engineering.

We offer a wide range of courses at undergraduate level. At 100-level there are several courses tailored to suit the varying needs and mathematical backgrounds of students entering university for the first time. The courses become more specialised at 200-level and above. Those at 400-level cover advanced aspects of Mathematics and Statistics that bring our honours students close to the frontiers of modern research. In between 100 and 400-level you will find mathematics and statistics papers not only aimed at specialists in these subjects but also at students majoring in Biology, Computer Science, Engineering, Management, Physics, and a host of other disciplines.

University offers you the only chance you will have to study subjects that you find interesting under the guidance of experts, many of whom have substantial international reputations in their fields of expertise. Make the most of this opportunity by taking - and enjoying! - our offerings in Mathematics and Statistics.

Associate Professor Jennifer Brown
Head of Department

About the Department of Mathematics and Statistics

The Department of Mathematics and Statistics is located in the Erskine building. Reception is on Level 4 on the north side. The department has 28 academic staff, including the chairs in Statistics, Applied Mathematics and Pure Mathematics. We offer a wide range of courses, and teach for all levels from first-year undergraduate to PhD.

Members of the department are engaged in research in a number of fields within Mathematics and Statistics. The department has strong research interests in the area of Biomathematics with a number of staff actively working on a variety of problems involving both discrete and continuous processes. There is a strong computational group in the department with interests in approximation, optimization, numerical linear algebra, and computer algebra (CAS). There are also strong links to the College of Engineering. The department has researchers working in ring theory, geometry, combinatorics, harmonic analysis, and the potential theory of differential operators. There are also staff members working in mathematical education and the history of mathematics. The department has a strong research group in statistics working in a number of areas.

The Department of Mathematics and Statistics has modern, well equipped teaching and research computer laboratories, classrooms and meeting rooms. The computing facilities include cutting edge 64-bit Windows systems, as well as Linux and UNIX operating systems. The labs are fitted out with fully networked terminals designed to satisfy the performance demands of modern mathematical and statistical computing applications. Four computer labs in the basement of the building service all our undergraduate courses. These are complemented by two fully equipped labs on Level 4 for our advanced honours and postgraduate students. These facilities have extended opening hours and are equipped with fast and reliable printing services.

Research students have computer access provided in their departmental offices. The departmental computing facilities can be accessed remotely from any computer with a broadband or network connection on or off campus, so you don't even need to be physically in the Erskine building. The building itself has full wireless coverage. A complete range of mathematical and statistical computing software is provided, along with all the usual IT packages. The leading technical computer languages in Mathematics and Statistics, MATLAB and 'R', are available, along with Maple for symbolic algebra.
Other statistical computing is provided by SAS and Statistica.

Contact information

Please contact us if you have further questions regarding our courses or research.

Head of Department

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Enquiries

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University of Canterbury Contact Centre

For more information about study options or an enrolment pack get in touch with the Contact Centre on:

Freephone: 0800 VARSITY
Phone: +64 3 364 2555
Email: enrol@canterbury.ac.nz
www.canterbury.ac.nz/enrol

The Erskine building, which houses the Department of Mathematics and Statistics

Undergraduate degree structure: BSc/BA

A major in Mathematics or Statistics generally leads to a Bachelor of Science or a Bachelor of Arts. Later you can proceed to a BSc(Hons) or BA(Hons), MSc, MA, PGDipSc or PhD. You can usefully take mathematics and statistics courses while majoring in another subject. Students majoring in Biology, Chemistry, Computer Science, Engineering, Physics, Commerce and Management often take Mathematics and/or Statistics up to 300-level.

The BSc and BA degrees require a minimum total of 360 points.

For students first enrolled prior to 2010

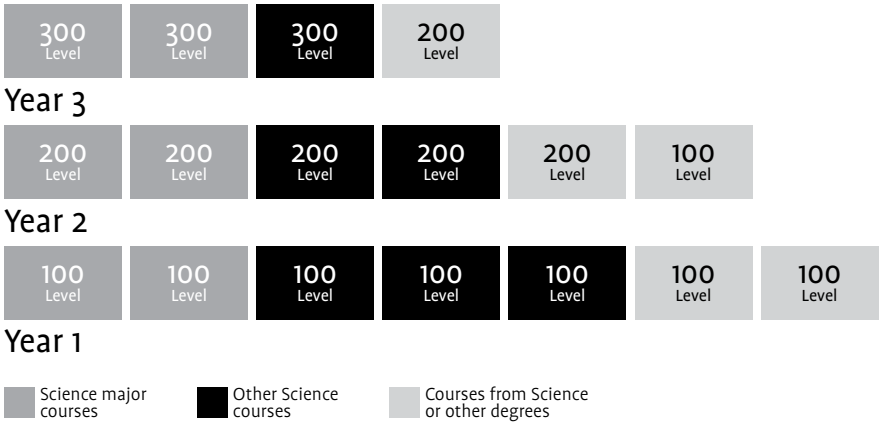
At least 254 points must be from Science (for a BSc) or Arts (for a BA) courses.

The remaining 106 points can be from any courses of your choice.

At least 216 points must be from courses above 100-level, with at least 84 points at 300-level, at least 56 of which must be in a single subject – this is your major.

For a BA, it is compulsory to complete the requirements for a minor subject as well as a major (for BA minor requirements, refer to the Enrolment Handbook).

Bachelor of Science – current degree structure



Each block represents a standard course with the following point values:
100-level – 18 points; 200-level – 22 points; 300-level – 28–30 points.

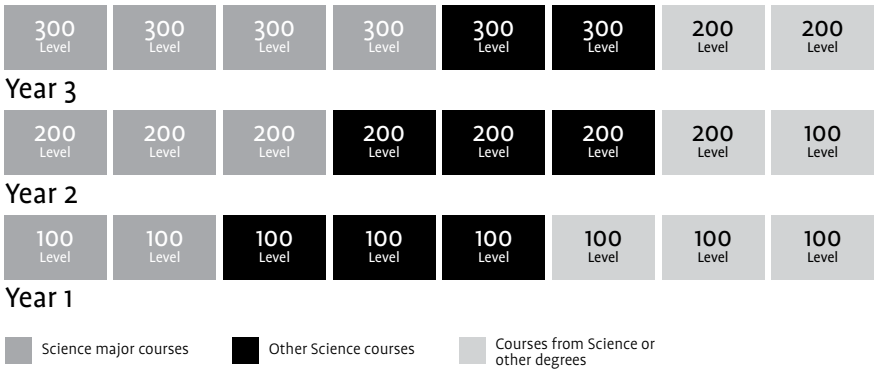
For students first enrolled from 2010 onwards

From 2011 onwards, all courses will have a point value of 15 points or multiples of 15. **Year 1 students will normally enrol in 120 points made up of eight 100-level, 15-point courses (four each semester)**. It is proposed that the degree structure in 2011 will be adjusted to reflect the introduction of the 15-point common course size:

- At least 255 points must be from Science (for a BSc) or Arts (for a BA) courses.
- The remaining 105 points can be from any courses of your choice.
- At least 225 points must be from courses above 100-level, with at least 90 points at 300-level, at least 60 of which must be in a single subject – this is your major.
- For a BA, it is compulsory to complete the requirements for a minor subject as well as a major (for BA minor requirements, refer to the Enrolment Handbook).

When choosing your first-year courses, you should include courses that allow you to advance to 200-level in at least two, and preferably three, subjects. For full details of the requirements to major in a specific subject, see the Enrolment Handbook.

Bachelor of Science – proposed degree structure for students enrolling in Year 1 in 2010*



Each block represents a 15-point course.
This structure is for students starting 2010 onwards.
**Subject to NZVCC CUAP approval due August 2009.*

Starting your degree

Mathematics

MATH 101 Introductory Mathematics with Applications – 15 points

MATH 102 Mathematics 1A – 15 points

MATH 103 Mathematics 1B – 15 points

MATH 120 Discrete Mathematics – 15 points

MATH 130 Introduction to Logic & Computability – 15 points

MATH 170 Mathematical Modelling and Computation – 15 points

The core of the 100-level (i.e. first–year) programme consists of linear algebra and calculus, found in the two papers MATH 102 and MATH 103. MATH 103 follows on from MATH 102 and has MATH 102 as a prerequisite. Anyone wanting to do a significant amount of Mathematics in their degree should take both these papers. MATH 102 is required for people intending to major in any of several subjects, including Commerce.

We advise those who have a weak maths background or haven't studied maths for some time to take the preparatory paper MATH 101, to be followed by MATH 102 (and maybe MATH 103) if appropriate. MATH 101 aims to raise the technical and understanding levels of students who lack confidence in their mathematical skills.

MATH 120 is designed as an additional paper for students who are interested in the structure and logic of Mathematics. It is particularly recommended for students majoring in Mathematics, Statistics or Computer Science.

MATH 130 is a course on logic that is taught by both Mathematics and Philosophy staff.

MATH170 provides an introduction to mathematical modelling and computation. It complements existing 100-level courses in the mathematical sciences and is particularly recommended for those who wish to major in applied mathematics.

Students who have achieved very well at NCEA Level 3 in mathematics with calculus and/or statistics and modelling could consider direct entry into a second–year mathematics course.

Statistics

STAT 101 Statistics 1 – 15 points

Many students need Statistics to support their studies in other subject areas, such as the Life Sciences, Physical Sciences, the Social Sciences, Management and Computer Science. Others will wish to do a substantial amount of Statistics in their undergraduate programme.

STAT 101 is our first–year course in Statistics. It will give you a sound basic knowledge of the subject and a good grounding in how Statistics is applied to tackle genuine problems. You can enter our 200-level statistics courses from STAT 101.

Students who have achieved very well at NCEA Level 3 in statistics and modelling and/or mathematics with calculus could consider direct entry into a second–year statistics course.

Direct Entry into 200-level

In exceptional cases, you may be offered entry directly into 200-level courses. There are both advantages and disadvantages to missing out 100-level completely and this is not a step to take lightly. It requires the approval of the Head of Department and this will only be given if it is in your best interests. In most cases, you are much better advised to take the extra year and begin your university studies with a good, broad choice of 100-level courses.

Recommended preparation for first-year courses

Students who want to take MATH 102 and then MATH 103 have various options:

1. Take MATH 102 in Semester 1 followed by MATH 103 in Semester 2. This is recommended for those with a strong background in maths.
2. Take MATH 101 in Semester 1 followed by MATH 102 in Semester 2 and then the follow up mathematics course over the Summer or MATH 103 in Semester 1 the following year. This is recommended for those with a weaker background in maths.

You should take MATH 102 in Semester 1 or 2 only if you meet the entrance criteria. In recent years we have found that **67% of students who did not follow our criteria failed MATH 102 in Semester 1**, whereas only 16% failed who did follow them.

We strongly recommend students intending to enrol in MATH 102 take the pre-entry self assessment quiz.

