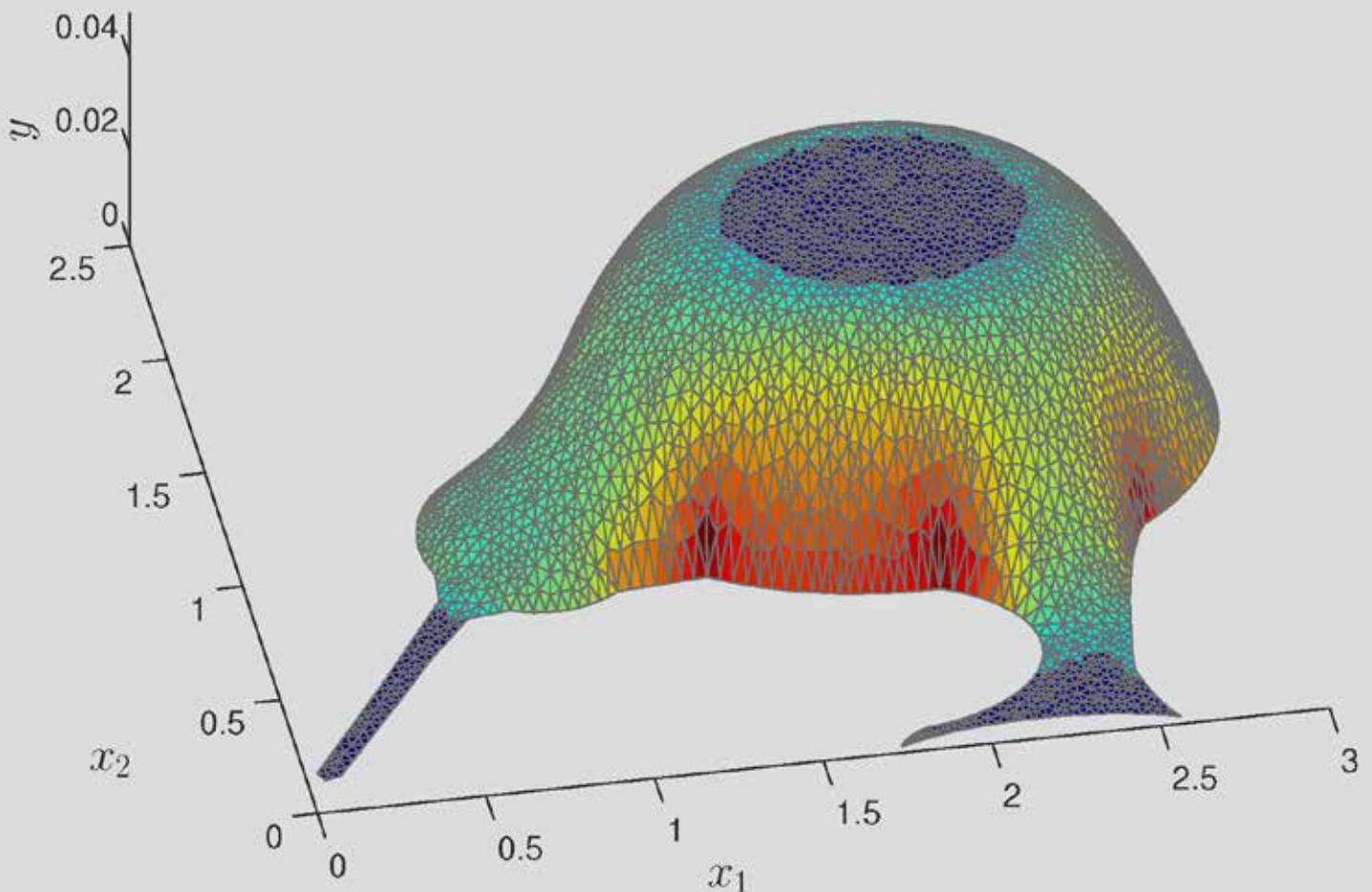


Proof.



Cover image:

The graph shows the velocity profile of a gel flowing through a kiwi shaped duct. In dark blue areas, the velocity is constant."

– Timm Treskatis, PhD candidate

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Information is correct as at the time of publication
but is subject to change. The University's official
regulations and policies are available online at
www.canterbury.ac.nz/regulations

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Welcome to the School of Mathematics and Statistics



Mathematics and statistics underpin almost everything we do, from biology to business management, engineering to theoretical physics, commerce to computer science, and all subjects in between.

There are hundreds of different jobs that require mathematics or statistics and demand for graduates is ever expanding. We live in a “data-driven world” and opportunities are widespread. Make the most of this by taking – and enjoying – our courses. Whether you intend to pursue Mathematics or Statistics as your major or use them to enhance your programme in another field, we will give you the competitive edge.

Our School equips students with powerful tools to describe and analyse the world, and to develop new methods and techniques to address problems as they arise. Demand

continues to accelerate for key skills that mathematicians and statisticians possess, including quantitative understanding, theoretical insight, appreciation of pattern and structure, measured interpretation, analytical expertise, global communication and education.

