UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND

Computational Modelling

Crunching the big problems

Computational Modelling formulates and models real-world problems, then uses computing to develop solutions.

You could help create a new product – a pacemaker, a refrigerator, or perhaps part of a satellite – to see whether it works at a theoretical level before a company commits time and money to building the real thing. You might model the survival of an endangered species, plan how to map the wave patterns of the ocean from space, or optimize the layout of components in a new type of dishwasher.

Otago's Bachelor of Applied Science (BAppSc) in Computational Modelling will give you advanced mathematical modelling and computational expertise, along with broad-based skills to fit you for the workforce.

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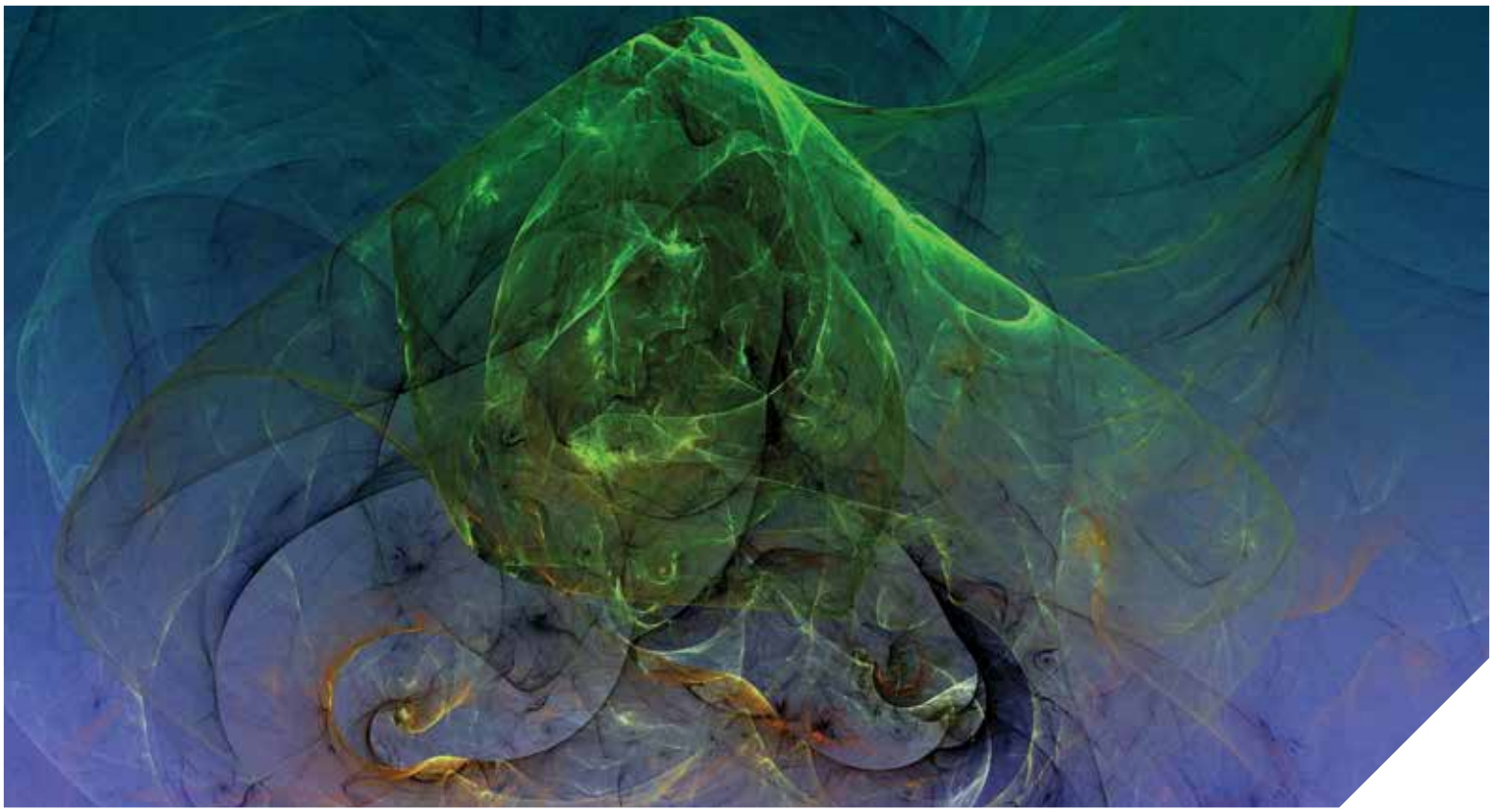

Why study Computational Modelling?