Each year, the Department of Mathematics and Statistics offers direct entry to MATH 103 or 200-level in Mathematics/Statistics to a few outstanding students. If you have achieved a high number of NCEA Level 3 mathematics passes with an Excellence grade or obtain a scholarship pass at outstanding level, please contact the Department of Mathematics and Statistics in person to discuss this option.

The entrance criteria listed below are recommendations only. Any student who meets standard university entrance requirements may enrol in any of the 100-level courses (except MATH 103, which has MATH 102 as a prerequisite). Nonetheless it is in your best interests to follow them.

MATH 102 (Semester 1, Semester 2)

We strongly advise at least 18 credits in NCEA Level 3 mathematics with calculus. Achieving some credits at merit or excellence is also a good preparation for 100-level Mathematics. The equivalent Unit Standards are also acceptable.

Other suitable backgrounds include:

- 24 credits in NCEA Level 3 mathematics with statistics
- Scholarship in NCEA Level 3 mathematics either with calculus or statistics
- 50%+ Bursary mathematics with calculus
- 60%+ Bursary mathematics with statistics
- Pass in MATH 101

MATH 103 (Semester 1, Semester 2, Summer)

Prerequisite: MATH 102.

MATH 101 (Semester 1)

There are no entrance criteria for MATH 101. This course is aimed at students who do not reach the criteria for MATH 102, or who haven't studied maths for some time.

If your background in mathematics is weak, you may want to consider enrolling in the two-week Science Headstart course in January or February. Contact Continuing and Bridging Education for further information.

MATH 120 (Semester 1)

There are no entrance criteria for MATH 120.

MATH 130 (Semester 2, Summer)

There are no entrance criteria for MATH 130.

MATH 170 (Semester 2)

This course is aimed at students who are taking MATH 103 concurrently. Students who take MATH 170 concurrently with MATH 102 are likely to experience severe difficulties.

STAT 101 (Semester 1, Semester 2)

There are no entrance criteria for STAT 101.

If your background in Statistics is weak, you may want to consider enrolling in the two-week Science Headstart course in January or February. Contact Continuing and Bridging Education for further information.

Other suitable preparation for MATH 102 include the following

Certificate in Foundation Studies (CertFounStudies) and Certificate in University Preparation (CUP)

The courses BRDG 016 Mathematics Part One, BRDG 017 Mathematics Part Two and BRDG 015 General Mathematics are preparatory courses run as part of the Continuing and Bridging Education's Certificate in Foundation Studies (CertFounStudies) and Certificate in University Preparation (CUP) programmes; see the Continuing and Bridging Education website for further information.

- For MATH 102 - A or B in BRDG 016 and BRDG 017; A in BRDG 015
- For MATH 101 - Pass in BRDG 015

Cambridge International Examinations

For MATH 102 - Pass in A Level Mathematics, or a good pass in AS Level Mathematics (preferably including both units P1 and P2)

Beyond first year

We offer a wide variety of courses in mathematics and statistics at 200 and 300-levels.

The mathematics course range from abstract pure mathematics through to computer-oriented applied courses. If you are unsure which ones best suit your needs, contact one of the course advisors or the lecturer in charge of the course you are thinking of taking (see Help and advice section). If you are contemplating an honours degree, include the core courses MATH 102 and MATH 103 in your first year of study. MATH 120 or MATH 170 should also be seriously considered, although neither is essential. At the 200-level, many students leave their options open regarding their preferred subject and take honours in two subjects.

Up to five second-year statistics courses are offered on topics including inference, probability, regression, applied statistics, and computational methods. These courses have STAT 101 and/or MATH 102 as prerequisites. For an honours degree in statistics, MATH 103 or MATH 199 (STAR course) are also required.

Second Year

You should be doing at least 55-60 points at the 200-level, including the core courses MATH 254 and MATH 264. MATH 243 is an excellent course to do at some stage. Choose from our other second year courses according to what you are most interested in. In the three main areas, consider:

- **Pure mathematics;** MATH 221 and MATH 222
- **Applied mathematics;** MATH 231, MATH 271 and MATH 282
- **Statistics;** At least three STAT courses at 200-level

These programmes place you into what is sometimes referred to as pre-honours in Mathematics or Statistics. At this level, you may wish to leave your options open regarding your preferred subject and take courses in two subjects. Common combinations are Mathematics and Physics, Mathematics and Statistics, Mathematics and Computer Science, Mathematics and Economics, Mathematics and Chemistry, but other combinations are possible. *No matter in which subject you want to graduate, you should seriously consider taking one of these programmes if you are good at mathematics.*

Third Year

You now become more specialised because you are normally concentrating on one subject. Typically you take 60 points of 300-level Mathematics or Statistics. For an honours degree, a further 30 points of 300-level Mathematics or Statistics is required.

Mathematics

You should take the core courses MATH 352, MATH 353, MATH 361 and MATH 363, and choose from our other courses according to your interests. All honours students should seriously consider taking MATH 343, either at 300-level or as a special topic at 400-level. Students should seek advice on their choice of programme.

Statistics

You should normally take five or six courses from 300-level Statistics depending on your interests. Papers from Mathematics and/or other departments can be substituted and will increase your options in your fourth year.

Changes to degree structure from 2010

From 2010, all Mathematics and Statistics 100-level and 300-level courses, and all Statistics 200-level courses, will be worth 15 points each. From 2011, all Mathematics 200-level courses will also be worth 15 points. See Undergraduate degree structure for full details of the old and new degree structure.

Students taking 100-level courses in 2010

Your entire degree will be under the new 15 point system, meaning that all the courses you take will be worth 15 points each. When planning your programme of study, make sure you look at the 2011 version of the 200-level Mathematics courses, as this is when you'll be taking those courses. See below for information regarding prerequisites for 300-level courses.

Students taking Statistics 200-level courses in 2010

The Statistics 200-level and 300-level components of your degree will be under the new 15 point system. See below for information regarding prerequisites for 300-level courses.

Students taking Mathematics 200-level courses in 2010

The 100-level and Mathematics 200-level components of your degree will be under the old points system (100-level courses in units of 18 points, and 200-level courses in units of 11 points) and the 300-level components will be under the 15 point system. You should avoid trying to complete your 200-level requirements over more than one year: get all your 200-level courses done in 2010 if at all possible. If this is not possible, you should make an appointment to talk to the 200-level coordinator before finalising your enrolment.

Prerequisites for 300-level courses

Note that prerequisites for all Statistics 300-level courses will be updated from 2011, and for all Mathematics 300-level courses from 2012, to allow entry from the new 15 point 200-level courses. The details of the new prerequisites have yet to be finalised, but for the purposes of planning you may find the following guidelines useful. If you are unsure about which 200-level courses you should take in order to be allowed into a specific 300-level course, feel free to talk to the relevant course coordinator directly.

Current prerequisite	Likely equivalent 15 point prerequisite
MATH 221/MATH 231	MATH 220
MATH 222/MATH 243	MATH 240
MATH 251/MATH 261	MATH 201
MATH 254	MATH 201 and MATH 203
MATH 264	MATH 201 and MATH 202
MATH 271	MATH 270
MATH 282	MATH 280
STAT 212	STAT 213
STAT 214	STAT 213
STAT 216	STAT 211
STAT 218	STAT 221
STAT 222	STAT 201
STAT 224	STAT 202
11 points from...	15 points from...
22 points from...	30 points from...

Honours degrees

BSc(Hons) and BA(Hons) in Mathematics or Statistics

The Honours degree is a one-year (if studied full-time) coherent programme of study, consisting of an Honours project and eight 400-level courses. The assessment of the Class of Honours is based on overall performance in the programme. To enrol in Honours, you need to be eligible to graduate with a BA or BSc (360 points) and have the appropriate prerequisites for entry into Honours, which generally means at least 60 points at 300-level from your chosen subject, and a further 30 points at 300-level from either MATH or STAT courses (see below for prere quisites for specialised honours programmes). Students are also expected to have a GPA of at least 6.0 (B+ average) in courses relevant to their chosen subject and final approval for entry is given by the Head of Department.

For details of the 400-level courses on offer, see the department's Honours handbook (available from reception) or the department web page. The final decision on which courses are offered will depend on student demand and staff availability. However, in every year there will always be at least one course offered in analysis, algebra, discrete mathematics, functional analysis, differential equations and computational mathematics. Every Statistics 300-level course is offered as a 400-level course and courses in generalised linear models and bioinformatics are offered each year. A broad range of honours projects for 2010 is listed in the Honours handbook and on the department web page. This list is not exhaustive, and there is plenty of scope for other possible projects. Project supervision is by mutual agreement between the supervisor and student. It is expected that a student will have arranged their project by the end of the first week of term. Assessment is based on a written report (80%), which is to be submitted in September, and an oral or a poster presentation in early October (20%).

Specialised honours programmes

In addition to the single honours degrees, there are a number of joint honours programmes that you can study to combine Mathematics with another subject. To keep your options open to enter these courses you must ensure you study a broad base of courses at lower levels, especially the core mathematics courses, so that you have the appropriate prerequisites. For all joint honours programmes it is very important that you check the calendar regulations to ensure you are taking all the required courses. Some of the more relevant sections of the calendar are included below.

BSc(Hons) in Mathematics and Statistics

You can do a joint degree in Mathematics and Statistics. This is a great thing to do and very marketable. You should start by taking the core Mathematics and Statistics courses; beyond that there is a range of suitable courses. To do a BSc(Hons) in Mathematics and Statistics, you need at least 105 points from 300-level MATH and STAT courses.

BSc(Hons)in Mathematics and Physics

The Physics and Astronomy and Mathematics and Statistics departments offer a joint BSc(Hons)programme. This is aimed at students who are interested in both subjects and do not wish to concentrate entirely on one at the expense of the other.

You enter this programme at the 300-level where normally you take 60 points of MATH 300-level and 60 points of PHYS 300-level courses. This is again followed in the next year with a mixture of 400-level courses as well as a research project.

If you are interested in keeping this option open, it is important that you take the right Mathematics and Physics courses at the 200-level in preparation. The course coordinator for this programme is David Wiltshire, in Physics, and you should seek advice from him or from Peter Renaud (Mathematics).

BSc(Hons)in Mathematics and Philosophy

The interaction between Mathematics and Philosophy in the twentieth century has been far greater than at any previous time. The BSc(Hons) programme in Mathematics and Philosophy is designed for students with a high creative mathematical ability whose interests in Mathematics draw them towards foundational and philosophical issues. The aim of the programme is to produce honours graduates in Mathematics with a substantial background in Philosophy and a keen awareness of the connections between the two fields. Another aim of the programme is to equip such people with knowledge and skills that would make them especially welcome recruits to PhD programmes in Logic, Philosophy and Foundations of Mathematics.

The intellectual training given by this combination of disciplines noted for their rigour will not only prepare graduates for postgraduate research but also make them attractive to employers who value the ability to think and argue clearly.