At Canterbury, we boast a committed group of internationally acclaimed researchers who are dedicated to high-quality innovative and engaging teaching. Our interests span a wide range of fields, and we have strong links to other departments, especially to Computer Science, Chemistry, Physics, Geography, Geology, Biology, Economics and Finance, Philosophy and Engineering. We host the Biomathematics Research Centre, are partnered with Statistics New Zealand, and have strong links with industry both nationally and internationally.

Many of our staff have won teaching awards, and actively research various aspects of mathematics and statistics education and pedagogy. This has a positive impact on the delivery, relevance and quality of our teaching.

Enquiries

Level 4, Erskine Building.

Phone: +64 3 364 2600

Fax: +64 3 364 2587

Email: enquiries@math.canterbury.ac.nz
or enrolment@math.canterbury.ac.nz

Web: www.math.canterbury.ac.nz

Postal address:

School of Mathematics & Statistics
University of Canterbury
Private Bag 4800, Christchurch 8140
New Zealand

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

Web: www.canterbury.ac.nz/enrol

This handbook will help you plan your course of study in Mathematics or Statistics. Our School has a vibrant community of teachers and researchers who are committed to creating a terrific place to study and learn. We would love to hear from you, and encourage you to contact us for information and advice.

Professor Jennifer Brown
Head of Department

Associate Professor Günter Steinke
Deputy Head of Department



About the School of Mathematics and Statistics



We offer a wide range of courses, and teach for all levels from first-year undergraduate to PhD. We also teach in the bridging programmes to support students new to university as well as run workshops through the study skills support team.

Our dedicated team also contributes to pan-University numeracy and quantitative literacy and support through the University of Canterbury Statistics Consultancy service.

We are located in the Erskine building on floors four to seven.

Visit our reception on Level 4 if you would like more information or to talk with a lecturer.

Our people

The school has over 50 members, including academics, senior tutors, research fellows, and IT and administrative support staff. We are made up of a rich and diverse mix of New Zealand and international scholars who come from around a dozen different countries.

The department has strong research interests in many fields within Mathematics and Statistics. Interests include:

- Mathematical biology, working on a variety of problems involving exciting cutting-edge Mathematics.
- Financial and industrial mathematics and statistics, using analytic techniques to understand economics, finance, and industrial processes.
- Computational mathematics and statistics, a strong group in the department is pursuing this rapidly advancing area.
- Pure Mathematics, leading international experts are researching in various fields.
- Logic and the history and philosophy of Mathematics.
- Mathematics and Statistics education.
- Applied Statistics.

Our researchers have strong links to all other colleges and faculties at the University, and research is being used in Health, Economics, Finance, Engineering and Environmental Management.

Our facilities

The School of Mathematics and Statistics has modern, well-equipped teaching and research facilities. The department's undergraduate computer labs utilise thin client technology. This allows them to provide a wide range of computing environments, which includes a conventional Windows desktop and a number of secure testing and exam environments. Access to the department undergraduate desktop can be from outside the university campus via a Microsoft Windows remote desktop environment. Honours and postgraduate students can access an additional range of software, a UNIX environment and a number of high-performance computational servers. The leading technical computer languages in Mathematics and Statistics, such as MATLAB, SAS, R, SPSS, Sage, Statistica and Python are available, along with Maple and Mathematica for symbolic algebra.

Undergraduate degree structure

A major in Mathematics or Statistics is often taken as part of 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 or Statistics courses while majoring in another subject. Students studying Accounting, Biology, Chemistry, Computer Science, Ecology, Economics, Engineering, Finance, Geology, Geography, Management Science, Physics, and Psychology often take Mathematics and/or Statistics up to 300-level.

First-year students will normally enrol in 120 points made up of eight 100-level, 15-point courses (four each semester).

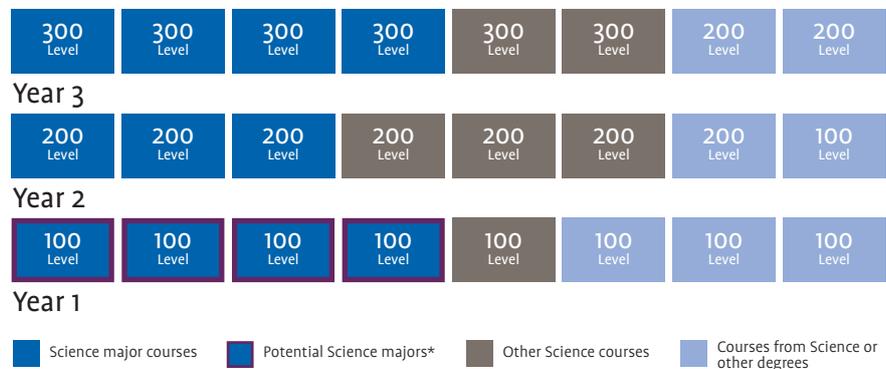
When choosing your first-year courses, you should include courses that allow you to advance to 200-level in at least two, and preferably three, subjects. For full details of the requirements to major in a specific subject, see the UC Regulations: www.canterbury.ac.nz/regulations

To the right are the requirements for a Bachelor of Science (BSc). Requirements for other bachelors degrees differ slightly; see the UC Regulations for details.

