Mathematics and Statistics

Never Stand Still

Faculty of Science

School of Mathematics and Statistics
Mathematics and Statistics at UNSW

The School of Mathematics and Statistics is the largest in Australia and a major centre of research in the mathematical sciences. Our School has notable strengths in fundamental research right through to cutting edge applications. Our alumni hold top jobs in business and industry and our graduates are keenly sought by employers.

In 2012 UNSW ranked first in Australia in the 2012 Academic Ranking of World Universities, and was positioned in the top 76-100 band overall. Our QS World University Ranking in 2012 saw our School ranked 44th in the world for Mathematics. Researchers in the School work in partnership with industry to solve real-world problems, and this collaboration with industry includes Australian Research Council Linkage Grants held by members of staff. Our links with industry extend to our learning and teaching activities, with industry partners sponsoring some of our courses, degrees and undergraduate prizes.

Our teaching and research activities are carried out in three departments: Applied Mathematics, Pure Mathematics and Statistics with activities ranging across a multitude of areas including applications in finance, medicine and environmental science.

Our School’s research includes a very broad spectrum of mathematics and statistics. We collaborate locally and internationally with leading mathematicians and statisticians, and with industry groups in areas as diverse as environmental modelling, biomathematics and biostatistics, computing, finance, medicine, engineering and physics. Classical and modern areas of pure mathematics such as analysis, algebra and combinatorics are also a focus.

Our graduates’ starting salaries are Australia’s highest: 8% higher than the average. We also have the lowest percentage of graduates still unemployed 4 months after graduation.

We have around 60 academic staff and many visiting professors, emeritus professors and postdoctoral fellows. Our School has access to first class, modern facilities with outstanding computing equipment.

Our degrees are designed to offer maximum flexibility to specialise in areas that interest you. Students seeking vocational training often combine their major specialisation (for example, Engineering, Commerce or Law) with Mathematics in a dual degree to broaden their career opportunities.

High achievers with particular interests are offered special tuition, vacation scholarships and the chance to work directly with world class researchers in an Honours year. During an Honours year, significant time is spent writing a thesis, whilst learning extensive communication, presentation and project-management skills. For more information regarding scholarships and Honour years, please contact the School.

Whichever Mathematics or Statistics degree you choose, the skills you learn will place you, as an individual, at a competitive career advantage.

Studying Mathematics and Statistics - a snapshot

Mathematics and Statistics concerns the use of logical reasoning and quantitative - as well as investigative - techniques to study patterns and randomness in numbers, shapes, motion, behaviour and so on - essential techniques in countless technological professions such as engineering, finance, computing and environmental science.

Studying Mathematics and Statistics, equips you with problem solving and analytical skills. Mathematics and Statistics encourages resourcefulness and creativity, teaching you how to learn and adapt to new developments and how to deal with uncertainties. All of these skills are fundamentally important in today’s workforce.

Our School offers a wide variety of courses, which you can also complement with other disciplines to broaden your skills base for a variety of career opportunities. After receiving a solid training in calculus, algebra and discrete mathematics, students can specialise in...
**Mathematics and Actuarial Studies** - a dual degree in which students study the application of Mathematics and Statistics, with Accounting, Economics and Finance. In the workplace, graduates command high starting salaries since actuarial skills are in high demand within companies specialising in insurance, superannuation, fund management and banking.

**Mathematics and Finance** - a dual degree program, providing the mathematical, statistical and computational methods widely sought across the financial sector, together with a solid grounding in finance.

**Physical Oceanography** - the techniques used to develop mathematical equations to model fluid flow in the oceans and atmosphere. Students learn how to predict weather patterns such as the onset of a storm surge or the next time an El Niño will occur.

**Quantitative Risk** - a new industry-sponsored degree, responding to the recent strong demand for specialists in bank risk. It is closely related to actuarial studies, but specialises in bank risk while actuarial studies specialises in insurance risk.

**Applied Mathematics** - the development and implementation of methods to understand and predict real world problems and improve their outcomes. Mathematical methods and models are employed to find solutions not only for technical and industrial problems, but also for social, biomedical and economic problems.

**Pure Mathematics** - the foundation of all Mathematics. It is concerned with discovering the patterns and structures that underlie wide areas of Mathematics. Although motivated more by a search for beauty and symmetry, this area of Mathematics has led to major advances in many areas of science and technology.

