



Microbiology and Immunology

What can't be seen matters

“Microbiology research is vital to a sustainable future in almost every major industry.”

Pramit Patel
Microbiology and Immunology graduate

Microbes are essential for maintaining life on Earth. They comprise more than 50 per cent of the life forms on our planet, yet only around 1 per cent have been identified and studied. Infectious microorganisms, including bacteria and viruses, can attack our bodies and we rely on our immune system to protect us. Thus the relationship between microbes and immune cells is critical for our survival.

The University of Otago is the only institution in New Zealand offering bachelor's degrees in both Microbiology AND Infection and Immunity. The courses provide insights into the unseen world of microbes and the immune system, and an understanding of the practical applications arising from their study.

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Why study Microbiology and Immunology?

Microorganisms are everywhere – in our bodies, our food, the air, soil, and water. Because they're everywhere, they're involved in almost every aspect of our lives.

They are used in producing foods such as cheese, wine, and beer, as well as many pharmaceutical, chemical and agricultural products. They are important for soil fertility and the decomposition of materials but can cause major diseases in humans, animals and plants.

The harmful effects of some microorganisms link microbiology with immunology. Immunologists investigate how we can protect humans and animals from infectious diseases by using vaccines, and the role of the immune system in non-infectious diseases such as cancer.

Background required

There are no first-year papers labelled microbiology or infection and immunity. Instead, you take papers relating to the biology of cells and human health that include significant coverage of these subjects. You will also take a paper in biological chemistry, so it is helpful to have studied Year 13 Biology and Chemistry.

Career opportunities

An Otago graduate of Microbiology and Immunology will be limited only by their imagination.

Recent developments in fields such as biotechnology, aquaculture, molecular biology, microbial genetics, immunology and medicine have increased the demand for graduates with a microbiology and immunology major. The range of job opportunities continues to expand. Along with the traditional areas of teaching and research, graduates work in medical or veterinary laboratories and biotechnological and agricultural industries. Graduates are also employed as managers and advisers in government agencies.

Graduates with Microbiology and Immunology qualifications find employment in a wide variety of areas.



Microbiology and Immunology degrees

Microbiology is offered as a major for a three-year Bachelor of Science (BSc) degree. We also offer the Infection and Immunity major for a Bachelor of Biomedical Science (BBiomedSc) degree. The BSc will train you in all aspects of microbiology, immunology and virology whereas the BBiomedSc emphasises biomedical subjects. Both can also be taken at honours level, which is an additional one-year programme that includes a significant research project.

The Department also contributes to the teaching of microbiology, immunology, genetics, medicine, and medical laboratory science degrees.

What will I learn?

In your first year, which covers general biology and chemistry subjects, you will learn about the diversity of microorganisms, microbial virulence and diseases and gain basic knowledge of the immune system and how it functions.

In your second year, specialist microbiology and immunology papers will introduce you to microbes in health and disease, immunology, applied and environmental microbiology, microbial plant and animal interactions, biotechnology, ecology, environmental microbiology, molecular genetics and microbial genetics.

In your third year, the papers offered build on your knowledge from second year. Topics cover food production and safety, microbial disease and antibiotic resistance, the body's response

to diseases, microbial ecology, molecular microbiology and virology.

How will I study?

First-year papers are taught through lectures and laboratory sessions and self-directed tutorials. Second- and third-year classes are also taught through lectures and laboratories but encourage more independent thinking and initiative. In your third year, you will collaborate with other students and improve your oral communication and research skills. Laboratory classes are exciting and hands-on, with modern state-of-the-art facilities. Assessment is by a combination of written examination and internal assessment.

What about further study?

Fourth-year honours or PGDipSci students undertake an original research project and can continue to further postgraduate study, such as an MSc or a PhD. The department has a reputation for a collegial and constructive environment that enables students to achieve to the best of their ability.



PROFILE

Pramit Patel ^{MSc}

Senior Technician, Analytica Laboratories, Hamilton

Pramit Patel found his degree in Microbiology and Immunology an excellent gateway to a biotechnology career. The bachelor's course provided a solid foundation, allowing him to study a broad range of topics and decide what most interested him. A subsequent master's degree then allowed him to apply his critical thinking skills to real-world situations.

"The practical component of the research showed me how incredibly relevant microbiology is. Some of the biggest global issues we are facing today can be improved with the right drive and skillset."

Pramit now leads a commercial pollen analysis service, extracting and testing pollen from honey samples to determine its botanical and geographical origin.

This experience has shown him that commercial sciences are diverse and always on the move. A career in biotechnology will grow as quickly as the technology does, and a role with a commercial client focus will expand as customers modify their businesses to adapt.

Pramit says he is glad he left university with the skills and confidence to develop and test his own scientific ideas.

"On any given day I'm developing and validating new methods to make processes quicker and easier for our clients."

Thinking outside the box and engaging in design processes are endeavours many people might not associate with a career in science, but Pramit says he has found them critical to commercial research and development. He enjoys how this makes his work environment innovative and exciting. At the end of the day, he also gets the satisfaction of seeing his ideas at work in real commercial settings.

"Studying a master's has given me the theoretical and practical skills to form solutions to complex ideas both analytically and creatively. I enjoy the fact that in my role, my creativity is as valuable as the technology I use."



For questions about
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micro.otago.ac.nz

