



# Neuroscience Pūtaiao Roro

"The application of neuroscience for translation and commercialisation is a relatively new and exciting area. I love using the knowledge from my studies to create a compelling plan, to support a project's success and to best fit the investment and commercialisation ecosystem."

Deanna Barwick  
Commercialisation Manager,  
Otago Innovation Limited

Neuroscience is all about understanding how the brain and wider nervous system works, and it's one of the fastest growing areas of science.

The University of Otago is the only New Zealand university to offer an undergraduate degree in Neuroscience.

Neuroscientists apply a wide-range of scientific disciplines, including anatomy, biochemistry, computer science, pharmacology, physiology, psychology and zoology. As an interdisciplinary programme, it is taught by staff from varied departments across the University. Each teaches a separate "neuro" component, resulting in a coherent and integrated subject.

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## Why study Neuroscience?

The brain is a final frontier ... a last great unknown. Neuroscientists are its explorers. They try to understand how the brain functions, how it deals with injury or damage, and how it develops and changes over time. What they find helps neurologists, psychiatrists and clinical psychologists – and provides important models for high-level information processing and robotics. Knowing how the brain perceives stimuli and controls movement helps those working on human performance, from sports science to space medicine.

## Background required

Taking chemistry and biology until Year 13 is recommended. Students without good marks in chemistry are strongly advised to enrol in the Chemistry Bridging paper (BP607) during Summer School, prior to their first year of study.

## What papers will I take?

### First year

Essential first-year papers provide introductions to cellular biology (CELS 191); human biology, particularly of the nervous system (HUBS 191); and biological psychology (PSYC 111).

Additional papers are required – most students choose chemistry (CHEM 191) but other options are available.

Please see our website for more details.

Note that most of these papers are included in the Health Sciences First Year (HSFY) course, with the exception of PSYC 111. Students who start their degree in HSFY and then change to Neuroscience can take PSYC 111 in their second year.

### Second year

Here you can begin to “custom design” your Neuroscience degree. Neuroscience students take core papers in psychology, anatomy and physiology; as well as choosing optional papers from zoology, pharmacology, biochemistry and genetics.

### Third year

Following their interests, third-year students choose from a variety of papers covering advanced topics in neuroscience, with an emphasis on the latest findings in research.

## How will I study?

Due to the interdisciplinary nature of Neuroscience at Otago, teaching styles vary between papers. Many first- and second-year papers are taught through a combination of lectures and laboratory sessions, while third-year papers will include group projects and discussions. Assessments are varied and include written examinations and laboratory reports.

## Career opportunities

To become a neuroscientist, you would need to complete postgraduate study following your Bachelor of Science (BSc). With a BSc(Honours), postgraduate diploma or a master's degree you could have an exciting research career in a university, research institute or the pharmaceutical industry. With a PhD, you could be a leader in new research, combined with teaching at a university or in a research institution.

Neuroscience also provides a convenient first degree for those proceeding to postgraduate specialisation in professional or applied fields – such as law, medicine, pharmacy, physiotherapy, audiology or bioengineering.

Graduates with a BSc in Neuroscience possess valuable skills that are widely sought after by employers, including technical expertise in areas where there is a global shortage of skilled workers. You can read what some of our graduates have been up to on our website.

## Neuroscience research at Otago

Neuroscientists at the University of Otago are involved in a range of exciting research. Neuroscience students learn about cutting edge research being conducted at Otago, as well as research from around the world, and can work in the lab with Otago's

neuroscientists as postgraduates.

Some examples of research being conducted at Otago are listed below:

- Professor Cliff Abraham is interested in the neural mechanisms of memory. His lab is also investigating biomarkers and therapeutic agents for Alzheimer's disease.
- Dr Olivia Harrison's research is focussed on mental health and its relationship to interoception (how we perceive our body), with a particular focus on breathing.
- Associate Professor Yusuf Cakmak's research focuses on non-invasive peripheral neuromodulation, wearable sensors and mobile health applications.
- Associate Professor Beulah Leitch is interested in the changes that occur at synapses (the contact between brain cells that allow them to communicate with each other) during ageing and various brain disorders, including epilepsy and Alzheimer's disease.
- Professor Colin Brown investigates how the brain controls reproduction and cardiovascular function.
- Dr Rosie Brown investigates the neural circuitry underlying parenting behaviour, and how hormones alter mood and behaviour in mothers.
- Associate Professor Stephanie Hughes studies how lysosomes (the waste disposal system in cells) contribute to neurodegenerative diseases, including childhood Batten disease, Alzheimer's disease and Parkinson's disease.
- Dr Paul Szyszka investigates olfactory search behavior in insects – what are their perceptual limits in olfaction and what patterns of neural activities are behaviourally relevant?

For questions about  
Neuroscience  
[otago.ac.nz/neuroscience](http://otago.ac.nz/neuroscience)



## PROFILE

**Deanna Barwick** Bachelor of Science with Honours (Neuroscience), PhD.  
Commercialisation Manager, Otago Innovation Limited.

"I began my undergraduate studies in Health Sciences First Year (HSFY) not knowing what avenue I was interested in long-term. I took PSYC 112 Human Thought and Behaviour and was fascinated by the paper – then one of my lab partners mentioned they were studying Neuroscience. I remember thinking “you can study that?!” then changed my major to Neuroscience for second year.

"I really liked studying Neuroscience at Otago – it taught me how to look at research critically, to think about information being presented, and to apply a lens of curiosity over it.

"The lecturers always highlighted how unknown the field of neuroscience truly is, and how what we learn now could change completely as new research emerges.

"The biggest highlight of my undergraduate degree was taking NEUR 301 Current Topics

in Neuroscience with Ian McLennan; the skills I learnt during that paper set me up for a successful career in research and the lens to look at science critically.

"Since completing my PhD, I have slowly transitioned from working as an Assistant Research Fellow to support my write up period into University Commercialisation at Otago Innovation.

"My studies definitely prepared me for my career, but I also had a huge learning curve on the job as I learnt how to link scientific research with marketing and business. The skills I learnt at Otago, especially during my PhD, allow me to pick up new skills quickly and gave me the right mindset to take on challenges. That, and being surrounded by a supportive team have allowed me to hit the ground running and succeed in my new career."