**Statistics** - the methodology for drawing conclusions from data - estimating the present, predicting the future and making decisions in the face of uncertainty. Modern Statistics is a rapidly evolving science in which revolutions in technology present exciting new opportunities for collection and analysis of huge and complex data sets.

**Mathematics and Computer Science** - the mathematical skills, knowledge, methods and abilities vital for the development of Computer Science and Technology. Growing areas such as Cryptography for internet security and safety analysis of software are deeply rooted in Mathematics.

**Mathematics and Engineering** - the techniques and methodology of many branches of sophisticated mathematics, essential for many advanced engineering and technological applications. Industrial research and development relies on complex computer simulations based on mathematical models and on statistical theory to meet exacting quality control standards.

**Mathematics for Teachers** - the vocational area providing the knowledge required for scientific and technological endeavours as well as the communication skills for sharing this knowledge with others.
Undergraduate Degrees with a specialisation in Mathematics or Statistics

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<th>Degree</th>
<th>Duration</th>
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<td>B Science and Business</td>
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</tr>
<tr>
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Advanced Mathematics

This is the degree of choice for students with an interest in mathematics and who are looking to pursue careers that take advantage of new mathematical developments and innovations.

Advanced Mathematics includes an Honours research year; it combines advanced coursework with a research project. Advanced Mathematics is divided into several specialisations:

- Applied Mathematics
- Pure Mathematics
- Statistics
- Quantitative Risk

Scholarships

In addition to the prestigious UNSW and Faculty Scholarships, there are numerous scholarships and awards to help with your undergraduate studies in Mathematics and Statistics at UNSW worth $5,000 to $6,000 per year.

Further information regarding Scholarships can be found at the following website: www.scholarships.unsw.edu.au

Career Opportunities

Mathematics and statistics graduates work in a huge variety of areas, wherever logical skill and analysis of quantitative data is needed to provide accurate and timely answers. Areas include:

- Data Forensics/Fraud Detection - analysing patterns in large data sets to find the “needles in the haystack” of fraudulent or terrorist activity.
- Environmental Modelling - understanding of massive computer models that predict changes in weather, climate and ocean currents.
- Biostatistics - securing public health and testing drugs and new procedures for safety and efficacy, using statistical inference.
- Cryptography - encoding and decoding signals, for instance, financial markets, the internet and the military, as well as numerous other applications.
- Quantitative Risk - monitoring the risk positions of banks in light of changing market conditions as well as credit and operational profiles.
- Game Design - designing complex games to ensure correct probabilities and accurate simulations.
- Data Management - ensuring accuracy and accessibility of organisations’ data warehouses.
- Teaching - inspiring the new generation with an understanding of the power of mathematics.
- Research - answering the many abstract questions thrown up by other sciences and by mathematics itself.

For further information regarding careers within the sphere of Mathematics and Statistics, visit our careers page on: www.maths.unsw.edu.au/futurestudents/careers

Degrees in which you can undertake Advanced Mathematics

Students enrolled in either of these degrees must maintain a high credit average to remain in the degree.

<table>
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<th>Degree</th>
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<tbody>
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<td>ATAR and audition</td>
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One of my fondest memories of studying mathematics at UNSW was of my first year algebra lecturer raving about the beauty of the formula $e^{\pi i} = -1$. That incident was my first time witnessing such passion about a simple formula and I was both amazed and slightly alarmed at it.

It was soon apparent that this passion for mathematics was an integral part of life at the School of Mathematics and Statistics. In fact, after four years at university, this enthusiasm for mathematics certainly enriched my experiences as a student – it was contagious, and it also showed me that mathematics could be both fun and intriguing.

I completed my BSc (Advanced Mathematics) with a major in Pure Mathematics in 2010. One of my original motivations for choosing UNSW was that this degree meant I could just concentrate on mathematics. But the degree was also structured so that I had enough flexibility to study in areas outside their major through elective subjects. I took courses in areas as diverse as economics, arts and science. I also had the opportunity to dabble in areas of applied mathematics such as operations research and dynamical systems. These courses broadened my understanding of mathematics and gave a glimpse of how theory could be put into practice.

My lecturers and tutors were always helpful and supportive, and the small number of students in pure mathematics produced a tight-knit community. The School also offered opportunities such as vacation research, funded by scholarships from UNSW and the Australian Mathematical Science Institute, inter-university competitions, and even a chance to play a role in encouraging women to pursue mathematics through the ‘Girls do the Math’ program.