Entry to the BSc(Hons) degree programme is at 300-level. The requirements at 300-level are:

1. 90 points in MATH 310-399 level, normally including MATH 321, MATH 335, MATH 342, MATH 343;
2. 30 points chosen from PHIL 301-399, MATH 308 and MATH 309.

For more details about this programme contact Professor Douglas Bridges (Mathematics) or Dr Philip Catton (Philosophy).

BSc(Hons)in Computational and Applied Mathematics

This major is in the BSc(Hons) and MSc degrees, and draws on courses which apply mathematics and computing. In addition to the required mathematics courses, a choice of papers in Management Science, Statistics or other subjects may be required.

The department now provides a complete course structure in scientific computation using MATLAB through the sequence MATH 170, MATH 271 and MATH 381. It is important that students ensure a background in core mathematics which means taking MATH 254 and MATH 264 or the equivalent papers at the 200-level. For those students with limited computational background the MATH 282 course runs in the Summer. At 300-level, you should take MATH 352, MATH 353, MATH 361, MATH 363, MATH 371 and MATH 381.

Postgraduate programmes

There are a number of active research groups working on problems in Pure Mathematics, Applied Mathematics and Statistics. Possible research areas in the department may be found in the Postgraduate Students area, or may be discussed with Dr Mark Hickman or Dr Marco Reale.

Apart from the University of Canterbury Scholarships, we may be able to offer some additional financial assistance in the form of part–time tutoring positions, and fees scholarships (at the NZ resident rate).

Postgraduate Diploma in Science (PGDipSc)

This is a one-year full-time course. The course may be taken by any BSc graduate with 90 points in 300-level courses approved by the Head of Department, and must include 60 points from MATH 310–399 or from STAT 310–399. A pass in eight one–semester courses chosen at the 400-level is normally required. Your choice requires the approval of the Head of Department. A completed Postgraduate Diploma in Science (PGDipSc) can be substituted for the course work year of a two-year Master of Science (MSc).

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

After obtaining your bachelor's degree in Mathematics or Statistics, you may enrol for a master's degree. The minimum period of study is two years full-time after a BSc/BA degree, or one year full-time after the respective Honours degree. The first year of the two–year master's degree consists of at least eight one–semester 400-level courses. Again your choice requires the approval of the Head of Department. The second year (and also the one year masterate) consists of a thesis only. We almost always ask that you enrol for a BSc(Hons)/BA(Hons) or PGDipSc in your first year.

Doctor of Philosophy (PhD)

Having graduated with a good honours or msaster's degree, you may enrol for the degree of Doctor of Philosophy. You will work under the supervision of an academic staff member with whom you have a shared research interest. This normally involves at least three years full–time study. You must then present a thesis embodying the results of this research for examination.

Current student profiles

Matt Botur and Anna MacDonald

Anna MacDonald

Like a lot of students starting university, initially I wasn't sure which subject to major in. With this in mind, I selected courses which kept my options open. In my first year, along with Psychology and Economics, I took MATH 102, MATH 103 and STAT 101, knowing they would provide me with a solid base of knowledge in university level Mathematics and Statistics. At 200-level I took the core Mathematics and Statistics courses (MATH 254, MATH 264. STAT 213) as well as some Economics courses. By selecting these broad subjects, I kept my options open for deciding my major, and being able to continue my study in any of the three areas at 300-level. I found that both subjects were invaluable with fields from Mathematics and Statistics popping up in Economics. It wasn't until 300-level that I realised my true calling was studying Statistics, so I enrolled in as many Statistics courses as I could handle. I also took some Mathematics courses and the crossover between Mathematics and Statistics helped make sure I had a well-rounded degree.

My honours year, as well as 400-level courses, required a year-long research project. This is a valuable opportunity to delve into an area that piques your interest and a great way to come to terms with the everyday applications of Mathematics and Statistics.

It was while working on my honours project (and also a Summer research project the Department offers) that I realised research was the future for me. With the backing of my supervisor and other lecturers in the Department, I started a PhD in March 2008. If the opportunity ever arises to research an area of Mathematics or Statistics, I highly recommend it. You'll love it!

Matt Botur

In my first couple of years at university, I took Political Science and Law, planning to move into diplomacy. But after two years, I needed a change - I simply wasn't enjoying my studies. I switched to Engineering Intermediate Year, giving me quite a range of science papers. I soon discovered that Mathematics and Biology were my favourites, and decided to pursue a Mathematics degree, with some Biology papers on the side.

At 200-level, as well as the core courses (MATH 254 and MATH 264), I immersed myself in a range of mathematical disciplines including logic, cryptography and mathematical modelling, which gave me new perspectives on using Mathematics in the real world. With these under my belt, I decided to apply for a Summer research scholarship, an experience I wholeheartedly recommend. My project on nonlinear dynamics let me combine biological models, computer programming (MATH 170/271) and mathematical techniques that were entirely new to me. 300-level has meant an extension once more, into the realms of analysis, linear algebra, differential equations, and so-called "recreational maths". In addition, tutoring on MATH 170, taking my first Stats paper (STAT 211) since high school, and taking two Biology courses has provided a very full year.

Scholarships and prizes

The Department offers a range of scholarships and prizes to students studying Mathematics or Statistics each year.

Undergraduate scholarships and prizes

UC Emerging Leaders' Scholarships: Category D – 2x scholarships at $3500 each towards tuition fees for first year students enrolled in Mathematics and/or Statistics at 100-level or 200-level. Contact the Scholarships Office for application details.

John McMillan Scholarship in Economics and Mathematics: Up to two scholarships are awarded annually to eligible students enrolling in a BSc degree, majoring in Mathematics and Economics and studying subjects consistent with the course of study for the combined BSc(Hons) degree in Economics and Mathematics. Each scholarship is tenable for one year and covers the full first-year tuition fee. Contact the Scholarships Office for application details.

Department Scholarships: You do not need to apply for the department undergraduate scholarships.

Number of scholarships that may be offered each year:

Level	Full fees for MATH /STAT courses	Up to $1,000 for a MATH / STAT courses
200	2	4
300	2	4
400	3	8

1. All scholarships are eligible to students who are majoring in Mathematics or Statistics and are doing: (a) at least 66 points of MATH or STAT or other approved courses at 200-level; or (b) at least 84 points of MATH or STAT or other approved courses at 300-level; or (c) at least six MATH or STAT or other approved courses at 400-level.
2. The scholarships will pay for MATH or STAT courses only and at the domestic rate.
3. Holders of 300-level or 400-level scholarships will normally be expected to do some tutoring or marking for the department, for which they will receive additional remuneration.

Summer Scholarships: Scholarships of up to $2000 are also available for students doing Summer projects in Mathematics or Statistics (MATH 305/STAT 305 and MATH 491/STAT 491). These scholarships are applied for in August for projects commencing in November/December.

Mathematics and Statistics Prizes: The following prizes are awarded annually for excellence in Mathematics or Statistics:

- *Cook Memorial Prize:*
  For final Honours students.
- *Page Memorial Prizes:*
  Two prizes at level 300.
- *Peter Bryant Memorial Prizes:*
  Two prizes at 100-level and 200-level.
- *Brent Wilson Prize:*
  For Applied Mathematics at 300-level.
- *Gordon Petersen Prize:*
  For Pure Mathematics at 200-level.
- *Statistics New Zealand Prize:*
  For Statistics at 300-level ($1000).

Postgraduate scholarships

These postgraduate scholarships will be offered on the basis of the student's potential, as demonstrated by their performance at the Honours level and above. At any given time, a staff member would normally be the senior supervisor of at most one student supported by a departmental postgraduate scholarship.

These scholarships will pay full fees at the domestic rate plus a stipend determined by the Department, for one year in the case of a master's scholarship, and for up to three years in the case of a Doctoral scholarship. This amount may be reduced if the student accepts another scholarship. Holders of departmental postgraduate scholarships will normally be expected to do some tutorials or marking for the department, for which they will receive additional remuneration.

Other awards

- Statistics New Zealand Māori and Pacific Islands Scholarships: To assist a Māori and a Pacific Islander attend university and obtain a Statistics or Mathematics undergraduate qualification ($3,500 per year for up to 3 years).
- J. Connal Scholarships: For BA students at 200-level who excel in Latin, English, French, History or Mathematics. ($400 per year for 2 years). No application required.
- Lord Rutherford Memorial Research Fellowship: For outstanding merit and promise in Physics, Chemistry or Mathematics at the postgraduate level ($20,000 per year for 2 years).
- Sims Empire Scholarship: For outstanding merit and promise in Physics, Chemistry, Mathematics or Medicine at the postgraduate level, for study in Great Britain ($15,000 per year for 2 years).
- Professor C. C. Farr Memorial Scholarship: For students who are enrolled in an honours or postgraduate degree in Physics and/or Astronomy and/or Mathematical Physics ($500 per annum). No application required.
- International Biometric Society Scholarship: For third-year students who are about to embark on a full-time fourth-year or honours course in Statistics, Mathematical Statistics, Biostatistics or Biometrics. Current value A$1000.

For details on applications for these awards go to *www.canterbury.ac.nz/scholarships*, or if you have any questions, please contact the Scholarships Office by email: scholarships@canterbury.ac.nz

The Scholarships Office also has a file on Māori and Pacific Island Scholarships. An increasing number of these are available in Science and Commerce in particular.

Career opportunities

What sorts of careers are there in Mathematics and Statistics?

This is a question many students ask. A quick glance at the 'Situations Vacant' section of Saturday's Press is enough to see that there are few, if any, relevant jobs listed under MATHEMATICS or STATISTICS. A more in-depth look will reveal that Mathematics and Statistics graduates are employed in many different areas. Industry, commerce, government departments and teaching represent some of the more obvious ones. Some jobs require specific mathematical or statistical skills while others, although not directly involving these skills, require the ability to think precisely and reason logically; these are abilities gained from your mathematical studies. For a good idea of the kinds of careers that Mathematics or Statistics can lead to, visit the American Mathematical Society's Early Career Profiles website (*www.ams.org/early-careers/*).

Generally, business, industry and government want people who have a broad background and interest in a variety of mathematical areas, computation and science. Therefore you need to take papers that will expand your knowledge of applications of Mathematics and Statistics. The most directly applicable papers would be in Accounting, Biology, Computer Science, Economics, Engineering, Management, and Physics. In particular, there are very good job opportunities in financial mathematics and in computing combined with Mathematics.

Employers in both private and government sectors are increasingly seeking top graduates from a general field, sometimes not specifying any particular discipline at all. They want bright people whom they will train. Also, the need for people who have a working knowledge of Statistics has burgeoned in recent years.

Many employers participated in the 2003 Graduate Recruitment Programme organised by the Careers Advisory Service, and the following were specifically seeking graduates in Mathematics and/or Statistics.