- It's rewarding and enjoyable to formulate a real-world problem, develop the model, and then use computers to find the theoretical solution.
- You'll have a vast range of career options. Few qualifications have relevance to such a wide variety of areas as Computational Modelling and people with skills in this field are highly sought after.
- It's a growing field. Career opportunities exist now to make use of your skills and with the growth in high technology based enterprise, demand for Computational Modellers will increase.

Background required

Because of its substantial mathematical content, high school students will need a good pass in Year 13 maths. Experience or familiarity with computing and/or physics also helps, but it is not essential.

Career opportunities

Career prospects in Computational Modelling are excellent. Opportunities abound in all areas of product development, financial modelling and business, physical and health science, animal and plant science, process engineering, food technology, design, telecommunications, software development, and information technology.

Chances are you'll begin your career by joining an existing firm. You could work for a large company, helping them with the development of their own products.

You may find work in a consultancy firm, or become self-employed in your own consultancy practice. Consultancy is one of the fastest growing career options for many scientific disciplines, and Otago's BAppSc ensures you have a sound knowledge of the commercial aspects of applied science. Consultancy work is project based, with plenty of variety and opportunities for travel.

Your skills will also make you a valuable asset to any engineering firm, and with your advanced programming abilities, there will also be plenty of scope to work in the computer industry. With the business knowledge you gained during your degree, and some industry experience under your belt, you'll be well qualified to become your own boss, if you want to start your own innovative business venture.

How will I study?

As well as learning theory in lectures, you'll gain hands-on experience in practical classes in Otago's well-equipped computer laboratories, making use of the latest technology and software.

What is the Bachelor of Applied Science?

The strength of the Applied Science programme is its outward focus – developing market-ready graduates with wide-ranging skills and practical experience in the workplace

The Applied Science programme is a three-year undergraduate degree with open entry at 100 level. An Honours stream is offered to those students who achieve an appropriate academic standard in their second year.

Every Applied Science degree has a compulsory minor or second major, in a subject area that's directly relevant and will deliver complementary skills. The programme encourages real-world business awareness, enabling you to apply what you have learnt to any organisation you work for.

What will I study?

The required papers at 100-level are: COMO 101, COMP 150 or COMP 160, MATH 160, MATH 170.

From second year onwards, you'll study a wide variety of papers to develop advanced mathematics skills, modelling and programming skills.

During your degree you will also complete a minor or a second major in a relevant discipline – this might be a business focus, or extended computing skills, wildlife studies for population modelling... the possibilities are huge!

NB: Check the latest paper details in the *Guide to Enrolment* published with enrolment material each year.

What will I learn?

You'll gain a thorough understanding of modern computational and numerical methods for solving a wide range of problems.

You'll be familiar with powerful, cutting-edge software packages and programming languages and you'll learn how to model realistic examples taken from both the physical and life sciences, including topics as diverse as how predators and their prey interact or why the weather cannot be predicted a long time in advance.

Combining my Computational Modelling study with other subjects

A minor or a second major are compulsory for your BAppSc degree. In Computational Modelling, your first year is very flexible – for example you can tailor a course that will cover the prerequisites for most of the other BAppSc subjects, including Energy Management, or Software Engineering.

PROFILE Elke Braun-Elwert

"When I arrived at Otago, Computational Modelling was being offered as a major (for the degree of Applied Science) for the first time. Having been strong in Maths and Science subjects at school, and always keen for a new challenge, a degree in Computational Modelling seemed a natural choice. I felt that a BAppSc offered a greater combination of fields and more variety and I liked the idea of being able to create realistic models from real-world situations.

In my Honours year I took a paper in Computational Biomechanics which sparked my interest in modelling human movement. Being a keen skier and fully qualified ski instructor I saw a wonderful opportunity for my fourth year project – modelling the dynamics of skiing. The more I delved into the topic the more complex and interesting it became – far beyond the scope of an Honours project!

At the end of my BAppSc(Hons) I felt I'd only seen the tip of the iceberg, and so I moved on to a Masters in Applied Science. My project involved developing a three-dimensional articulated skiing model which was capable of turning in both directions over uneven terrain.

Despite obvious simplifications, the model's movement looked remarkably realistic. The finished model was presented from a ski instructor's perspective and could be further developed into a valuable visual tool for coaching and training purposes.

I'm currently waiting for the results from my Masters and am beginning to apply for jobs. Ideally, I'll end up working for a small company specialising in designing sports coaching software, but other opportunities exist: helping to design advanced sports equipment, injury prevention and rehabilitation or developing animated characters with realistic-looking movement for movies and computer games."

For questions about

Computational Modelling

otago.ac.nz/sciences/departments-programmes/applied-science/majors/computational-modelling.html

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