

Mathematics

Everything comes down to maths ... eventually

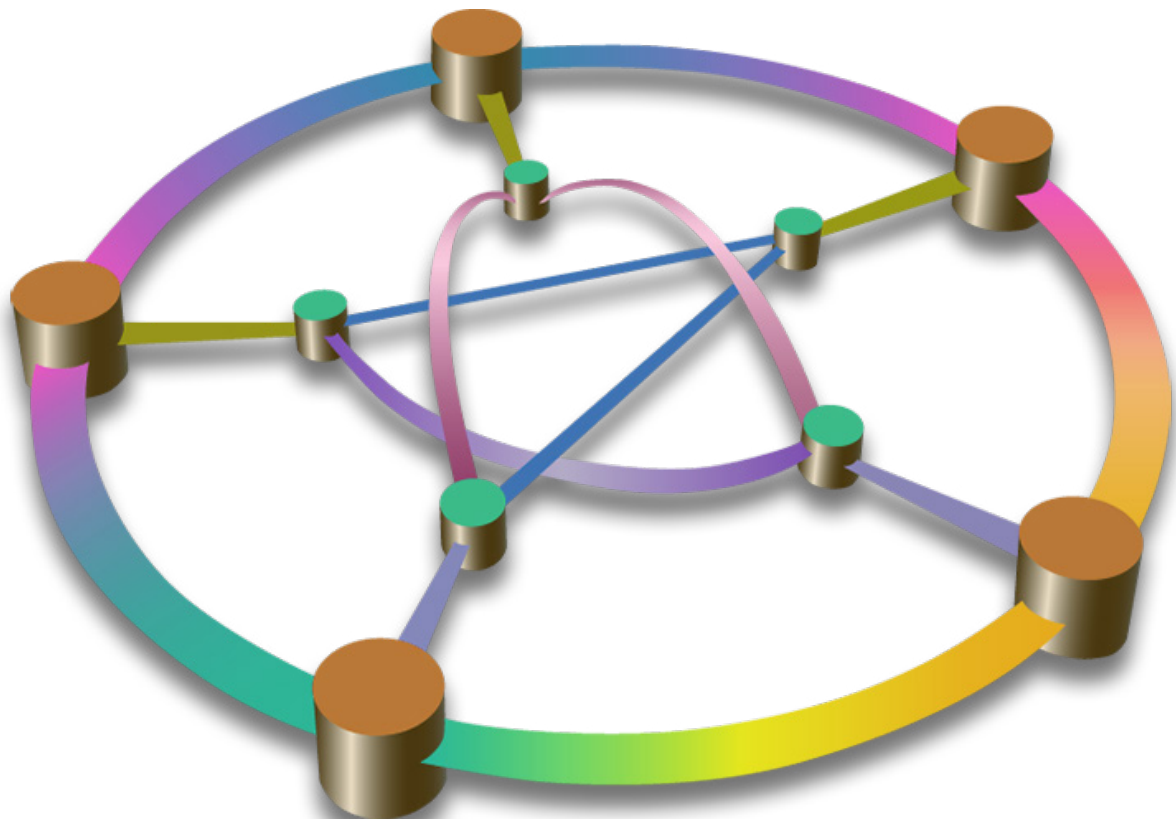
“A solid grasp of probability and statistics is important. One of the most useful things in industry is to be able to understand data presented to you.”

Paul van Mulbregt PhD

A short definition of mathematics would be “the study of quantities and how they are measured, combined, related, and operated upon.” We use mathematics for practical things like organising the arrival of materials on a building site in order to reduce storage; encrypting and decrypting internet messages; modelling blood flow through a damaged heart; and predicting the break-up of ice floes. These are all examples of mathematics in action – mathematics making a real difference in the world where we live.

Mathematics looks at the distribution of prime numbers, the properties of geometric figures, how dependent variables change, and what happens when you add up infinitely many terms. Studying these ideas lays the foundation for using mathematics to solve real-life problems.

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Some reasons for studying maths

You build a solid foundation for analysing and understanding the mass of quantitative data that is available these days. You develop problem solving and organisational skills that are highly sought after by employers. You learn to think both logically and creatively. You discover an amazingly varied and profoundly rich science that has an intrinsic beauty. You get your mind around some of the ancient problems that have fascinated humans for centuries.