Recruiters at the 2003 Graduate Recruitment Programme

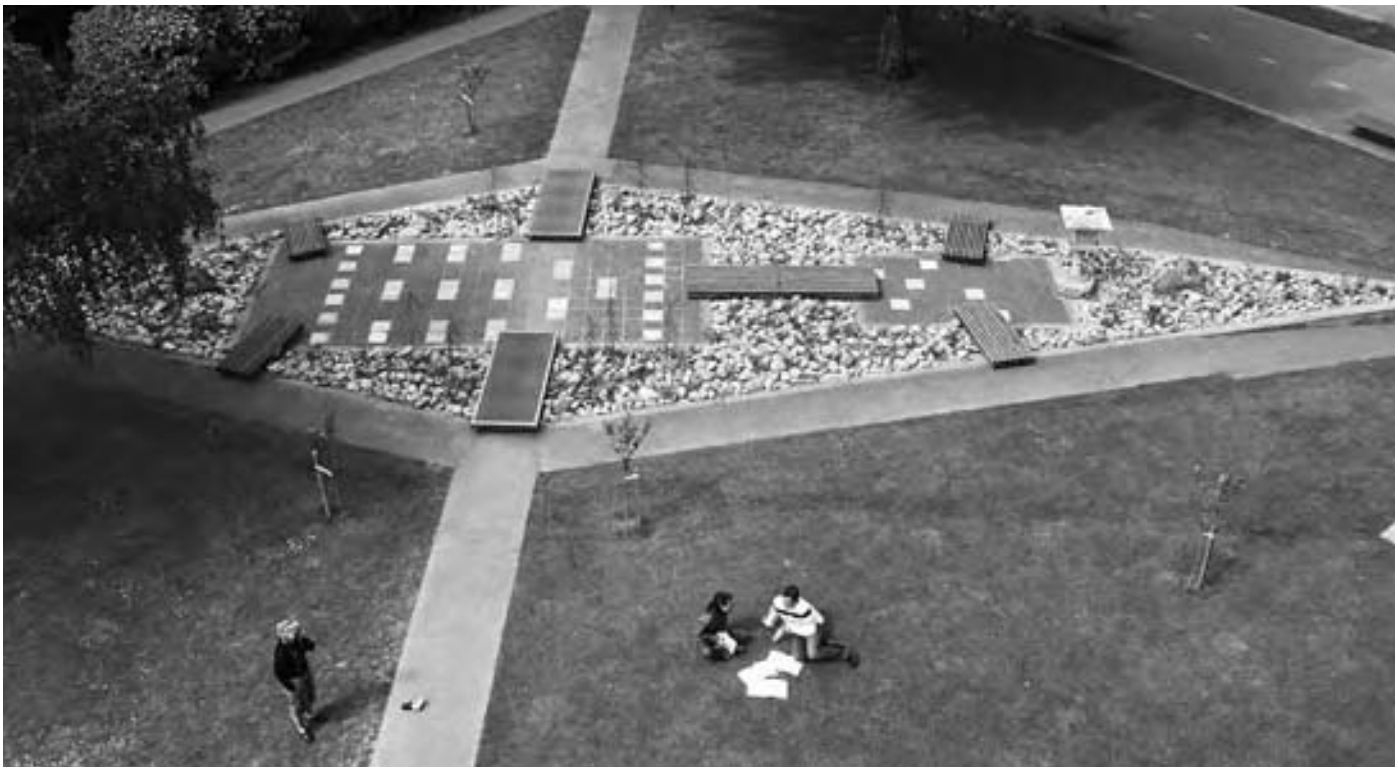
- Australian Bureau of Statistics
- Colleges of Education
- Concept Engineering Limited
- Government Communications Security Bureau
- Meteorological Service of New Zealand
- Royal New Zealand Navy
- Statistics New Zealand

Over the last couple of years, the following job vacancies have been advertised locally for graduates in Mathematics or Statistics, or for people with expertise in these areas. Many of these jobs require competence in using software packages such as SAS. Familiarity with spreadsheets, such as Excel, and data bases are also useful. Most jobs also require strong oral and written communication skills, well developed interpersonal skills, and the ability to work independently as well as in a team.

(Educational institutes, such as secondary schools and universities, advertising for teachers and lecturers have not been included in this list.)

Statistics New Zealand employs many of our Mathematics and Statistics graduates.

To find more specific information on occupations explore the careers web site. For general career enquiries contact the UC Careers & Employment or visit their career reference area at Level 2, Forestry.



The Bridges of Friendship Garden. The paths and bridges embody the famous Kōnigsberg bridges problem. The problem is to find a path around all the bridges that crosses each bridge exactly once (without going around the far ends of the diamond), or to prove that it can't be done. The layout of bridges is from the Prussian town of Kōnigsberg

Statistics New Zealand		
Analyst - Regional & Housing		Degree in Statistics, Mathematics, Economics or a relevant social science.
Analysts - National and Enterprise Accounts		Degree in Economics, or Accounting, Statistics or Mathematics with some Economics.
Analysts - Payments, Trade		Qualifications or experience in Accounting or Economics, Mathematics or Statistics with some Economics.
Economic Statistician		Degree and experience in Economics, Statistics or a similar field is essential.
Mathematical Statisticians		A good university degree with a large component of Mathematics or Statistics.
Analyst - Māori Statistics Unit		Have research and analytical skills. A relevant tertiary qualification or equivalent experience.
Economic Statistician/Analyst		Have qualifications or experience in Economics, Accounting or Statistics, with some Economics.
Government Departments		
ACC	Analysts	Qualifications in Mathematics, Statistics, operational research or Economics.
Defence Technology Agency (DTA)	Scientist/Analyst	A university degree in fields requiring good mathematical and modelling skills, for example, Physics, Engineering, Mathematics, Chemistry or operational research.
Defence Technology Agency	Scientist/Analyst	At least a Master's degree in fields requiring good mathematical and modelling skills, for example, Physics, Engineering, Mathematics, Chemistry or operational research.
Government Communications Security Bureau	Communication Systems Analyst	Achieved excellence at tertiary level in Computer Science, Electronic Engineering or Mathematics. A basic knowledge of Cryptography and Statistics would be an advantage.
Government Communications Security Bureau	Mathematician	Achieved excellence at tertiary level with a mathematics degree (preferably postgraduate). Knowledge of cryptography, computer networks or digital communications would be an asset.
Land Transport Safety Authority of New Zealand	Economic Analyst	Postgraduate degree in Economics with a strong background in at least one of the areas of Econometrics, Statistics and Mathematics.
Ministry of Education	Research Analysts	Experience in statistical analysis, investigation and trend reporting activities.
Ministry of Fisheries	Regional Intelligence Analyst	Tertiary qualification, preferably with a statistical and/or information analysis focus.
Ministry of Health	Intelligence Analyst	Have a flair for analytical, research, and statistical type activities.
Ministry of Social Development	Analyst - (several) Forecasting and Modelling Unit	Relevant tertiary qualification, preferably at the post graduate level. Experience in time series analysis and economic, statistical or mathematical modelling.
New Zealand Treasury	Analyst/Senior Analyst - Macro Forecasting and Analysis	Strong tertiary qualification in one or more of: Economics, Applied Mathematics, Econometrics, or a closely related discipline.
Industry and Commerce		
Meteorological Service of NZ	Trainee Meteorologists	BSc, BSc(Hons) or MSc in Mathematics or Physics.
Orion	Network Investment Analyst	A university degree that includes Economics, Mathematics and Physics.
Pacific Edge Biotechnology Ltd	Bioinformatician/ Computational Biologist	A recent degree with relevant biological, mathematical or information and computer science focus.
Rodgers & Partners Consultants Ltd	Business Analyst	Appropriate qualification in Mathematics, Finance, Engineering or Science.
Tower Managed Funds Ltd	Actuarial Analyst	Exceptional analytical skills, strong mathematical ability. Relevant degree with good grades in Mathematics, Statistics or Economics and Finance.
Weyerhaeuser NZ	Logistics Co–ordinator	Proven analytical and mathematical skills with attention to detail.
Zespri International Ltd	Innovation Analyst	Relevant tertiary qualification and experience in the area of Statistical Analysis and/or Computer Science.

Help and advice

You are always welcome to approach staff with any problems you have. Staff are not always in their offices and you may need to arrange an appointment at a class or with reception staff. Emailing the staff member is another option.

People to see to get matters sorted out are your lecturers, tutors or class representatives. The class representatives' names and contact numbers should be on your course notice board. If not, see the Students Association. If you feel that you need further advice, then you may wish to get in touch with the departmental grievance contacts, Mike Steel or Irene David. The department's disabilities contacts are Irene David and Sarah Vincent.

Here are some common problems and what to do about them.

Course planning

The course advisors listed below, will help with any problems you might have deciding which course best suits your needs.

- **100-level MATH**: Associate Professor Rick Beatson and Dr Miguel Moyers-Gonzalez.
- **100-level STAT**: Mrs Irene David.
- **200-level MATH**: Dr Peter Renaud.
- **200-level STAT**: Associate Professor Peter Smith.
- **300-level MATH**: Dr Mark Hickman.
- **300-level STAT**: Dr Carl Scarrott
- **400-level**: Dr Chris Price
- **Postgraduate**: Dr Mark Hickman and Dr Marco Reale

Course content

For help with this, you can see your lecturer during her/his office hours. You can ask your tutor in a tutorial. Make sure you have specific questions to ask and that you have first worked at the problem yourself.

Lectures

Lectures are the framework on which to base your studies. If you are not happy about any aspect of lectures, first approach your lecturer. They do appreciate the chance to sort matters out at a personal level. You may wish to do this through your class representatives. You could also approach your tutor or the departmental grievance committee, or finally the Head of Department.

Tutorials

Our 100-level lectures each contain several hundred students, but they are supplemented by regular small group tutorials in which you will be given personal assistance with problems arising from the lectures. The Department continues to offer tutorials at 200- to 400-level. The importance of tutorials cannot be over emphasised. If you do not participate in tutorials, then you will have great difficulty passing the tests and examinations. You should regard tutorial attendance as compulsory.

Talk to your tutor if tutorials are not working for you.

Tests/exams

Personal circumstances can cause you to miss a test or exam, or impair your performance in them. The University Calendar or the Enrolment Handbook should be consulted for the regulations concerning aegrotats, but you should also see the lecturer in charge of the course.

If you don't tell us, we can't help you!

Preparation courses

If you intend to enrol in MATH 102, MATH 103, or STAT 101 and feel that your background is inadequate then the preparation courses that we run in January/February may be for you. These courses are advertised in the Enrolment Handbook and in the Student Guide or on the summer courses website. Pamphlets and further information can be obtained from Reception on Level 4, Erskine building.

Private tutoring

If you need regular individual help, a list of private tutors is available from reception.

Personal well being

Don't forget there are many university services available to help with your physical and mental well–being. These include the Student Health and Counselling Service, Liaison Office, UC Careers & Employment, International Student Support and Chaplaincy Service. For further details see the Student Guide available from the Level 1, Registry building.