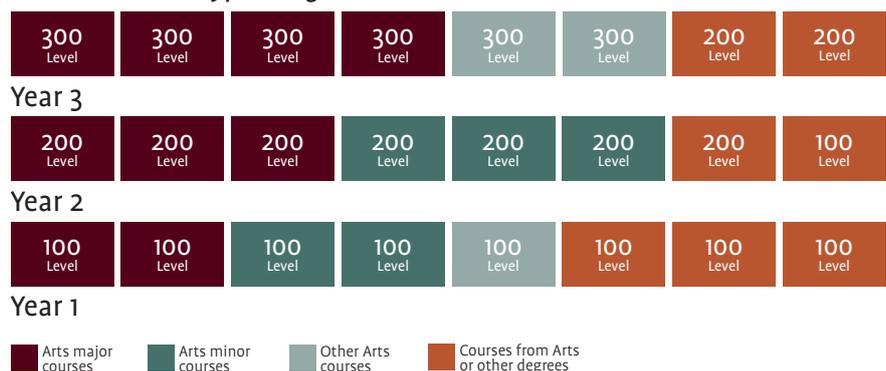
BSc and BA requirements

Refer to the latest calendar, online regulations or meet with a student advisor to plan your degree. www.canterbury.ac.nz/regulations

Bachelor of Science – typical degree structure



Bachelor of Arts – typical degree structure



‘With the exponentially increasing amount of data being produced these days, there are countless opportunities for stats grads.’

Andrew Richens

Bachelor of Science in Mathematics and Statistics

Bachelor of Science with Honours in Mathematics

Master of Science in Statistics

Statistical Analyst, Statistics New Zealand

First year

Mathematics

Mathematics has a range of entry-level courses pitched at different levels so we can cater for a wide variety of backgrounds and interests. We can help you determine which courses are right for you.

Please contact the department for advice or the UC liaison office.

100-level courses include:

- MATH 101 Methods of Mathematics
- MATH 102 Mathematics 1A
- MATH 103 Mathematics 1B
- MATH 120 Discrete Mathematics
- MATH 130 Introduction to Logic and Computability
- MATH 170 Mathematical Modelling and Computation

The core of the 100-level (i.e. first-year) programme consists of linear algebra and calculus, found in the two courses MATH 102 and MATH 103. MATH 103 follows on from MATH 102 and has MATH 102 as a prerequisite. If you want to do a significant amount of Mathematics in your degree, you should take both these courses. MATH 102 is required if you intend to major in several other subjects. We recommend that if you have not studied maths for some time, or do not have a strong mathematics background, you should take the preparatory paper MATH 101.

MATH 101 proceeds at a gentle pace, and includes the introduction and revision of key mathematical concepts. It is designed to improve the technical skills and understanding of students, and raise their confidence in mathematics. This can then be followed by MATH 102 (and maybe MATH 103) where appropriate.

MATH 102 is a course which deals with the basic ideas in calculus and linear algebra and their applications in many fields. Topics include linear equations and matrices, vector geometry, functions, limits, continuity, differentiation, integration and functions of two or more variables.

MATH 103 is a course which consolidates the concepts from MATH 102, and introduces more advanced ideas in calculus and linear algebra. It also incorporates the study of Statistics. It is a prerequisite for many courses in Mathematics and Statistics and other subjects at 200-level.

MATH 120 is a course for students who are interested in the abstract structure of mathematics and its relations to modern-day applications, such as cryptography. It is

particularly recommended for students majoring in Mathematics or Computer Science.

MATH 130 explores formal and informal reasoning, aspects of symbolic logic and patterns of inference and their connection with the invention of the modern computer. Given the subject covered, it is valuable in any undergraduate degree.

MATH 170 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.

Direct entry

Students who have performed exceptionally well at NCEA Level 3 in mathematics with calculus and/or statistics and modelling may be eligible for direct entry into a second-year mathematics course. Please contact the department for further information.

Statistics

Our first year paper is a gateway to all further study in Statistics and has been uniquely designed to cater for all students, whatever their background. Many students need Statistics to support and enhance their studies in other subject areas, such as the Life Sciences, the 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 Statistics 1 – 15 points

STAT 101 is our first-year course in Statistics. This course is specifically designed so that every student, no matter what background they have, can develop statistical literacy. This course is unique in its use of a mix of lectures and online learning so that you can create your very own pathway of study. It will give you a sound knowledge of the subject and a good grounding in how Statistics is applied to tackle genuine

Do you have 24 credits in NCEA Level 3 mathematics with calculus, with Excellence in most standards?	YES →	Contact the Department of Mathematics and Statistics to discuss direct entry into MATH 103 or EMTH 119.
NO ↓		
Do you have at least 18 credits in NCEA Level 3 mathematics with calculus, including differentiation and integration?	YES →	Suggested course: MATH 102 or EMTH 118.
NO ↓		
Do you have some credits in NCEA Level 3 mathematics with calculus or Level 3 statistics and modelling?	YES →	Suggested course: MATH 101.
NO ↓		
Do you have at least 16 credits in NCEA Level 2 Mathematics, including calculus?	YES →	Suggested course: MATH 101.
NO ↓		
If you do not meet the equivalent of any of the above conditions, consider an appropriate Bridging Programme or achieving the recommended NCEA credits outlined above.		

problems. For further information, please don't hesitate to contact Irene David (i.david@math.canterbury.ac.nz). There are no prerequisites for this course.

