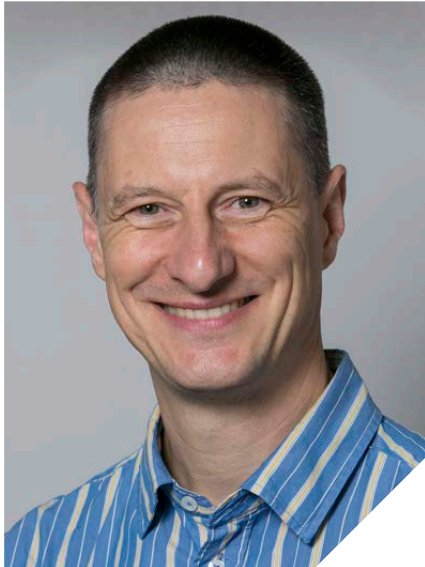# Applied Mathematics

Undergraduate Handbook 2018

THE UNIVERSITY OF
AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

SCIENCE
DEPARTMENT OF MATHEMATICS

Welcome to the Department of Mathematics

Mathematics and Applied Mathematics are powerful and versatile degrees – almost every sphere of knowledge and activity in the modern world relies on mathematics, because it is the language through which nature, technology and reality are described.

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

You can study Applied Mathematics in combination with a wide range of other subjects, especially in the Faculties of Arts, Science, Engineering and the Business School for the degrees of BA, BCom, BE or BSc.

Graduates of this University will need to apply their skills to solve complex problems in an ever-changing world. Applied Mathematics plays a fundamental role in providing the skills and framework needed to tackle such challenges.

Applied Mathematics is also an ideal supporting subject for many other disciplines. Your future prospects and employability in other fields are enhanced by significant mathematical content in your degree. Graduates from the department take up positions in business, industry, planning and environmental organisations, and a wide range of other areas.

BERND KRAUSKOPF
Head of Department

Our subject is ranked in the top 100 worldwide

QS World University Rankings by subject 2017

TOP
100
in the world

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Mathematics

Bachelor of Science in Applied Mathematics

Applied Mathematics provides you with the skills to develop theories and methods that investigate and explain phenomena in the world around us, including in science, engineering, business and industry.

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

Preparation for school leavers

Students will be selected on the basis of their rank score. There are no required subjects for entry into Applied Mathematics, however, we strongly advise that students take calculus (at NCEA level 3, or equivalent) in school.

It is important that you choose the Mathematics courses that are right for you. To help you choose your first Mathematics course, visit
www.math.auckland.ac.nz/stage1-faq

Complementary majors

The numerical and analytical skills you develop by studying Applied Mathematics can be applied across all scientific fields of study, making Applied Mathematics the perfect match for all other majors in science.

APPLIED MATHEMATICS +

Computer Science

Information Systems

Logic and Computation

Mathematics

Physics

Statistics

www.science.auckland.ac.nz/doublemajors

For course planning and enrolment, go to
www.science.auckland.ac.nz/student-centre

Thinking about postgraduate study options?
www.math.auckland.ac.nz/pg

BSc degree planner – Applied Mathematics

BSc

Year 1

| MATHS 150 | MATHS 162 | MATHS 250* | | | | | |

With appropriate prerequisites can also be filled by Stage II or III.

Note: MATHS 108, 110 and 208 can count toward the BSc; however, these courses are designed for other majors and are not intended for Mathematics majors.

*It is recommended that students take MATHS250 in their first year of study if possible.

Year 2

| MATHS 253 | MATHS 260 | MATHS 270 | | | | | GEN ED |

Stage II — Any Stage

Year 3

| MATHS 340 | MATHS 361 | MATHS** 362 or 363 | STAGE III ELECTIVE | | | | GEN ED |

Stage III Elective: 15 points from MATHS 332, 333, 362, 363 STATS 310, 325, 370, ENGSCI 343, 391

Stage III Science — Stage II or III Science — Any Stage

Note: Stage III courses can be taken at any stage if prerequisites are met.

**Requirement is subject to CUAP approval

1. Courses in a minimum of three subjects listed in the BSc Schedule

2. At least 180 points (12 courses) must be above Stage I

3. Up to 30 points (two courses) may be taken from outside the faculty

4. 30 points (two courses) must be taken from the appropriate General Education Schedules for BSc students

5. At least 75 points must be at Stage III, of which 60 points must be in the majoring subject

To view regulations for majors, and course descriptions, see www.calendar.auckland.ac.nz

BSc degree requires: 360 points (24 x 15-point courses). Each box represents one 15-point course.

We recommend that students enrol in eight courses each year.

Degree Planners for double majors can be found at www.science.auckland.ac.nz/course-planning

It is the student's responsibility to check that the final programme complies with University Regulations. The Faculty of Science is the final authority on all BSc regulations.