Academic staff and research interests

The Department has research strengths in several areas of mathematics and statistics, including:

- Algebra, combinatorics and logic
- Analysis and geometry
- Applied statistics
- Computational mathematics
- Dynamical systems and differential equations
- Financial and industrial mathematics
- History and philosophy of mathematics and mathematics education
- Mathematical biology
- Theoretical and computational statistics

For more details of the Department's research activity, see the Department webpage.

Academic staff

Associate Professor Rick Beatson Mathematics, statistics and fast algorithms for fitting spatial data, radial basis functions, visualisation, applications to laser scanner and geophysical data, neural networks, Kriging and cross validation.

Professor Douglas Bridges Constructive foundations of analysis, topology, algebra, and physics, computability and complexity, mathematical economics.

Associate Professor Jennifer Brown Ecological statistics, environmental monitoring, animal population assessment, sampling theory, experimental design.

Dr Qui Bui Fourier analysis, wavelet analysis, weighted function spaces, Littlewood-Paley theory.

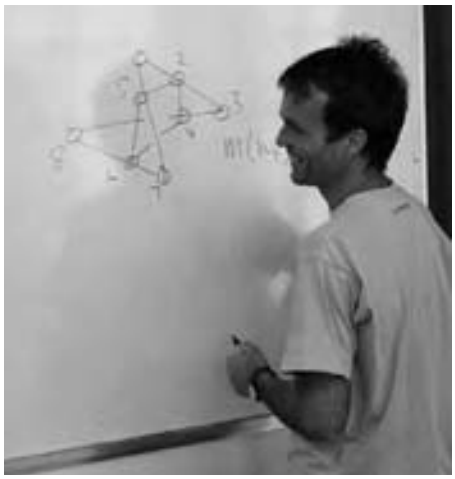
Associate Professor Ian Coope Numerical optimization, linear algebra and applications, computational science.

Dr James Degnan Phylogenetics and population genetics, the coalescent process applied to multiple species.

Dr John Hannah Abstract and linear algebra, mathematics education, history of mathematics.

Dr Mark Hickman Symmetries of differential equations, invariance under groups, algebraic computing, dynamical systems.

Dr Alex James Modelling of problems in combustion and ecology including larval fish growth and the role of environmental stochasticity.



Dr Dominic Lee Computational, Bayesian and nonparametric statistics, with applications in medical research, bioinformatics, signal processing and image processing.

Dr Ben Martin Varieties of representations of finitely generated groups, and applications; reductive algebraic groups; subgroup growth and representation growth of finitely generated groups; automorphism groups of trees; geometric invariant theory.

Dr Clemency Montelle History and philosophy of mathematics; the preparation, translation, and commentary of ancient mathematical texts in Greek, Latin, Sanskrit, Arabic and Akkadian; ancient mathematical astronomy and modelling.

Dr Miguel Moyers-Gonzalez Non-Newtonian fluid mechanics, hydrodynamic stability of complex fluids, industrial mathematics, haemodynamics (modelling and computation), partial differential equations: numerical and theoretical approaches.

Dr Rua Murray Dynamical systems, ergodic theory, numerical effects in dynamics, approximation theory.

Dr Michael Plank Mathematical biology, modelling problems in biology, ecology and engineering, including cardiovascular disease and kidney function.

Dr Chris Price Optimisation, acoustics.

Dr Marco Reale Interactions between graph theory and statistics, in particular time series analysis. Applications to econometrics, finance and bioinformatics.

Dr Peter Renaud Functional analysis, ergodic theory, number theory, cryptography, Clifford algebras, quantum mechanics.

Dr Raazesh Sainudiin Statistical inference of stochastic processes embedded within stochastically evolving networks. Examples include statistical decision problems in population genetics, phylogenetics, and ecological genetics.

Dr Carl Scarrott Spatial statistics, extreme value methods and spectral analysis with application to problems in industry, ecology, environment and science.

Associate Professor Charles Semple Combinatorics, computational complexity, and computational biology with particular interests in phylogenetics and matroid theory.

Associate Professor Peter Smith Statistical design and analysis of communication systems, digital mobile radio systems, antenna arrays, MIMO wireless systems, simulation.

Professor Mike Steel Discrete and stochastic models, bioinformatics, theoretical biology and evolutionary genetics.

Dr Günter Steinke Geometry, topology, groups, combinatorics.

Professor David Wall Mathematical wave theory, inverse problems, mathematical biology, computational mathematics, applied dynamical systems.

Associate Professor Neil Watson Partial differential equations and potential theory.

Dr Phil Wilson Mathematical modelling in biology and industry, multiscale information transfer and emergent phenomena, philosophy and communication of Mathematics.

100-level courses

Mathematics

MATH 101 Introductory Mathematics with Applications

15 Points 0.1250 EFTS

Introduction to calculus, trigonometry and algebra. Emphasis on setting up mathematical models of problems, solving them and interpreting the solutions. Applications to the physical, life and earth sciences as well as to commerce and the humanities.

R: MATH 102, MATH 103, MATH 108, MATH 109, MATH 170, MATH 171, MATH 199, EMTH 118, EMTH 119, EMTH 171. Students may not enrol concurrently with, or after obtaining a pass, in these courses.
Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH101-10S1 (C) Semester 1
Lect: Mon 2pm-3pm, Mon 4pm-5pm, Tu, Wed 12pm-1pm

MATH 102 Mathematics 1A

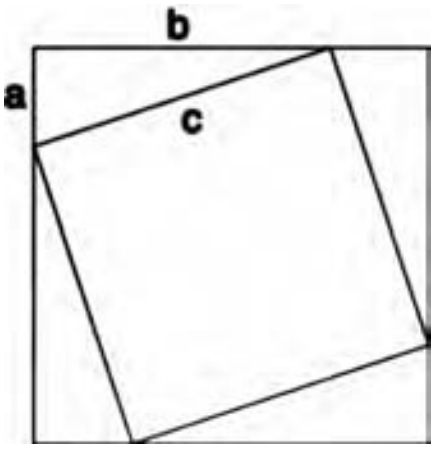
15 Points 0.1250 EFTS

An introductory course in calculus and linear algebra that is designed primarily for students who have done well in NCEA Mathematics with Calculus. This course deals with basic ideas in calculus and linear algebra which have applications in many areas of science and commerce.

R: MATH 108, MATH 199, EMTH 118
Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH102-10S1 (C) Semester 1
Lect: Mon, Wed, Thu, Fri 9am-10am

MATH102-10S2 (C) Semester 2
Lect: Mon, Tu, Wed, Thu 4pm-5pm



An inspiring picture containing one of our students' favourite proofs

MATH 103 Mathematics 1B

15 Points 0.1250 EFTS

A consolidation of concepts from MATH102 and introduction to more advanced ideas in calculus and linear algebra. It also incorporates some study of statistics. It is a prerequisite for many courses in mathematics and other subjects at 200-level.

P: MATH 102, MATH 108 or EMTH 118
R: MATH 109, MATH 199, EMTH 119
Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH103-10S1 (C) Semester 1
Lect: Mon, Tu, Thu, Fri 12pm-1pm

MATH103-10S2 (C) Semester 2
Lect: Mon, Wed, Thu, Fri 9am-10am

MATH 109 Mathematics 1D

18 Points 0.1500 EFTS

In MATH109 we extend the ideas you met in MATH108 to complete your level 100 study of core mathematics. You will discover more about the underlying geometrical ideas in linear algebra, using it to find areas and volumes and to solve problems about lines and planes. The algebraic aspect of calculus will be complemented by problems dealing with applications, where you will need to understand what your answers mean in practical terms.

P: MATH 106 or MATH 108.
R: MATH 104, MATH 105, MATH 107
Domestic Fee: $661 (2009)
International Fee: $3,120 (2009)

MATH109-09SU2 (C) Summer (Nov 09)
Lect: Tu, Fri 9:30am-11am, Wed 11am-12:30pm

MATH 120 Discrete Mathematics

15 Points 0.1250 EFTS

Discrete mathematics is that part of mathematics not involving limit processes. It includes logic, the integers, finite structures, sets and networks.

R: MATH 115
Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH120-10S1 (C) Semester 1
Lect: Mon, Tu, Wed, Fri 11am-12pm

MATH 130 Introduction to Logic & Computability

15 Points 0.1250 EFTS

An introduction to logic and computability.

R: MATH 134, PHIL 134, PHIL 138
Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH130-10S2 (C) Semester 2
Lect: Wed 12pm-1pm, Thu, Fri 1pm-2pm

MATH 134 Logic and Computability

18 Points 0.1500 EFTS

Introduction to logic and computability.

R: PHIL 134, PHIL 144, MATH 144
EQ: PHIL 134
Domestic Fee: $640 (2009)
International Fee: $2,835 (2010)

MATH134-10SU1 (C) Summer (Jan 10)
Lect: Mon, Wed 3pm-5pm, Fri 3pm-4:30pm

MATH 170 Mathematical Modelling and Computation

15 Points 0.1250 EFTS

An introduction to mathematical modelling and simulation via case studies using standard computer packages. Structured programming for mathematical problem solving.

R: MATH 171, EMTH 171
RP: MATH 109 or MATH 103 (prior or concurrent enrolment recommended)
Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH170-10S2 (C) Semester 2

Statistics

STAT 101 Statistics 1

15 Points 0.1250 EFTS

An introduction to the ideas, techniques and applications of statistics and probability.

R: STAT 111, STAT 112
Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT101-10S1 (C) Semester 1
Lect:
(A) Wed 12pm-1pm, Thu 1pm-2pm or
(B) Wed 1pm-2pm, Thu 3pm-4pm
Class:
(A) Fri 10am-11am or
(B) Fri 1pm-2pm

STAT101-10S2 (C) Semester 2
Lect:
(A) Tu, Wed 11am-12pm or
(B) Tu, Wed 9am-10am
Class:
(A) Thu 11am-12pm or
(B) Thu 9am-10am

Engineering Mathematics

EMTH 118 Engineering Mathematics 1A

15 Points 0.1250 EFTS

An introductory course in calculus and linear algebra that is designed primarily for students who have done well in NCEA Mathematics with Calculus. This course deals with basic ideas in calculus and linear algebra which have applications in many areas of Engineering.

R: MATH 102, MATH 108, MATH 199
Domestic Fee: $669 (2009)
International Fee: $3,538 (2010)

EMTH118-10S1 (C) Semester 1

Lect:
(A) Mon, Tu, Wed, Fri 8am-9am or
(B) Mon, Tu, Thu, Fri 12pm-1pm

EMTH118-10S2 (C) Semester 2

Lect: Mon, Tu, Wed, Thu 9am-10am

EMTH 119 Engineering Mathematics 1B

15 Points 0.1250 EFTS

A consolidation of concepts from EMTH118 and introduction to more advanced ideas in calculus and linear algebra. It also incorporates some study of statistics. It is a prerequisite for many courses in engineering mathematics and other subjects at 200-level.