Please note not all courses may be offered in 2014. For up to date information see www.canterbury.ac.nz/courses

Pathways

Preparation courses

If you intend to enrol in MATH 101, MATH 102 or STAT 101, and feel that your background is inadequate, then the preparation courses that we run in January/February may be for you.

For more information on these courses, see www.scienceheadstart.canterbury.ac.nz or email learningpreparationsupport@canterbury.ac.nz

To help you choose the course that is right for you, please talk to your school careers advisors, a UC liaison officer or contact our department.

We also have a pre-entry self-assessment quiz which is useful if you are intending to enrol in MATH 102 (or EMTH 118). See www.math.canterbury.ac.nz/php/prospective/pre-entry for details.

100-level options

Students who want to take MATH 102 (or EMTH 118) and then MATH 103 (or EMTH 119, respectively) have various options:

- Take MATH 102 (or EMTH 118) in Semester 1 followed by MATH 103 (or EMTH 119, respectively) in Semester 2. This is recommended for those with a strong background in maths, or
- Take MATH 101 in Semester 1 followed by MATH 102 (or EMTH 118) in Semester 2 and then EMTH119 over the Summer or MATH 103 in Semester 1 the following year. This is recommended for those who need to consolidate their mathematical skills.

(Note – EMTH118 and EMTH119 are engineering mathematics courses designed for BE (Hons) students.)

MATH 102 (Semester 1, Semester 2) and EMTH 118 (Semester 1, Semester 2)

We require students enrolling in EMTH 118 and strongly advise students enrolling in MATH 102 to have at least 18 credits in NCEA Level 3 mathematics with calculus, including differentiation and integration. 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 statistics with modelling
- Scholarship at NCEA Level 3 either mathematics with calculus or statistics and modelling
- 50%+ Bursary mathematics with calculus
- 60%+ Bursary mathematics with statistics
- A good pass in MATH 101
- Certificate in Foundation Studies (CertFounStudies) with an A or B in

BRDG 016 (Mathematics Part One) and BRDG 017 (Mathematics Part Two); see Bridging Programmes for further information

- Cambridge International Examinations: a pass in A-level mathematics, or a good pass in AS-level mathematics (preferably including both units P1 and P2)

There are no prerequisites for MATH 101, MATH 120, MATH 130 or STAT 101. MATH 170 is designed to be taken concurrently with MATH 103.

Bachelor of Science in Financial Engineering

Financial engineering is a cross-disciplinary field combining financial theory, mathematics and computational tools to design and develop new financial or actuarial products, portfolios and markets. It also has an important role to play in the financial industry's regulatory framework. Financial engineers manage financial risk, identify market opportunities, design and value financial or actuarial (insurance) products, and optimise investment strategies. To carry out these tasks, financial engineers develop mathematical and statistical models, and the computational tools to implement them.

UC is the first university in New Zealand to offer degrees in Financial Engineering. Two programmes are available from 2015: a three year undergraduate BSc in Financial Engineering and a subsequent one year BSc honours degree. The undergraduate degree covers the core technical skills in financial and economic theory, mathematics and statistics, and computer science. 16 courses are prescribed to provide the depth and breadth of knowledge required of all Financial Engineers. The remaining 8 electives provide pathways to specialise in finance, mathematics and statistics, or computer science.

This programme is designed to provide students with employment opportunities at graduation, or advancement to the one year Honours degree at Canterbury, or to a Master of Financial Engineering. Graduates with such cross-disciplinary knowledge and highly technical skills will have openings to a breadth of career opportunities such as investment, actuaries and statisticians/data scientists.

Program Structure

Core courses at 100-level and beyond

The required courses at 100 level provides the core skills and knowledge across finance and economics, mathematics and statistics and computer science: ECON 104, MATH 102, MATH 103, STAT 101, COSC 121 and COSC 122. The remaining cored courses are given in the BSc regulations, www.canterbury.ac.nz/regulations/bsc_regs.shtml

Elective Pathways

We recommend all the elective courses are taken from the Schedule of courses for Financial Engineering. Four suggested pathways of electives which allow key specialisations are:

- Finance – FINC 101, ECON 105, ACCT 102, FINC 205, FINC 203, ECON 207, STAT 211, FINC 305, FINC 311, FINC 312 and FINC 345;
- Economics – FINC 101, ECON 105, ACCT 102, FINC 203, ECON 207, ECON 208, STAT 211, FINC 305, FINC 311, ECON 321 and ECON 324.
- Statistics – ECON 105, INFO 125, MATH 120, FINC 205, ECON 207, STAT 202, STAT 221, FINC 311, ECON 324, STAT 315 and STAT 318.
- Mathematics – ECON 105, ACCT 102, MATH 170, ECON 207, MATH 202, MATH 203, STAT 221, FINC 312, MATH 302, MATH 353 and STAT 314.
- Computational – INFO 125, MATH 120, MATH 170, FINC 203, COSC 262, MATH 270, STAT 221, FINC 311, SENG 301, COSC 367 and STAT 318.

