

AUT

A FUTURE IN
**MATHEMATICAL
MODELLING AND
COMPUTATION**



WHAT IS MATHEMATICAL MODELLING AND COMPUTATION ABOUT?

Mathematical modelling tells us about our world and helps us predict what will happen next. People with skills in mathematical modelling and computation help find solutions to a vast array of complex issues facing the world.

Mathematical modelling has countless applications across many fields. Modellers are needed to manage financial risks and portfolios, help determine the abundance of elements in space, or predict the effects of weather patterns on electricity consumption or the likelihood of flooding. They may create a model to predict the effects of a public health policy, or optimise pest control measures to reduce predator numbers and improve survival of native birdlife.

Mathematical models may also be used to predict the effects of diet, help solve traffic and housing problems, and improve the efficiency of appliances and recycling systems. Activities such as predicting global warming patterns, figuring out the structural integrity of a building or forecasting economic trends also rely on mathematical modelling.

Mathematical modellers can be found in multiple workplaces.

For example:

- The Government and public sector need mathematic modellers to work on healthcare planning, environmental modelling, transport challenges and economic forecasting.
- The finance, banking and insurance industry hire people with modelling expertise for financial and business management, optimising investment strategies, doing risk assessments, and analysing financial data.
- Environmental agencies want mathematicians to assess environmental impacts, develop predictive models and analyse ecological systems.
- The engineering sector needs modellers to develop simulations to improve product design.

If you have a love of maths and problem solving and want to uncover new insights and solve real world problems for industry, the environment and/or for humankind, then mathematical modelling and computation could be the pathway to an ideal career for you.

OUTLOOK AND TRENDS

Employment outlook – The outlook is very bright for those embarking on careers in mathematical modelling and computation. Large organisations offer opportunities for considerable advancement with graduates starting in technical roles and working into management. Graduate programmes help graduates advance more directly to management and senior management positions. Some career options, such as actuary, are highly specialised and quite limited in numbers in New Zealand. Other broader roles, such as market/financial analyst or research analyst, can be found in many different sectors. There is also a continuing high demand for teachers of maths in secondary schools.

Diversity of work options – The diverse range of opportunities continues to grow. The ability to extract information from real-world phenomena to create mathematical models is important across many sectors. For example, your work might involve modelling interactions between animals, plants, humans and the environment for the Department of Conservation, COVID-19 modelling for Te Whatu Ora – Health NZ, or modelling for Fisher & Paykel Healthcare product design.

Funding impacts employment – Finance, healthcare and environmental research use mathematical modelling quite frequently and offer stable employment. However, research and projects in some sectors can only occur through contestable funding and this can lead to short term contracts, rather than full-time positions. Contracting offers variety because people work across a range of projects, rather than within one sector, but it offers less stable employment.

Subject crossovers – Mathematical modelling is often combined with analytical (statistics) skills. If you do a double major of mathematical modelling and computation along with analytics, you will widen your career options for modelling and analytic roles. For example, statistician, data analyst, data scientist, and performance analyst require either or both qualifications. Some organisations will be looking for mathematical and analytical skills combined with other skills, such as programming or engineering.

WORK SETTINGS

Mathematical modelling is useful in any environment where analysis or modelling is required to make business, operational and industrial decisions.

Graduates can find work opportunities in a wide array of sectors and industries, eg:

- Government and public sector organisations such as Te Whatu Ora – Health NZ, Institute of Environmental Science Research, AgResearch, Department of Conservation and local and regional councils.
- Private enterprise organisations, including Fisher & Paykel Healthcare, Scion, Spark, engineering consultancies, banks, and financial services.
- Research entities including Crown and private research institutes and research centres within educational institutions.

CAREER EXAMPLES

While the skills of mathematical modelling and applied mathematics are central to many roles, you often don't see the words 'mathematical modeller' or 'applied mathematician' in job titles.

For example, you could be working in a healthcare organisation applying modelling to epidemiology or physiology projects or helping design medical equipment.

You could also be working in environmental settings modelling fish stocks, kiwi populations, weed populations, threats from pests, or the behaviour of volcanoes or aquifers.

Mathematical modeller/Applied mathematician

Could be employed within finance, banking, healthcare, environmental organisations, government and public sector or research institutes. Creates models that demonstrate complex processes or solve problems. Works with, and analyses data, and translates and communicates complex technical information. Deepens understanding and predicts solutions through modelling.

Coastal Modeller

Provides analysis, reporting and modelling services for coastal and marine adaptation and management projects, contributing to a wide range of projects around coastal and estuarine environments.

Modelling Analyst

Assists with the development and maintenance of statistical models, delivering robust models and monitoring frameworks. Involves use of advanced statistical modelling and technical pricing solutions. Includes engaging with all sections of the business to identify opportunities to apply advanced technical modelling techniques to complex business problems.

Actuary

Predicts and assesses the financial risks and impacts of future events. Calculates the assets and liabilities of companies and determines their financial strength. Prepares reports and advises on insurance, investment, superannuation, and management of funds.

Could be employed in insurance companies, specialist consulting firms, Crown entities and government agencies (eg ACC, Reserve Bank), and large financial services and accountancy firms.

Performance Analyst

Evaluates performance of different systems within a company and reviews financial history and activities. Includes conducting extensive research and analysis, reporting findings, providing advice on improving areas of concern. May assess employee performance.

Enterprise Risk Manager

Shapes business risk strategy, and identifies and prepares for hazards to finances, operations, and objectives. Develops and maintains a risk management framework for the organisation, monitoring risks, providing advice on safety and security. Includes reviewing transactions, writing procedures, writing risk assessments, and providing advice on risk related issues.