P: MATH 102, MATH 108 or EMTH 118
R: MATH 103, MATH 109, MATH 199
Domestic Fee: $669 (2009)
International Fee: $3,213 (2009); $3,538 (2010)

EMTH119-10S2 (C) Semester 2

Lect:
(A) Mon, Tu, Wed, Fri 8am-9am or
(B) Mon, Tu, Thu, Fri 12pm-1pm

EMTH 171 Mathematical Modelling and Computation

15 Points 0.1250 EFTS

An introduction to mathematical modelling and simulation via case studies using standard computer packages. Structured programming for mathematical problem solving.

P: MATH 109 or EMTH 119 (prior or concurrent enrolment recommended). If you are taking EMTH 171 concurrently with EMTH 118 you are likely to experience difficulties.
R: MATH 170, MATH 171
Domestic Fee: $669 (2009)
International Fee: $3,538 (2010)

EMTH171-10S2 (C) Semester 2

Lect:
(A) Mon, Tu 1pm-2pm or
(B) Mon, Tu 5pm-6pm

200-level courses

Mathematics

MATH 201 Mathematics 2

15 Points 0.1250 EFTS

To be offered in 2011

This course deals with techniques in multivariable calculus and linear algebra which have applications in many areas of science, commerce and engineering. It is also preparation for many courses in advanced mathematics.

P: MATH 103 or MATH 109 or MATH 199 or EMTH 119

R: MATH 261, MATH 264, EMTH 202, EMTH 204, EMTH 210

MATH 202 Differential Equations and Vector Calculus

15 Points 0.1250 EFTS

To be offered in 2011

This course deals with techniques for solving differential equations, and develops further tools for multivariable calculus, building on the material in MATH201.

P: MATH 201 or EMTH 210

R: MATH 262, MATH 264, EMTH 202, EMTH 204

MATH 203 Linear Algebra

15 Points 0.1250 EFTS

To be offered in 2011

Linear algebra is a key part of the mathematical toolkit needed in the modern study of many areas in science, commerce and engineering. This course develops the fundamental concepts of linear algebra, including orthogonality, projections and eigenvalues, with an emphasis on practical applications and use of the computer package MATLAB.

P: MATH 201 or EMTH 210

R: MATH 252, MATH 254, EMTH 203, EMTH 204

MATH 208 Logic A

22 Points 0.1833 EFTS

To be offered in 2011

An introduction to the core ideas of logic.

P: Any 18 points in Philosophy or Mathematics or Computer Science.

R: PHIL 225, PHIL 246, PHIL 346, PHIL 208, PHIL 308, MATH 308

MATH 220 Discrete Mathematics and Cryptography

15 Points 0.1250 EFTS

To be offered in 2011

Discrete mathematics underpins many areas of modern-day science. This course is an introduction to graph theory and cryptography, two central topics in discrete mathematics.

P: One of MATH 102, MATH 103, MATH 108, MATH 109, MATH 115, MATH 120, MATH 199, EMTH 118 or EMTH 119.

R: MATH 221, MATH 231

MATH 221 Algebra and Cryptography

11 Points 0.0917 EFTS

The algebraic structure of integers and polynomials. Rings and finite fields. Introduction to cryptography.

P: MATH 104 or MATH 105 or MATH 106 or MATH 107 or MATH 108 or MATH 109 or MATH 199 or MATH 115.

R: MATH 211, MATH 315

Domestic Fee: $404 (2009)
International Fee: $2,063 (2010)

MATH221-10S1 (C) Semester 1

Lect: Mon 10am-11am, Wed 12pm-1pm

MATH 222 Groups and Symmetry

11 Points 0.0917 EFTS

An introduction to the methods of abstract algebra via the study of symmetries and permutations.

P: MATH 104 or MATH 105 or MATH 106 or MATH 107 or MATH 108 or MATH 109 or MATH 199 or MATH 115.

R: MATH 211

Domestic Fee: $404 (2009)
International Fee: $2,063 (2010)

MATH222-10S2 (C) Semester 2

Lect: Thu, Fri 12pm-1pm

MATH 230 Logic, Automata, and Computability

15 Points 0.1250 EFTS

To be offered in 2011

An introduction to various formal logics, the theory of automata, and the theoretical limitations of the computer.

P: 30 points from MATH 100-199 excluding MATH 101; or with permission of the Head of Department

R: MATH 208, MATH 308, PHIL 208, PHIL 308, PHIL 225, PHIL 246, PHIL 346

MATH 231 Discrete Methods

11 Points 0.0917 EFTS

An introduction to graph theory, a central area of discrete mathematics in which many real world problems can be interpreted and solved.

P: MATH 104 or MATH 105 or MATH 106 or MATH 107 or MATH 108 or MATH 109 or MATH 199 or MATH 115.

R: MATH 215

Domestic Fee: $404 (2009)
International Fee: $2,063 (2010)

MATH231-10S2 (C) Semester 2

Lect: Mon 10am-11am, Wed 12pm-1pm

MATH 240 Analysis and Groups

15 Points 0.1250 EFTS

To be offered in 2011

The course comprises two very different subjects, analysis and groups, both fundamental to mathematics and requiring mathematically rigorous thinking. It gives a deeper understanding of the real number system and limits, and an introduction to the methods of abstract algebra via the study of symmetries and permutations.

P: MATH 103, MATH 109, MATH 199 or EMTH 119

R: MATH 222, MATH 243

MATH 243 Analysis 2

11 Points 0.0917 EFTS

This course gives a deeper understanding of the real number system, calculus and limits.

P: MATH 104 or MATH 105 or MATH 107 or MATH 109 or MATH 199.

R: MATH 212

Domestic Fee: $404 (2009)
International Fee: $2,063 (2010)

MATH243-10S1 (C) Semester 1

Lect: Tu 9am-10am, Fri 1pm-2pm

MATH 251 Linear Systems

11 Points 0.0917 EFTS

Introduction to linear algebra. Linear systems, numerical solution of large linear systems, vector spaces, linear transformations.

P: MATH 104 or MATH 105 or MATH 107 or MATH 109 or MATH 199.

R: MATH 204, MATH 217, MATH 254, EMTH 203, EMTH 204

Domestic Fee: $404 (2009)
International Fee: $2,063 (2010)

MATH251-10S1 (C) Semester 1

Lect: Tu, Wed 10am-11am

MATH 252 Matrix Algebra 2

11 Points 0.0917 EFTS

Eigenvalues and eigenvectors, inner product spaces, orthogonality, quadratic forms, complex spaces.

P: MATH 104 or MATH 105 or MATH 107 or MATH 109 or MATH 199.
R: MATH 204, MATH 217, MATH 254, EMTH 203, EMTH 204
Domestic Fee: $404 (2009)
International Fee: $2,063 (2010)

MATH252-10S2 (C) Semester 2

Lect: Tu, Wed 10am-11am

MATH 254 Linear Algebra 2

22 Points 0.1833 EFTS

An accelerated course in Linear algebra. Linear systems, complex vector spaces, linear transformations, eigenvalues and eigenvectors, inner product spaces, orthogonality, quadratic forms, numerical solution of large linear systems.

P: MATH 104 or MATH 105 or MATH 107 or MATH 109 or MATH 199 and Head of Department approval.
R: MATH 204, MATH 217, MATH 251, MATH 252, EMTH 203, EMTH 204
Domestic Fee: $808 (2009)
International Fee: $4,124 (2010)

MATH254-10S2 (C) Semester 2

Lect: Tu, Wed, Thu, Fri 10am-11am

MATH 261 Multivariate Calculus

11 Points 0.0917 EFTS

An extension of the ideas of differentiation and integration to multivariate functions and to vector valued functions.

P: MATH 104 or MATH 105 or MATH 107 or MATH 109 or MATH 199.
R: MATH 204, MATH 218, MATH 219, MATH 264, EMTH 201, EMTH 202, EMTH 204, EMTH 210
Domestic Fee: $404 (2009)
International Fee: $2,063 (2010)

MATH261-10S1 (C) Semester 1

Lect: Thu, Fri 10am-11am

MATH 262 Differential Equations and Transforms

11 Points 0.0917 EFTS

An introduction to second order ordinary differential equations. Laplace transforms, Fourier series, Complex functions.

P: MATH 104 or MATH 105 or MATH 107 or MATH 109 or MATH 199.
R: MATH 204, MATH 218, MATH 219, MATH 264, EMTH 201, EMTH 202, EMTH 204, EMTH 210
Domestic Fee: $404 (2009)
International Fee: $2,063 (2010)

MATH262-10S2 (C) Semester 2

Lect: Thu, Fri 10am-11am

MATH 264 Multivariate Calculus and Differential Equations

22 Points 0.1833 EFTS

An accelerated course in calculus of several variables, vector fields and ordinary differential equations.

P: MATH 104 or MATH 105 or MATH 107 or MATH 109 or MATH 199 and Head of Department approval.
R: MATH 204, MATH 218, MATH 219, MATH 261, MATH 262, EMTH 201, EMTH 202, EMTH 204, EMTH 210, EMTH 264
Domestic Fee: $808 (2009)
International Fee: $4,124 (2010)

MATH264-10S1 (C) Semester 1

Lect: Tu, Wed, Thu, Fri 10am-11am

MATH 270 Mathematical Modelling and Computation 2

15 Points 0.1250 EFTS

To be offered in 2011

Numerical methods and stochastics: solving nonlinear equations; solving systems of linear equations; interpolation; initial value and boundary value problems for ordinary differential equations; Monte Carlo simulation and applications. Programming and problem solving using MATLAB and the application of these ideas.

P: (MATH 170 or MATH 171 or EMTH 171 or MATH 280 or MATH 282) AND (EMTH 119 or MATH 103 or MATH 109 or MATH 199)
R: EMTH 271, MATH 271

MATH 271 Mathematical Modelling and Computation 2

11 Points 0.0917 EFTS

Use of the package MATLAB including matrix algebra, user-defined functions, surface plotting. Numerical methods including solutions of systems of linear equations, solution or ordinary differential equations and systems of equations, approximation techniques. Modelling projects.

P: (MATH 109 or MATH 199) AND (EMTH 171, MATH 171 or MATH 282).
R: MATH 266, EMTH 271
Domestic Fee: $404 (2009)
International Fee: $2,063 (2010)

MATH271-10S2 (C) Semester 2

Lect: Mon, Tu 1pm-2pm
Lab:
(A) Thu 9am-11am or
(B) Thu 2pm-4pm or
(C) Thu 2pm-4pm or
(D) Fri 2pm-4pm

MATH 280 Introduction to Scientific Computation

15 Points 0.1250 EFTS

To be offered in 2011

Introduction to the mathematical software package, MATLAB, that integrates technical computation, graphics, visualisation, and programming

P: MATH 103, MATH 109, MATH 199 or EMTH 199
R: MATH 281, MATH 282

MATH 282 Introduction to Scientific Computing

11 Points 0.0917 EFTS

Introduction to the mathematical software package, MATLAB, that integrates technical computation, graphics, visualisation, and programming.

