



Pharmacology and Toxicology

The science behind drugs

“Graduates that we’ve employed have routinely impressed our international clients with their scientific knowledge, communication skills, attention to detail and commitment to operating in an ethical and transparent manner.”

Blair Hesp NZDipBus PhD CMPP
Managing Director, Kainic Medical Communications

Pharmacology is the science of the effects of drugs on biological systems, from the molecular level through to patient studies. Toxicology is the study of the harmful effects of chemicals. Toxicology courses at Otago cover both environmental and human toxicology, with a particular emphasis on drugs and drug development.

Pharmacology and toxicology are at the forefront of modern medicine with a focus on developing drugs to treat important conditions, such as cancer, diabetes, neurological conditions and heart disease.

Understanding pharmacology is key to advancing research in almost all areas of biomedical research, while toxicology is key to understanding human impacts in a changing world.

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Why study pharmacology and toxicology?

Most people are interested in pharmacology because drugs occupy such a prominent place in everyday life. Constant progress in medicine involves the design of new drugs that can cure cancer, cardiovascular disease, neurological disorders and other medical conditions.

Pharmacology incorporates and applies a variety of biological sciences, such as biochemistry, chemistry, physiology, microbiology and genetics. Unlike pharmacy, which is about the preparation and dispensing of drugs, pharmacology is the science behind how drugs produce their effects on the body and what the body does to the drugs. Pharmacology also plays a key role in developing drugs of the future.

Toxicology at Otago examines the harmful effects of chemicals on the human body, as well as understanding the impact of chemicals on the environment and in our food supply.

A good knowledge of pharmacology and toxicology is also an important part of the training of medical doctors, pharmacists, dentists, nurses and physiotherapists. Other scientists often find pharmacology useful in their own specialisation. For example, physiologists, biochemists, zoologists and psychologists may use drugs to understand the biological system or disease they are studying.

Pharmacology and toxicology at Otago

We offer two specialised undergraduate degrees: a Bachelor of Science (BSc) majoring in Pharmacology and Toxicology, and a Bachelor of Biomedical Science (BBioMedSci) majoring in Drugs and Human Health. A minor in Environmental Toxicology is also available.

First year of study

To study pharmacology you must take both chemistry (CHEM 191) and biochemistry (BIOC 192) courses at the first-year level. You will also need to complete an additional two biomedical

science papers in an area such as cell and molecular biology (CELS 191, BIOL 112, BIOL 123), or human body systems (HUBS 191, HUBS 192).

Many students enrol in Health Sciences First Year (HSFY) and this will provide you with the requisite subjects to continue your study in pharmacology and toxicology.

Second year

You can choose to pursue pharmacology as your major, in which case you will take two core papers (PHAL 211 and PHAL 221) which cover the basic principles of pharmacology, toxicology and drug discovery, and will introduce the major drug classes currently used to treat disease.

For students who wish to include pharmacology and toxicology as part of their studies in other areas, the semester 2 paper PHAL 221 provides an in-depth exploration of the process of drug discovery from basic research through to clinical use. This paper is the ideal addition to any biomedical science course.

Third year

The four papers on offer allow students to explore key topics in depth, including neuropharmacology (PHAL 303), clinical pharmacology (PHAL 304), molecular and immunopharmacology (PHAL 305), and toxicology (PHAL 306).

Background required

There are no secondary school subject requirements for entry into pharmacology. Students must meet the prerequisites for entry into second-year papers as outlined in the University Guidelines and are encouraged to maintain chemistry and biology to Year 13.

Teaching style

As a small department, we have a friendly and helpful relationship with our students and our teaching staff routinely receive excellent feedback. All pharmacology and toxicology papers are taught through a combination of lecture/tutorials and laboratory practical

sessions. Practical sessions range from the use of modern cellular techniques through to human clinical trials.

Research at Otago

All our teaching staff are engaged in cutting-edge pharmacology and toxicology research, seeking to develop new drugs and address toxicological problems. Areas of particular expertise include:

- Cancer drug development and treatment.
- Cardiovascular health and cardioprotection.
- Inflammation and wound healing.
- Neuropharmacology and auditory pharmacology.
- Toxicology, environmental and human.
- Cannabinoids.

Postgraduate opportunities

There are many postgraduate study opportunities including honours, master's and PhD degrees specialising in either pharmacology or toxicology. Research students work in our established laboratories using a range of modern techniques. Interdisciplinary research is available through the MSc in Toxicology which permits study across multiple departments.

Careers

Graduates of our department go on to a wide range of careers including research, governmental, administration and advisory positions. Major employers include the National Poisons Centre, MedSafe, Pharmac, the Ministry of Health, universities, Crown Research Institutes and pharmaceutical companies. Pharmacology and toxicology are also popular choices for students seeking a career in the professional medical sciences (e.g. medicine or pharmacy) or those pursuing a double degree in law, commerce or education.

PROFILE

Brad Sutherland

Bachelor of Science with Honours (Pharmacology), PhD (Pharmacology)

Brad Sutherland's degrees in pharmacology have landed him a prestigious postdoctoral research fellowship at Oxford University, proving that an Otago qualification really can take you anywhere.

Brad's journey started at secondary school where he studied all the sciences. From there, he enrolled in the Health Sciences First Year (HSFY) programme at Otago.

"This sparked my interest in both health sciences and the use of scientific progress to treat clinical disease."

After HSFY, Brad began his studies in pharmacology, diving into subjects such as anatomy, physiology and biochemistry. One challenge for pharmacologists is the need to understand all of these subjects, but this also means they can approach scientific problems from many different angles.

"The pharmacology course was excellent, with excellent lecturers and lab demonstrators. The labs were the most fun. There are not many places where you can do scientific experiments on yourself, but you can here."

For Brad, the fun – and challenges – continued as he went on to complete a BSc(Hons) and a PhD in Pharmacology.

"The degrees that I obtained at Otago have given me the confidence and ability to transfer my research skills to one of the leading stroke research facilities in the world."

The future for Brad is just as exciting with many options available to him in academia, research, drug regulation, policymaking, or industrial science, where he could be involved in developing new drugs or strategies to treat disease.



For questions about
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otago.ac.nz/pharmacology

