Neuroscience is all about understanding how the brain and wider nervous system works, and is 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 many departments. Each teaches a separate “neuro” component, with the result being a coherent and integrated subject.

“There is a heavy focus in many of the Neuroscience papers on learning to be a critical thinker. This is a vital skill in medicine, and also in life. There was also a massive focus on science communication and this has been incredibly helpful in my current studies, which involve educating patients on their health and conditions.”

Allanah Hartley BSc(Hons)
Neuroscience graduate
**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 to Year 13 is recommended. Students without good marks in chemistry are strongly advised to enrol in the Bridging Chemistry paper during Summer School, prior to their first year of study.

**Career opportunities**

To become a neuroscientist, you would complete postgraduate studies following your BSc. With a BSc(Hons), postgraduate diploma, or master's degree you could have an exciting research career in a university, research institute, or in the pharmaceutical industry. With a PhD, you could be a leader in new research and combine this 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. For example, law, medicine, pharmacy, physiotherapy, audiology, and 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 worldwide shortage of skilled workers.

You can read details about what several Neuroscience graduates are doing on our website.

**What papers do 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 course, with the exception of PSYC 111. Students who start with Health Sciences First Year and then change to Neuroscience can do 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 list of papers covering advanced topics in neuroscience, with an emphasis on the latest findings.

**Career options**

Students who do particularly well can apply for entry to the Bachelor of Science with Honours (BSc(Hons)) programme after completing their Bachelor of Science (BSc). This elite course offers ideal preparation for those interested in a career in neuroscience research. Students can also enrol in a one-year postgraduate diploma or a two-year Master of Science.

**How will I study?**

Due to the interdisciplinary nature of the Neuroscience programme, 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 have group projects and discussions. Assessments are varied and include written examinations and laboratory reports.

**Neuroscience research**

Neuroscientists at the University of Otago are involved in a range of exciting research. Neuroscience students learn about this (and other) research as undergraduates, and can work in the lab with Otago's neuroscientists as postgraduates.

For example:

- Professor Cliff Abraham is interested in the neural mechanisms of memory. His lab is also investigating biomarkers and therapeutic agents for Alzheimer's disease.
- Associate Professor Mike Paulin is investigating how animals use sensory information to move quickly, accurately, and efficiently.
- Professor John Reynolds is interested in how we learn and remember skills, with a focus on Parkinson's disease and stroke.
- Professor Colin Brown investigates how the brain controls reproduction and cardiovascular function.
- Associate Professor Christine J a is researching how a mother's health during pregnancy affects the formation of the foetal brain to elevate risk of mental illness.
- Associate Professor Liana Machado is interested in cognitive functions and how they are affected by ageing, brain disease, and lifestyle choices.
- Dr Paul Szyzska investigates olfactory search behavior in insects – what are their perceptual limits in olfaction, and what patterns of neural activities are behaviourally relevant?

**Profile**

**Allanah Hartley BSc(Hons) Neuroscience graduate**

At the end of her Health Sciences First Year, Allanah Hartley was unsure of her next steps, so she decided to focus on the subjects she had enjoyed the most.

“I realised the lectures on the brain had really interested me. The lecturers had been engaging and the content itself was fascinating.

“I liked that they were presenting current research that was emerging, rather than information taken from old textbooks. I liked that it was a developing and evolving field with many passionate people. It seemed to be an exciting area of science that I too could become passionate about.”

Otago's Neuroscience programme, in which biology meets psychology, proved a good choice for Allanah.

“I liked that I was able to do some more art-based papers such as psychology but still was able to study science-based papers like anatomy and pharmacology.”

One of her highlights was a paper on neurological diseases.

“We learnt all about the different diseases, and then had clinical sessions during which a patient with a condition we learnt about such as Alzheimer’s or Parkinson’s would come and speak to us. It was really powerful because you suddenly realised that you weren’t learning the content for the sake of it. Here were real people living with these conditions, and we could appreciate the important role that research plays in helping them.”

Currently studying medicine, Allanah believes that her Otago degree equipped her with an invaluable set of transferrable skills that continue to help with her postgraduate studies.

“There is a heavy focus in many of the Neuroscience papers on learning to be a critical thinker. This is a vital skill in medicine, and also in life. There was also a massive focus on science communication and this has been incredibly helpful in my current studies, which involve educating patients on their health and conditions.”

For questions about Neuroscience

otago.ac.nz/neuroscience