P: MATH 104 or MATH 105 or MATH 107 or MATH 109 or MATH 199.
R: MATH 280, MATH 281
Domestic Fee: $404 (2009)
International Fee: $2,063 (2010)

MATH282-10SU1 (C) Summer (Jan 10)

Lab: Mon, Wed, Fri 9am-12pm
Limited entry. See limitation of entry regulations.

Statistics

STAT 201 Applied Statistics

15 Points 0.1250 EFTS

A practical introduction to commonly used statistical methods, designed to increase the breadth of statistics skills. The emphasis is on the application of statistical techniques to solve problems involving real data.

P: STAT 101, STAT 111, STAT 112 or STAT 131
R: FORE 210, STAT 220, FORE 222, STAT 222
Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT201-10S1 (C) Semester 1

Lect: Tu, Wed 1pm-2pm, Thu 11am-12pm
Lab:
(A) Mon 11am-12pm or
(B) Mon 12pm-1pm or
(C) Mon 1pm-2pm

STAT 202 Regression Modelling

15 Points 0.1250 EFTS

Regression models are the most widely used statistical tools for examining the relationships among variables. This course will provide a practical introduction to the fundamentals of regression modelling.

P: STAT 101, STAT 111, STAT 112 or STAT 131

R: FORE 210, STAT 220, FORE 224, STAT 224

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT202-10S2 (C) Semester 2

Lect: Tu, Wed 1pm-2pm, Thu 11am-12pm

Lab:

(A) Mon 11am-12pm or
(B) Mon 12pm-1pm or
(C) Mon 1pm-2pm

STAT 211 Random Processes

15 Points 0.1250 EFTS

Not offered in 2010

This course introduces some of the most useful probability models that are widely used in biology, medicine, economics, finance, engineering, physics and many other areas. The models that will be covered are Markov chains, martingales and Poisson processes.

P: STAT 111, STAT 112, MATH 103, MATH 108, MATH 109, MATH 199, EMTH 119 or (STAT 101 and (MATH 102 or EMTH 118))

R: STAT 216

STAT 213 Statistical Inference

15 Points 0.1250 EFTS

This course provides the theoretical foundations for statistical estimation and testing at an introductory level. These are essential for more advanced studies in statistics at higher levels because they facilitate a deeper understanding of statistical techniques and their applications.

P: MATH 103, MATH 199, EMTH 119, (STAT 101 and (MATH 102 or EMTH 118)) or ((STAT 111 or STAT 112) and (MATH 108 or MATH 109))

R: STAT 214

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT213-10S2 (C) Semester 2

Lect: Mon, Tu, Wed 3pm-4pm

STAT 221 Monte Carlo Methods

15 Points 0.1250 EFTS

This course is about the generation of random numbers and their uses, including computer simulations to mimic and contrast random real-world phenomena. It will provide an intuitive and practical understanding of the basic methods in computational statistics, and show how to implement statistical algorithms to manipulate, visualise and comprehend various aspects of real-world data.

P: STAT 111, STAT 112, MATH 103, MATH 108, MATH 109, MATH 115, MATH 171, MATH 199, EMTH 119 or (STAT 101 and (MATH 102 or EMTH 118))

R: STAT 218

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT221-10S1 (C) Semester 1

Lect: Wed, Thu, Fri 9am-10am

Lab: Fri 11am-12pm

Engineering Mathematics

EMTH 202 Calculus

15 Points 0.1250 EFTS

Differentiation and integration of multivariate functions and vector valued functions; transform methods for solving differential equations.

P: Subject to approval of the Dean of Engineering and Forestry

Domestic Fee: $669 (2009)
International Fee: $3,538 (2010)

EMTH202-10W (C) Whole Year (S1 and S2)

Lect: Thu, Fri 10am-11am

EMTH 203 Linear Algebra

15 Points 0.1250 EFTS

Linear systems; numerical solutions of linear equations; vector spaces and linear transformations; eigenvalues and eigenvectors; inner product spaces, orthogonality and quadratic forms; complex spaces.

P: Subject to approval of the Dean of Engineering and Forestry

Domestic Fee: $669 (2009)
International Fee: $3,538 (2010)

EMTH203-10W (C) Whole Year (S1 and S2)

Lect: Tu, Wed 10am-11am

EMTH 204 Calculus and Algebra

30 Points 0.2500 EFTS

An accelerated course in linear algebra and calculus of several variables; linear systems and equations; vector spaces and linear transformations; eigenvalues and eigenvectors; inner product spaces, orthogonality and quadratic forms; vector fields and ordinary differential equations.

P: Subject to approval of the Dean of Engineering and Forestry

Domestic Fee: $1,339 (2009)
International Fee: $7,075 (2010)

EMTH204-10W (C) Whole Year (S1 and S2)

Lect: Tu, Wed, Thu, Fri 10am-11am

EMTH 205 Engineering Statistics

6 Points 0.0500 EFTS

Measurements and data. Probability and random variables. Common distributions. Estimation and hypothesis testing. Regression. Reliability.

P: Subject to approval of the Dean of Engineering and Forestry

Domestic Fee: $268 (2009)
International Fee: $1,415 (2010)

EMTH205-10S2 (C) Semester 2

Lect: Tu 12pm-1pm, Fri 1pm-2pm

EMTH 210 Engineering Mathematics

12 Points 0.1000 EFTS

P: Subject to approval of the Dean of Engineering and Forestry

Domestic Fee: $536 (2009)
International Fee: $2,830 (2010)

EMTH210-10S1 (C) Semester 1

Lect:

(A) Mon 1pm-2pm, Thu, Fri 10am-11am or
(B) Tu, Thu, Fri 1pm-2pm

EMTH 271 Mathematical Modelling and Computation 2

12 Points 0.1000 EFTS

Use of the package MATLAB including matrix, algebra, user-defined functions, surface plotting. Numerical methods including solutions of systems of linear equations, solution of ordinary differential equations and systems of equations, approximation techniques. Modelling projects. Engineering applications using spreadsheets.

P: (1) EMTH 171 or MATH 171; (2) Subject to approval of the Dean of Engineering and Forestry.

R: MATH 271

Domestic Fee: $536 (2009)
International Fee: $2,830 (2010)

EMTH271-10S2 (C) Semester 2

Lect:

(A) Mon, Tu 1pm-2pm or
(B) Mon, Wed 9am-10am

Lab:

(A) Thu 9am-11am or
(B) Thu 2pm-4pm or
(C) Thu 2pm-4pm or
(D) Fri 2pm-4pm

300-level courses

Mathematics

MATH 301 Mathematics in Perspective

15 Points 0.1250 EFTS

Topics in the history, philosophy, directions and culture of mathematics including significant results from the past and an outline of some major areas of progress in the 20th century.

P: 36 points in Mathematics or Statistics or Engineering Mathematics at 100 level and 44 points from the BA or BSc Schedule at 200 level in Mathematics, Statistics, Engineering Mathematics, related subjects, or other subjects with good grades, as approved by the Head of Department.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH301-10S1 (C) Semester 1

Lect: Mon, Thu 4pm-5pm
Class: Fri 11am-12pm

MATH301-10S1 (D) Semester 1

MATH 305 Mathematics Project

14 Points 0.1167 EFTS

This 150 hour course provides students with an opportunity to develop mathematical or statistical research skills to extend and strengthen their understanding of an area of mathematics or statistics.

P: 44 points from MATH 210-299, and approval of HOD.

R: STAT 305

Domestic Fee: $514 (2009)
International Fee: $2,427 (2009)

MATH305-09SU2 (C) Summer (Nov 09)

MATH 321 Fields and Commutative Rings

15 Points 0.1250 EFTS

Not offered in 2010

An introduction to fields and rings, including applications to coding theory and the impossibility of constructions such as 'squaring the circle'.

P: MATH 220, MATH 221, MATH 222, MATH 240 or (MATH 203, MATH 254, EMTH 204 or EMTH 211 with HOD permission) and a further 15 points from MATH 201-294

R: MATH 311

MATH 322 Group Theory

15 Points 0.1250 EFTS

Concrete (e.g. crystallographic) and abstract groups. Fundamental theorems. Constructions and group representations.

P: MATH 222, MATH 240 or (MATH 203, MATH 220, MATH 221, MATH 254, EMTH 204 or EMTH 211 with HOD permission) and a further 15 points from MATH 201-294

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH322-10S1 (C) Semester 1

Lect: Thu 12pm-1pm, Fri 1pm-2pm
Class: Thu 9am-10am

MATH 324 Cryptography 2

15 Points 0.1250 EFTS

This course deals with the mathematical ideas underlying modern cryptography, including algebra, number theory and probability theory.

P: MATH 221 and a further 11 points from MATH 210-299

R: MATH 391

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH324-10S2 (C) Semester 2

Lect: Tu, Fri 9am-10am
Class: Wed 9am-10am

MATH 333 Coding Theory

15 Points 0.1250 EFTS

An introduction to the mathematics underlying communication codes, in particular linear codes and ciphers.

P: 22 points from MATH 221, MATH 222, MATH 231, MATH 251, MATH 252, MATH 254, EMTH 203, EMTH 204 or 22 points at 200 level Maths with HOD approval.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH333-10S1 (C) Semester 1

Lect: Mon, Tu 1pm-2pm
Class: Thu 4pm-5pm

MATH 334 Combinatorics

15 Points 0.1250 EFTS

Modern combinatorics and discrete mathematics with an emphasis on design theory.

P: 22 points from MATH 221, MATH 222, MATH 231, MATH 251, MATH 252, MATH 254, EMTH 203, EMTH 204 or 22 points at 200 level Maths with HOD approval.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH334-10S2 (C) Semester 2

Lect: Mon, Tu 1pm-2pm
Class: Tu 2pm-3pm

MATH 335 Computability Theory

14 Points 0.1167 EFTS

Not offered in 2010

Mathematical models of computation. Computability and non-computability. Abstract complexity theory.

P: COSC 222 or PHIL 246 or 22 points in MATH or EMTH at 200 level, as approved by the Head of Department.

MATH 336 Foundations of Mathematics

15 Points 0.1250 EFTS

An introduction to the philosophy of mathematics, classical and intuitionistic logic, set theory, and Gōdel's theorems.

P: 22 points from MATH 221-282 or EMTH 200-204 or EMTH 210-271; or approval of HOD.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH336-10S2 (C) Semester 2

Lect: Mon 10am-11am, Tu 11am-12pm
Class: Mon 12pm-1pm

MATH 342 Applications of Complex Variables

15 Points 0.1250 EFTS

Application of complex variable theory in the physical and engineering sciences. Contour integration. Conformal mappings.