Advice about the Financial Engineering degree is available from the degree coordinator Dr Carl Scarrott, carl.scarrott@canterbury.ac.nz.

*Subject to Universities New Zealand CUAP approval due December 2014

Beyond first year

We offer a wide variety of courses in Mathematics and Statistics at 200 and 300-levels. The Mathematics courses range from abstract Pure Mathematics through to computer-oriented applied courses. Up to five second-year Statistics courses are offered on topics including inference, probability, regression, applied statistics and computational methods.

If you are unsure which courses best suit your needs, contact one of the course advisers or the lecturer in charge of the course you are thinking of taking. If you are contemplating an Honours degree, include the core courses MATH 102 and MATH 103 in your first year of study. For an Honours degree in Statistics, MATH 103 or MATH 199 are also required. At 200-level, many students leave their options open regarding their preferred subject and take courses in both Mathematics and Statistics. You must ensure that you take the required prerequisites in first year for second year courses.

Second year

To complete a major in Mathematics, you should be doing at least 60 points at the 200-level, including the core courses MATH 201, MATH 202 and MATH 203. For Statistics, choose at least three courses. Choose from our other second-year courses according to what you are most interested in. Consider:

- Pure Mathematics: MATH 220, MATH 230 and MATH 240
- Applied Mathematics: MATH 220 and MATH 270
- Theoretical Statistics: STAT 211, STAT 213 and STAT 221
- Applied Statistics: STAT 201 and STAT 202

At this level, you may wish to leave your options open regarding your preferred subject and take courses in two subjects. Mathematics and Statistics are a natural pair. Other valuable combinations are with Physics, Computer Science, Economics, Chemistry, Biology and Finance, and other combinations are possible. Mathematics and Statistics will enhance any programme you are taking.



‘Mathematics is really essential since it gives a way of systematically exploring the huge space of possible evolutionary scenarios.’

Professor Mike Steel

Senior Tutor

Winner of the 2014 University Research Medal

Director for Biomathematics Research Centre

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.

For Mathematics majors

It is recommended that you take the core courses MATH 302, MATH 303, MATH 353 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.

We encourage you to come along to the department and get some advice on your choice of programme.

For Statistics majors

Students with an applied interest normally select courses from STAT 312, STAT 315, STAT 317, STAT 318 and STAT 391. Students with a theoretical and computational interest should take STAT 313, STAT 314 and STAT 316. Papers from Mathematics and/or other departments can be substituted, and will increase your options in your fourth year. We encourage you to come along to the department and get some advice on your choice of programme.



Honours degrees

An honours degree usually requires an additional one-year coherent programme of study, consisting of an individualised Honours project and eight 400-level courses.

An honours degree provides an opportunity to confer a competitive edge to your degree, study those areas which you find interesting in further depth and enjoy the independence and rewards of engaging in supervised research. The intellectual training and experience given by this additional year will not only equip graduates for postgraduate research but also make them attractive to employers who value the specialisation, the ability to interact and communicate at an advanced level, and the discipline and skills gained from developing and successfully completing an independent project.

For details of the 400-level courses on offer, see www.canterbury.ac.nz/courses or the department's honours handbook, which is available from reception or the department website. The final decision on which courses are offered will depend on student demand and staff availability, but will span a wide range of cutting-edge research in Mathematics and Statistics. Project supervision is by mutual agreement between the supervisor and student.

There are a number of joint honours programmes where you can combine Mathematics and Statistics, or one of these with another subject for your course of study. To keep your options open for entering these programmes, you must ensure you study a broad base of courses at lower levels so that you have the appropriate prerequisites.

For contact information please see www.math.canterbury.ac.nz/php/undergraduate/help/

General honours programmes

BSc(Hons) and BA(Hons) in Mathematics and BSc(Hons) and BA(Hons) in Statistics are broad programmes which provide graduates with expansive, flexible analytical and quantitative skills that can be applied in a wide variety of contexts.

Specialised honours programmes

BSc(Hons) in Mathematics and Statistics

You can do a joint honours degree in Mathematics and Statistics which combines a select range of complementary and mutually enhancing subjects in these two disciplines, resulting in computational and methodological expertise.

BSc(Hons) in Mathematical Physics

In conjunction with the Physics and Astronomy Department, we offer a joint programme aimed at students who are interested in both subjects and who do not wish to concentrate entirely on one at the expense of the other. You enter this programme at the 300-level where you normally take 60 points of 300-level MATH and 60 points of 300-level PHYS courses.

BSc(Hons) in Mathematics and Philosophy

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 strong background in Philosophy and a keen awareness of the connections between the two fields.