Note: Requires master's degree and/or experience in actuarial analysis

SKILLS AND KNOWLEDGE

Analysis, problem solving and experimental design

- Able to analyse complex situations and information, identifying the problem and determining a range of viable solutions
- Skilled in interpreting results, drawing conclusions, and reporting on these
- Ability to understand, develop and implement effective models and algorithmic solutions to problems
- Competent in selection of appropriate mathematical and computational and statistical techniques to perform industrial and business data acquisition and analysis
- Confident in utilising modelling, statistical and business intelligence software

People and self-management skills

- Ability to communicate with clients and colleagues using a client-focused approach
- Capable of presenting fundamental ideas and arguments to people outside the profession
- Strong planning, organisational, decision-making, and problem-solving skills
- Ability to work collaboratively in a team

PERSONAL QUALITIES

- Logical, analytical, and methodical
- Quick to learn new tasks
- Highly accurate with an intuition for drilling down to detail
- Motivated, proactive and able to manage time to meet deadlines

SALARY GUIDE

Salary range is indicative of the NZ job market at the time of publication (mid-2023) and should only be used as a guide.

	On average per year
Mathematical modelling and computation graduates (includes performance analyst, statistician, actuary, mathematics modeller)	\$55,000-\$65,000 Approx. starting salary
	\$75,000-\$100,000 3-5 years' experience

Sources: Payscale, Salary Explorer, Careers NZ, SEEK, Glasdoor, Potentia, Jobtet

PROFESSIONAL REGISTRATION

New Zealand currently has no registration for statisticians or modellers. The NZ Statistical Association and Anzstat provide support with professional development and career networking.

THE AUT APPROACH

The Bachelor of Science involves a 30-point project across two courses in the third year. You'll develop skills to carry out an independent scientific project in the context of Aotearoa New Zealand that may be undertaken in partnership with industry.

This draws on previous knowledge and skills, building your skills in ethics, planning, troubleshooting, time management, and reporting on a project.

The project develops your ability to work independently on a project, solve a variety of business and industry problems and communicate effectively, linking theory to practical applications of solutions.

FURTHER STUDY OPTIONS

Further study in mathematical sciences is available at postgraduate level, including the Postgraduate Certificate in Science, Postgraduate Diploma in Science, Master of Analytics, Master of Science, Master of Philosophy, and Doctor of Philosophy.



ANNA TAUFAO

Cards Service Representative at Westpac NZ
Bachelor of Science in Applied Mathematics*

"I started applying for jobs in banking in my last semester even though I had one paper to do over summer school. I have been working for Westpac as a cards service representative since January. Once I have a year's experience behind me, I hope to enter Westpac's graduate programme, in risk, product sustainability marketing or technology areas.

Westpac said they were interested in me because of my studies and previous customer service experience – I was a Qantas Airways call customer representative before I started studying.

Banking appeals because I'm using what I do best which is working with numbers. I assist customers over the phone with debit and credit card queries. These include interest rates, cash advances, balance transfer, card transaction disputes, potential fraud transactions, apple pay/google pay queries, and many other card related queries.

I really enjoy helping customers who don't understand their credit card statement. I find my knowledge of maths really helps my ability to explain statements and fees to customers, especially the elderly. Helping them through their confusion is very satisfying because gaining good financial knowledge impacts lots on our daily lives.

I also enjoy the team, and my team leader who is always checking in on us and motivating us. As a single parent, my main challenge is balancing work with motherhood, especially with a child with Autism Spectrum Disorder (ASD). I'm grateful for the flexibility I can have in my schedule to fulfil both roles."

*The Applied Mathematics major is now called Mathematical Modelling and Computation

EMPLOYER COMMENT

"In a large organisation such as ours, sharing the same values and vision is helpful to working collectively towards the same goal. Work tasks can be taught, but a positive attitude towards one's work acumen is up to the individual. A great worker gets their hands dirty and tackles their workload head on. An applicant must not only rely on their degree but also their life experiences and intellect.

Anna brings an understanding of how to listen carefully and apply the content being taught accurately. She understands what questions to ask effectively to better articulate what gaps in knowledge she is aware of."

Daniel Naulivou

Cards Services Team Leader:
Transformation and Customer Operations
Westpac NZ

USEFUL WEBSITES

Australian and New Zealand Industrial and Applied Mathematics (ANZIAM)

anziam.org.au

Mathematics in Industry New Zealand (MINZ)

minz.org.nz

NZ Mathematical Society

nzmathsoc.org.nz

New Zealand Society of Actuaries

actuaries.org.nz

The NZ Statistical Association

stats.org.nz/new-zealand-statistical-association

Society for Industrial and Applied Mathematics

siam.org/careers

Statistics New Zealand

stats.govt.nz

FURTHER INFORMATION

For the most up-to-date information on studying mathematical modelling and computation, visit aut.ac.nz/mmc

For other Future Career Sheets visit aut.ac.nz/careersheets

EMPLOYABILITY & CAREERS

For employability and career support, AUT students can book an appointment through <https://elab.aut.ac.nz/>

 @AUTEmployabilityandCareers

FUTURE STUDENTS

Contact the Future Student Advisory team for more information: aut.ac.nz/enquire

futurestudents@aut.ac.nz

 @AUTFutureStudents

CURRENT AUT STUDENTS

Contact the Student Hub Advisors team for more information: 0800 AUT UNI (0800 288 864)

aut.ac.nz/enquire | studenthub@aut.ac.nz

CITY CAMPUS

55 Wellesley Street East, Auckland Central

Connect with us now:



The information contained in this career sheet is correct at time of printing, mid 2023.