P: MATH 264 or EMTH 204 or (MATH 261 and MATH 262) or EMTH 202 or MATH 243.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH342-10S2 (C) Semester 2

Lect: Mon, Wed 3pm-4pm
Class: Tu 4pm-5pm

MATH 343 Metric, Normed and Hilbert Spaces

15 Points 0.1250 EFTS

An introduction to those parts of modern analysis essential for many aspects of pure and applied mathematics, physics, economics and finance.

P: MATH 243, MATH 254, MATH 264, EMTH 202 or EMTH 204 or 22 points from 200-level MATH with Head of Department approval.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH343-10S1 (C) Semester 1

Lect: Wed 12pm-1pm, Thu 1pm-2pm

MATH 352 Applied Matrix Algebra A

15 Points 0.1250 EFTS

Introduction to computational optimisation and the associated linear algebra.

P: (MATH 251 and MATH 252), MATH 254, EMTH 203 or EMTH 204

R: EMTH 412

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH352-10S1 (C) Semester 1

Lect: Tu, Wed 10am-11am
Class: Tu 12pm-1pm

MATH 353 Applied Matrix Algebra B

15 Points 0.1250 EFTS

Introduction to the theory and application of eigensystems and the associated linear algebra.

P: Either MATH 252 or MATH 254 or EMTH 203 or EMTH 204.

R: EMTH 414

RP: (MATH 251 or MATH 352) and (MATH 271, MATH 280, MATH 281 or MATH 282)

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH353-10S2 (C) Semester 2

Lect: Thu, Fri 10am-11am

MATH 361 Partial Differential Equations

15 Points 0.1250 EFTS

An introduction to the methods of solution for partial differential equations and to their applications.

P: (MATH 261 and MATH 262), MATH 264, EMTH 202, EMTH 204 or EMTH 264

R: EMTH 391, EMTH 413

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH361-10S1 (C) Semester 1

Lect: Thu, Fri 10am-11am
Class: Fri 2pm-3pm

MATH 363 Dynamical Systems

15 Points 0.1250 EFTS

An introduction to nonlinear systems, the use of linearisation techniques and bifurcation theory.

P: MATH 264 or (MATH 261 and MATH 262) or EMTH 202 or EMTH 204

R: EMTH 415

RP: MATH 252 or MATH 254

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH363-10S2 (C) Semester 2

Lect: Tu, Wed 10am-11am
Class: Wed 4pm-5pm

MATH 371 Vector Calculus and Modelling

15 Points 0.1250 EFTS

Applications of calculus in solving applied problems in science and engineering. Techniques for modelling and solving physical continuous systems.

P: MATH 264, MATH 261, EMTH 202 or EMTH 204.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH371-10S1 (C) Semester 1

Lect: Mon, Wed 3pm-4pm

MATH 376 Applied Stochastic Modelling

15 Points 0.1250 EFTS

Not offered in 2010

Theory and applications of Markov processes. Applications to population dynamics, queuing and reliability.

P: (11 points from STAT 212, STAT 214, STAT 216 and a further 11 points from STAT 210-299) and (MATH 109 or MATH 199)

EQ: STAT 316

MATH 381 Advanced Scientific Computing

15 Points 0.1250 EFTS

The use of advanced MATLAB routines for numerical methods in a range of topics including: the solution of nonlinear algebraic equations; systems of ordinary differential equations; two-point boundary value problems; partial differential equations; nonlinear optimization; numerical integration; numerical approximation.

P: MATH 261, MATH 262, MATH 264, EMTH 202, EMTH 204, MATH 271 or MATH 282

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH381-10S2 (C) Semester 2

Lect: Tu, Thu 11am-12pm

MATH 393 Independent Course of Study

15 Points 0.1250 EFTS

P: HOD approval

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH393-10S1 (C) Semester 1

MATH 394 Independent Course of Study

15 Points 0.1250 EFTS

P: HOD approval

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

MATH394-10S2 (C) Semester 2

MATH 395 Mathematics Project

15 Points 0.1250 EFTS

Not offered in 2010

This 150 hour course provides students with an opportunity to develop mathematical research skills to extend and strengthen their understanding of an area of mathematics.

P: 44 points from MATH 210-299, and approval of Head of Department

R: MATH 305

Statistics

STAT 305 Statistics Project

14 Points 0.1167 EFTS

This 150 hour course provides students with an opportunity to develop mathematical or statistical research skills to extend and strengthen their understanding of an area of mathematics or statistics.

P: 33 points from STAT 210-299, and approval of HOD.

R: MATH 305

Domestic Fee: $514 (2009)
International Fee: $2,427 (2009)

STAT305-09SU2 (C) Summer (Nov 09)

STAT 312 Sampling Methods

15 Points 0.1250 EFTS

Sampling techniques and designs. Special sampling designs for surveys of animal populations.

P: 11 pts from STAT 212, STAT 214, STAT 222, STAT 224 and a further 11 pts from STAT 210 to STAT 299.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT312-10S1 (C) Semester 1

Lect: Tu 9am-10am, Wed 12pm-1pm

STAT 313 Computational Statistics

15 Points 0.1250 EFTS

Data analysis and statistical inference based on permutation methods, EDF methods, bootstrap and resampling methods, kernel methods and Markov chain methods.

P: (MATH 109 or MATH 199) and 11 points from (STAT 212, STAT 214, STAT 222, STAT 224) and a further 11 points from STAT 210-299.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT313-10S1 (C) Semester 1

Lect: Mon, Wed 2pm-3pm

STAT 314 Bayesian Inference

15 Points 0.1250 EFTS

Not offered in 2010

This course explores the Bayesian approach to statistics by considering the theory, methods for computing Bayesian solutions, and examples of applications.

P: (MATH 109 or MATH 199) and 11 points from (STAT 212, STAT 214) and a further 11 points from STAT 210-299.

RP: STAT 212 and STAT 214.

STAT 315 Multivariate Statistical Methods

15 Points 0.1250 EFTS

Detailed study of multivariate methods. Application of multivariate methods, test statistics and distributions.

P: 11 points from (STAT 214 or STAT 224) and a further 11 points from STAT 210-299, or subject to Head of Department approval.

RP: MATH 252 or MATH 254

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT315-10S2 (C) Semester 2

Lect: Wed 2pm-3pm, Thu 1pm-2pm

STAT 316 Applied Stochastic Modelling

15 Points 0.1250 EFTS

Not offered in 2010

Theory and applications of Markov processes. Applications to population dynamics, queuing and reliability.

P: (1) 11 points from STAT 212, STAT 214, STAT 216 and a further 11 points from STAT 210 to STAT 299; (2) MATH 109 OR MATH 199.

R: MATH 376

RP: STAT 212, STAT 216 and 11 points from MATH 252, MATH 254, MATH 261, MATH 262, MATH 264, EMTH 202, EMTH 203,EMTH 204

EQ: MATH 376

STAT 317 Time Series Methods

15 Points 0.1250 EFTS

Analysis of sequentially collected data including data modelling and forecasting techniques.

P: (1) 11 points from STAT 212, STAT 214, STAT 222, STAT 224 and a further 11 points from STAT 210 to STAT 299, ECON 211 and MSC1210; (2) MATH 109 or MATH 199

RP: 11 points from MATH 251, MATH 252, MATH 254 and 11 pts from MATH 271, MATH 282, STAT 216

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT317-10S2 (C) Semester 2

Lect: Tu 2pm-3pm, Fri 9am-10am

STAT 318 Data Mining

15 Points 0.1250 EFTS

Parametric and non-parametric statistical methodologies and algorithms for data mining.

P: (1) 11 points from STAT 210 to 299; (2) 11 points from the STAT 210 to 299, or COSC 200 to 299 or any other relevant subject with Head of Department approval.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT318-10S2 (C) Semester 2

Lect: Tu, Thu 9am-10am

STAT 319 Generalised Linear Models

15 Points 0.1250 EFTS

STAT319 is a course in Generalised Linear Models (GLM), suited to anyone with an interest in analysing data. In this course we introduce the components of GLM and other advanced data analysis techniques. We use the free-ware package R. R is becoming the preferred computer package for many statisticians. In this course we will show you how to use the package, enter, manipulate and analyse data in R.

P: 22 points from STAT 200-level courses prior to 2010.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT319-10S1 (C) Semester 1

STAT 393 Independent Course of Study

15 Points 0.1250 EFTS

P: Head of Department approval.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT393-10S1 (C) Semester 1

STAT 394 Independent Course of Study

15 Points 0.1250 EFTS

P: Head of Department approval.

Domestic Fee: $551 (2009)
International Fee: $2,813 (2010)

STAT394-10S2 (C) Semester 2

STAT 395 Statistics Project

15 Points 0.1250 EFTS

Not offered in 2010

This 150 hour course provides students with an opportunity to develop statistical research skills to extend and strengthen their understanding of an area of statistics.

P: 33 points from STAT 210-299, and approval of Head of Department

Engineering Mathematics

EMTH 391 Engineering Applied Mathematics and Statistics

12 Points 0.1000 EFTS

Elementary probability and statistics, distributions, estimation and confidence intervals, goodness of fit tests. Partial differential equations, their use in modelling engineering applications, methods of solution and properties of these solutions.

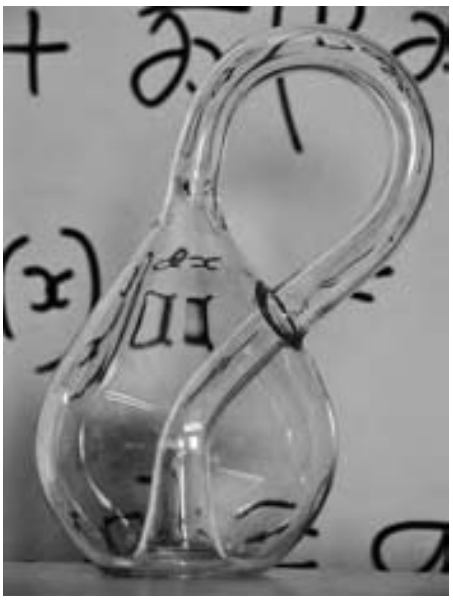
P: (1) EMTH 210 or EMTH 202 or EMTH 204 or (MATH 261 and MATH 262), or MATH 264; (2) Subject to approval of the Dean of Engineering and Forestry.

R: MATH 361, ENCI 302, ENCI 303, EMTH 205

Domestic Fee: $536 (2009)
International Fee: $2,830 (2010)

EMTH391-10S2 (C) Semester 2

Lect: Tu, Wed, Thu, Fri 10am-11am



The Klein bottle: an example of a non-orientable surface. Picture a bottle with a hole in the bottom. Now extend the neck. Curve the neck back on itself, insert it through the side of the bottle without touching the surface, and extend the neck down inside the bottle until it joins the hole in the bottom. A true Klein bottle in four dimensions does not intersect itself where it crosses the side. Unlike a drinking glass, this object has no "rim" where the surface stops abruptly. Unlike in a balloon, a fly can go from the outside to the inside without passing through the surface (so there isn't really an "outside" and "inside").

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