Background required

To enter our mainstream programme you need a clear pass in at least one of the NCEA level 3 papers at secondary school.

If your mathematics background is only to Year 11 or 12, you can still progress in mathematics at Otago by taking the preparatory paper MATH 151 General Mathematics.

What do I study?

If you wish to major in Mathematics for a BSc, you must begin with the 100-level papers MATH 160 Mathematics 1 and MATH 170 Mathematics 2, which are a mix of algebra and calculus, providing a vital basis for more advanced papers; and STAT 110 or 115.

200-level papers focus more on specialised fields of mathematics, such as matrix algebra and linear systems, the calculus of functions that depend on several variables, and how to solve differential equations.

These are expanded at 300-level with a wide variety of papers giving students the opportunity to complete a well-rounded degree in mathematics.

Honours degrees and combined degrees

Able students are encouraged to take honours. The honours programme requires an additional year of study after completion of a three-year bachelor's degree. It is more intensive than the ordinary degree, and there is no doubt that it is a much stronger qualification. The final year includes a supervised project on an agreed topic. Some students combine mathematics with another subject, such as physics, finance, genetics, or computer science, to give a combined honours degree. In this case the final year project usually combines both subjects.

How do I study?

Most mathematics papers at Otago involve several lectures a week, usually 50 minutes long. You need to take notes based on the material presented, although in some papers part of the material is already available in outline notes that are followed closely.

There will also be tutorials that are really advice sessions, where you can go along and ask for help with weekly exercises or with understanding course material. Some papers have compulsory tutorials, others have open tutorials where you can go as many times as you wish.

Apart from the final examination, you are assessed internally based on exercise marks, a mid-semester test, or a series of computer tests. Papers differ but in all cases your internal assessment is an important part of your overall grading.

Career opportunities

Career options for mathematics graduates are much wider than you might think. Many students take jobs where mathematics is not the main focus of the business, and yet their mathematical skills are their greatest asset. That is because mathematics and the analytical and logical thinking that it teaches are vital in understanding and solving all manner of quantitative problems, from electricity generation to data compression, from weather forecasting to the study of bone density loss.

Mathematics graduates, especially those with a well-rounded background in mathematical, statistical, and computer skills, have a qualification that integrates perfectly into the modern, technology-based world.

Applied mathematicians are in demand wherever employers need deterministic models, for example, in seismology and the earth sciences, meteorology, the chemical and forensic industries, health, ecology and conservation, transportation and scheduling, engineering, and computing, to name a few.

And for those with both applied mathematics and statistics, i.e. a background in both deterministic and stochastic models, one can add to the above list the areas of social science, financial services and insurance, epidemiology, quality assurance, economics, policy, government, and many others.

PROFILE

Iain Dangerfield

Bachelor of Science with Honours and Master of Science

"I ended up at Otago because my family moved to Dunedin, but I'm really glad I went there as I enjoyed my time at Otago hugely.

"I initially chose to do mathematics because it was a requirement for studying first-year physics, but I ended up enjoying the maths more and majoring in that instead.

"I liked the variety of papers. In the 200- and 300-level papers the class sizes were relatively small, so I got to know my classmates and lecturers well. I got along with my lecturers, and in my honours and master's years I felt like I was part of a community in the maths department. It was also nice to be able to get work as a marker and tutor.

"In my later study I focused on abstract algebra – group and ring theory in particular. My honours dissertation was on simple groups and solvable groups, while my master's thesis was on Leavitt path algebras.

"Now I'm working as a high school maths teacher. My mathematics study hasn't been directly applicable – I don't directly use much of the content that I studied at Otago, but I needed to have done maths at university in order to teach it at high-school level. Plus, since maths teachers are in high demand I was able to get a TeachNZ scholarship, which paid for my teacher training as well as extra money on top of that. I was also able to find a job very quickly, as were most of the trainee maths teachers in my cohort!

"If you're interested in maths, I'd highly recommend studying it. There are a lot of pluses..."



For questions about
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otago.ac.nz/mathematics