BSc(Hons) in Computational and Applied Mathematics

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

BSc(Hons) in Finance and Mathematics

The management of financial risk is a huge part of the modern economy. Banks manage investment funds, exporters manage exchange rates and insurance companies need to make sure they have the resources to pay out after natural disasters! Students with knowledge of finance and the analytical and quantitative skills of a mathematician are highly sought after in the job market.

BSc(Hons) in Finance and Statistics

In conjunction with the Department of Economics and Finance, we offer a BSc(Hons) programme. This is aimed at students who are interested in the interaction between the two disciplines of Finance and Statistics, providing students with the competitive edge in this area.

BSc(Hons) in Economics and Mathematics

The BSc (Hons) programme in Economics and Mathematics is designed for students who combine a love of Pure Mathematics with an interest in how it is used to provide rigorous underpinnings for economic theory. Such students typically go on to either a PhD programme or else employment as a mathematical economist in government or finance.

BSc(Hons) in Financial Engineering

Financial engineering is a cross-disciplinary field combining financial theory, mathematics, statistics and computational tools to design and develop new financial or actuarial products, portfolios and markets. It also has an important role to play in the financial industry's regulatory framework. Financial engineers manage financial risk, identify market opportunities, design and value financial or actuarial (insurance) products, and optimize investment strategies.

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 (www.math.canterbury.ac.nz/php/graduates/), or may be discussed with the Postgraduate Coordinator.

There are options for financial assistance in the form of scholarships, individual research grant related fellowships, and part-time tutoring positions.

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) degree.

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

After obtaining your bachelor's degree in Mathematics or Statistics, you may enrol for a Masters 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. The first year of the two-year Masters 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 satisfactory Honours or Master's degree, you may enrol for the degree of Doctor of Philosophy. You will work under the supervision of academic staff members with whom you have a shared research interest. This normally involves at least three years' full-time study. You must then prepare a thesis presenting the results of this research for examination.



'I'm both a mathematician and a scientist. Maths gives me insight into problems I otherwise wouldn't understand, from predicting stoat outbreaks in New Zealand forests, to helping international cycling teams perform better. If I can help my students realise the power behind the subject they are studying then I've achieved something.'

Dr Alex James

Associate Professor

Deputy Director of the new Centre for Complex Systems and Networks

Scholarships and prizes

The Department and the University of Canterbury offer a range of scholarships and prizes to students studying Mathematics or Statistics each year.

Undergraduate scholarships and prizes available in 2014 – may vary in other years

UC undergraduate entrance scholarships

Up to \$3,000 cash. For students who are completing NCEA Level 3 or equivalent University Entrance qualifications, no application is required.

UC emerging leaders' scholarships

Up to \$5000 towards tuition fees.

UC Dux scholarships

Available to nominated secondary school Duxes who undertake their first year of undergraduate study at the University of Canterbury, who have completed or are completing a university entrance qualification, and who attended school in the year of nomination. The nomination must be done by the Principal or Deputy Principal of the student's high school. The awards provide \$5,000 towards tuition fees.

UC Alumni Association scholarships

For students demonstrating an awareness of the value of an alumni community. Two scholarships valued at \$5,000.

John McMillan scholarship in Economics and Mathematics

Up to two scholarships for 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.

Riccarton Rotary Youth Trust scholarship

For a Canterbury school leaver facing major financial challenges to entering tertiary education. Up to \$30,000 in total over four years.

Bright Start scholarships

To cover first-year fees for residents of the South Island, north of the Waitaki River, who face financial and/or personal challenges. Applicants may be school leavers or mature students. Offered if funds permit.

UC international student scholarships

For top-achieving students who can demonstrate leadership and contribution to the school and/or community (up to 25 awards at up to \$20,000 per annum towards tuition fees).

UC Mathematics and Statistics high achievers awards

These scholarships recognise and support high-achieving students entering their first year of a BSc or BA degree programme and majoring in Mathematics or Statistics. Up to 5 awards of \$1,000 available.

Department undergraduate scholarships

The Department awards scholarships to outstanding students in the undergraduate programme at each stage (200, 300 or 400-level). You do not need to apply for the Department undergraduate scholarships; they are offered on the basis of performance in MATH and STAT courses in the preceding year.

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: up to two prizes at 300-level
- Peter Bryant Memorial Prizes: up to 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
- Helen Wily Prize: for Mathematical Sciences at 300-level and 400-level (female students)



'The sense of community that you get here is amazing. It's such a massive place but you always feel at home. The campus itself is beautiful, there's always somewhere new to discover.'

Alison Faulls

Studying towards a Bachelor of Science in Chemistry and Mathematics

UC Emerging Leaders' scholarship

Other awards

- Statistics New Zealand Maori and Pacific Island Scholarships: to assist a Maori and a Pacific Island student to attend university and obtain a Statistics or Mathematics undergraduate qualification (\$3,500 per year for up to three years).
- J. Connal Scholarships: for BA students at 200-level who excel in Latin, English, French, History or Mathematics. (\$400 per year for two 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 two 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 two 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\$1,000.
- Fulbright Study Awards: for New Zealand graduate students to study in the USA or vice versa (www.fulbright.org.nz).