Undergraduate Mathematics Courses

Course Code	Title
Stage I	
MATHS 102	Functioning in Mathematics
MATHS 108	General Mathematics 1
MATHS 110	Mathematics for Science
MATHS 150	Advancing Mathematics 1
MATHS 162	Computational Mathematics
MATHS 190/MATHS 190G	Great Ideas Shaping Our World
SCIGEN 101/101G	Communicating for a Knowledge Society
MATHS 153	Accelerated Mathematics (Young Scholars Programme)
Stage II	
MATHS 202	Learning Mathematics through Teaching
MATHS 208	General Mathematics 2
MATHS 250	Advancing Mathematics 2
MATHS 253	Advancing Mathematics 3
MATHS 255	Principles of Mathematics
MATHS 260	Differential Equations
MATHS 270	Numerical Computation
COMPSCI 225	Discrete structures in Mathematics and Computer Science
Stage III	
MATHS 302	Perspectives in Mathematics Education
MATHS 315	Mathematical Logic
MATHS 320	Algebraic Structures
MATHS 326	Combinatorics
MATHS 328	Algebra and Applications
MATHS 332	Real Analysis
MATHS 333	Analysis in Higher Dimensions
MATHS 340	Real and Complex Calculus
MATHS 361	Partial Differential Equations
MATHS 362	Methods in Applied Mathematics
MATHS 363	Advanced Modelling and Computation
STATS 370	Financial Mathematics

For course descriptions and prerequisite information, go to www.math.auckland.ac.nz/ugcourses

Careers in Applied Mathematics

A good mathematical background enhances and develops your problem-solving skills, comprehension of abstract concepts and analytical and creative thinking. These qualities are valued in technical roles and in positions of leadership and management.

Academia and research

Actuarial and business analysis

Biostatistics and biotechnology

Data science

Government (IRD, Defence, Security Intelligence)

Economic analysis

Information systems and technology

Financial services (banks, investment funds, insurance)

Modelling (engineering, industry, logistics, meteorology and many other areas)

Operations research

Risk management

Software development (programming, artificial intelligence, robotics)

Statistical analysis

Sustainability analysis

Teaching

Telecommunications industry

Aigafiafia Peterson is studying for a Bachelor of Science majoring in Applied Mathematics and Statistics.

"I enjoyed maths and science at school. Understanding how things work was an interest of mine. I like the challenge maths brings and the fact that you know when you are right. As well as the excitement and satisfaction when you solve a problem! Applying maths to things in everyday life such as personal finance, shopping, building and baking always comes in handy.

"I enjoy the different range of modules that are taught. The lecturers are always willing to help you and it's good to realise that a degree could help you make the changes you want to see in the world.

"I've been told that there's a shortage of mathematicians out in the field and so I hope to increase our numbers, as maths is very important in everyday life. I hope to one day inspire young Māori and Pacific students to take an interest in maths at university.

"I have yet to think about where my degree will take me. However maths provides a wide range of career choices such as logistics, teaching, statistician, finance, business and many more."

Helpful information

Academic dates
www.auckland.ac.nz/dates

Academic Integrity Course
www.auckland.ac.nz/academic-integrity

Accommodation
www.accommodation.auckland.ac.nz

Buy coursebooks
www.science.auckland.ac.nz/resource-centre

Career Development and Employment Services
www.auckland.ac.nz/careers

Course advice and degree planning in Science
www.science.auckland.ac.nz/student-centre

General education
www.auckland.ac.nz/generaleducation

How to apply
www.apply.auckland.ac.nz

How to enrol
www.auckland.ac.nz/enrolment

International students
www.international.auckland.ac.nz

Māori and Pacific students
www.science.auckland.ac.nz/tuakana

Need help?
www.askauckland.ac.nz

Rainbow Science Network for LGBTI students
www.science.auckland.ac.nz/rainbowscience

Scholarships and awards
www.scholarships.auckland.ac.nz

Support for students
www.science.auckland.ac.nz/support

Hear from some of our Mathematics graduates and see what exciting careers paths they're following.

www.math.auckland.ac.nz/graduates

APPLICATIONS CLOSE ON 8 DECEMBER FOR SEMESTER 1 OR 1 DECEMBER FOR SUMMER SCHOOL.

Questions about Mathematics?
ugadvice@math.auckland.ac.nz

Disclaimer
Although every reasonable effort is made to ensure accuracy, the information in this document is provided as a general guide only for students and is subject to alteration. All students enrolling at the University of Auckland must consult its official document, the University of Auckland Calendar, to ensure that they are aware of and comply with all regulations, requirements and policies.

THE UNIVERSITY OF AUCKLAND
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NEW ZEALAND

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www.facebook.com/science.uoa