For more details about applying for these awards and for a full list of scholarships available please see www.canterbury.ac.nz/scholarships



‘I enjoy the complexity of my subjects and the logic and reasoning behind them, and applying my knowledge of them to real-life situations.’

Mahali Matehe

Ngāi Tahu

Ngāti Porou

Studying towards a Bachelor of Science in Mathematics and Physics

Career opportunities

University graduates with strong analytical ability and quantitative skills are in high demand throughout the world.

Mathematicians and statisticians find themselves in a broad range of occupations, including financial institutions such as banks and insurance companies, actuarial science, IT and web-based companies, market research organisations, manufacturing companies, the pharmaceutical industry, public health institutes and medical statistics research, quality control, operations and market research, Crown Research Institutes, government departments (including Statistics New Zealand, Treasury, Ministry of Primary Industries), non-profit organisations, local bodies, teaching and educational institutes, and universities.

An undergraduate degree or postgraduate qualification in Mathematics or Statistics is a solid foundation for many careers around the world as well as in New Zealand. Increasingly, employers in both private and government sectors around the world seek top graduates from a general field, sometimes not specifying any particular discipline at all. They want bright people whom they will train. Your studies in Mathematics or Statistics develop your critical thinking and logical problem-solving skills, exactly the kind of skills that employers look for.

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 courses that will expand your knowledge of applications of Mathematics and Statistics. The most directly applicable courses would be in Accounting, Biology, Computer Science, Economics, Engineering, Finance, Management Science and Physics. In particular, there are very good job opportunities in financial Mathematics and Statistics and in computing.

We now live in a technological age where information is plentiful but the people with the skills to analyse this data meaningfully are in short supply – the need for people who have a working knowledge of Statistics has burgeoned in recent years.

Over the last few 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 spreadsheet software such as Excel and databases is 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.

Two useful websites for ideas of the kinds of careers that Mathematics or Statistics can lead to are the: American Mathematical Society's Early Career Profiles website (www.ams.org/early-careers/) American Statistical Association's JobWeb (www.amstat.org/jobweb/index.cfm).

To find more specific information on occupations, explore the careers website. For general career enquiries, contact Careers, Internships and Employment (www.canterbury.ac.nz/careers/).

Statistics New Zealand	
Analyst - Regional and Housing	
Analysts - National and Enterprise Accounts	
Analysts - Payments, Trade	
Economic Statistician	
Mathematical Statisticians	
Analyst - Maori Statistics Unit	
Economic Statistician/Analyst	
Government Departments	Position
ACC	Analysts
Defence Technology Agency (DTA)	Scientist/Analyst
Government Communications Security Bureau	Communication Systems Analyst
Government Communications Security Bureau	Mathematician
NZ Transport Agency	Economic Analyst
Ministry of Education	Research Analysts
Ministry of Fisheries	Regional Intelligence Analyst
Ministry of Health	Intelligence Analyst
Ministry of Social Development	Analyst (several) - Forecasting and Modelling Unit
New Zealand Treasury	Analyst/Senior Analyst - Macro Forecasting and Analysis
Greater Wellington Regional Council	Senior Data Analyst
Industry and Commerce	Position
Meteorological Service of NZ	Trainee Meteorologists
Orion	Network Investment Analyst
Pacific Edge Biotechnology Ltd	Bioinformatician / Computational Biologist
Rodgers & Partners Consultants Ltd	Business Analyst
Tower Managed Funds Ltd	Actuarial Analyst
Weyerhaeuser NZ	Logistics Co-coordinator
Zespri International Ltd	Innovation Analyst
OCG Consulting Ltd	Actuary
Affinity ID	Business Intelligence Analyst
Indufor Asia Pacific Ltd	GIS/Remote Sensing Consultant
Fonterra	Optimisation Analysts
Synovate Ltd	Data Analyst/Scriptwriter

Research

Broad groupings of the school's research interests are highlighted below. Details of the school's publications are available in the UC Research Report. We welcome inquiries from prospective graduate students.

Algebra, Combinatorics and Logic

Areas of current research by the department include: algebraic groups; representation theory; clifford algebras; automorphism groups; finite geometry; matroid theory, combinatorial and algorithmic phylogenetics; constructive analysis and topology; foundations of mathematics; non-classical logics; number theory.

Analysis and Geometry

The School's research strengths in these areas include: approximation theory; topological geometry; constructive and non-classical analysis and topology; functional analysis (including applications to quantum theory); harmonic analysis; partial differential equations and potential theory; general topology; algebraic geometry.

Applied Statistics

Applied Statistics broadly covers research where statistics is being used to help solve real-world problems. Examples include: environmental monitoring, risk assessment and uncertainty analysis, medical and engineering applications, and statistical genetics.

Computational Mathematics

Broadly, this research area involves tool building in the form of the development and analysis of algorithms and methods for numerical computation. Areas of current research in the school include: numerical optimisation, approximation theory, algorithms for surface approximation, inverse problems, numerical linear algebra, interval analysis and rigorous set processing.

Dynamical Systems and Differential Equations

Members of the school have interests in theoretical, computational and applied aspects of nonlinear differential equations and discrete time dynamical systems. Areas of particular activity include: chaotic dynamics, ergodic theory, inverse problems, nonlinear models in ecology and medicine, and symmetry methods.

Financial and Industrial Mathematics and Statistics

Broadly, this involves the use of mathematics to understand economics and finance, and processes arising in industrial settings. Specific interests include: econometrics; mathematical economics; fast surface fitting algorithms for applications in geophysics, image processing, computer graphics and custom manufacture; statistical design and analysis of communication systems; signal and image processing; acoustics and industrial applications of spatial statistics, extreme value methods and spectral analysis.

History and Philosophy of Mathematics, and Mathematics and Education

Areas of current research by the school include: mathematics in the ancient Near East, ancient Greece, India, and Islam, with an emphasis on editing mathematical texts from these cultures from the original primary sources; mathematics during the Italian renaissance; the history of ancient mathematical astronomy; constructive and non-classical mathematics; the foundations of mathematics; mathematics, education in the tertiary sector; and mathematics and communication.

Mathematical Biology

The school hosts the Biomathematics Research Centre. This focuses on three broad areas: computational molecular biology and phylogenetics, ecological and physiological modelling, and statistical applications in ecology and medicine.

Theoretical and Computational Statistics

The Statistics group within the school has an active research programme in many aspects of theoretical and computational statistics. Particular topics include: stochastic processes, computational methods, Bayesian inference, statistical genetics, sampling theory, random matrices, extreme value theory and graphical models.

For more details about our research areas please see

www.canterbury.ac.nz/php/research



'definitely loving the team environment!'

Catherine Cumpstone

Bachelor of Science in Biological Sciences and Statistics

Statistical Analyst, Statistics New Zealand, Christchurch

Teaching and student support

Our philosophy

Mathematics and Statistics are not spectator sports! We know that the key to student success is engagement and enjoyment, and our staff are very enthusiastic about getting you involved. We use a variety of leading teaching techniques and supporting technologies, model our passion for the discipline, and have a keen interest in each and every one of our students. We are committed to developing your confidence as learners and inquirers.

Our support

We have a strong team of dedicated senior tutors supported by 85 tutors who have a broad range of backgrounds, ethnicities and expertise. Most importantly, we are all passionate about Mathematics and Statistics.

The nurturing learning environment includes a support HUB in our building with work spaces for students and help on hand when you need it.

Our courses

Most courses in Mathematics and Statistics are delivered via lectures; others have specifically tailored learning environments. In addition, courses typically have a tutorial component in which you will meet regularly in small groups with one of our experienced tutors to consolidate and work on the material covered in your lectures, and to offer personal assistance. As well as this, courses may have regular computer labs and dedicated examples classes. We also provide plenty of support via help sessions, online support and forums, office hours and informal drop-in periods.

Our awards

Our commitment to excellence in teaching is recognised by both students and the broader university community. Six of our staff have won prestigious University Teaching awards, as well as the UCSA "Best Lecturer of the Year" winner in the College of Engineering (2011) and "Top Three in the College" (2008). Over the years, several other staff have been singled out for their contributions. A number of our staff actively research in Mathematics and Statistics education and pedagogy and, due to their expertise and commitment to teaching, are invited to be keynote speakers at international conferences.

Our place in the university

Our department offers far more than just teaching and research. At almost any place in the University, you will come across us. We offer support for any students with questions about numeracy through the UC Learning Skills Centre (www.lps.canterbury.ac.nz/lsc/). You don't need to be taking one of our courses to get help here and the workshops we host are a great place to meet other students.

A great place to start your study at UC is with a Science Headstart course over summer (www.canterbury.ac.nz/bridging/). See www.math.canterbury.ac.nz and click on Courses to view the Mathematics and Statistics courses offered.

If you are a postgraduate student then you will be pleased to know that our department hosts a statistical consulting unit. If you have any Mathematics or Statistics questions about your research, come over and see us.

Our commitment

We pride ourselves on the interaction and support we give to students. You are always welcome to approach staff with any problems you have. There are many options to seek advice, give feedback and get support. These include our lecturers, senior tutors, administrative support staff and nominated class representatives. We have dedicated members of staff who can help students with particular issues.

The advisors listed on the department webpage at www.math.canterbury.ac.nz/php/undergraduate/help will help with any problems you might have deciding which course best suits your needs.

Our assistance

Personal wellbeing

There are many university services available to help with your physical and mental wellbeing. These include the Student Health and Counselling Service, Liaison Office, UC Careers, Internships & Employment, International Student Support and Chaplaincy Service. See www.canterbury.ac.nz/currentstudents.shtml

Unexpected circumstances

Sometimes personal circumstances can cause you to miss a test or exam, or impair your performance in them. Please let us know about this as soon as possible, as we will do all we can to support you. The University regulations should be consulted for the rules concerning aegrotats: www.canterbury.ac.nz/regulations

Private tutoring

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



'Maths is done by people. I make sure my students never forget this. We need to talk with each other, 'think ahead', look at problems from various directions, ask questions and work together.'

Dr Rua Murray

Senior Lecturer

Winner of the 2013 Ako Aotearoa National Tertiary Teaching Excellence Award

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