UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND
SAPERE AUDE

# Microbiology and Immunology

## What can't be seen matters

"Without microbiological processes, life on our planet would grind to a halt! Microbes are everywhere on earth, and that makes my degree relevant to everyone."

**Lisa Flanagan**
Microbiology and Immunology Graduate

Microbes are essential for maintaining life on Earth. They comprise more than 50% of the life-forms on our planet, yet only around 1% have been identified and studied. Infectious microorganisms such as 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 bachelors' degrees in both Microbiology, and Infection and Immunity. These 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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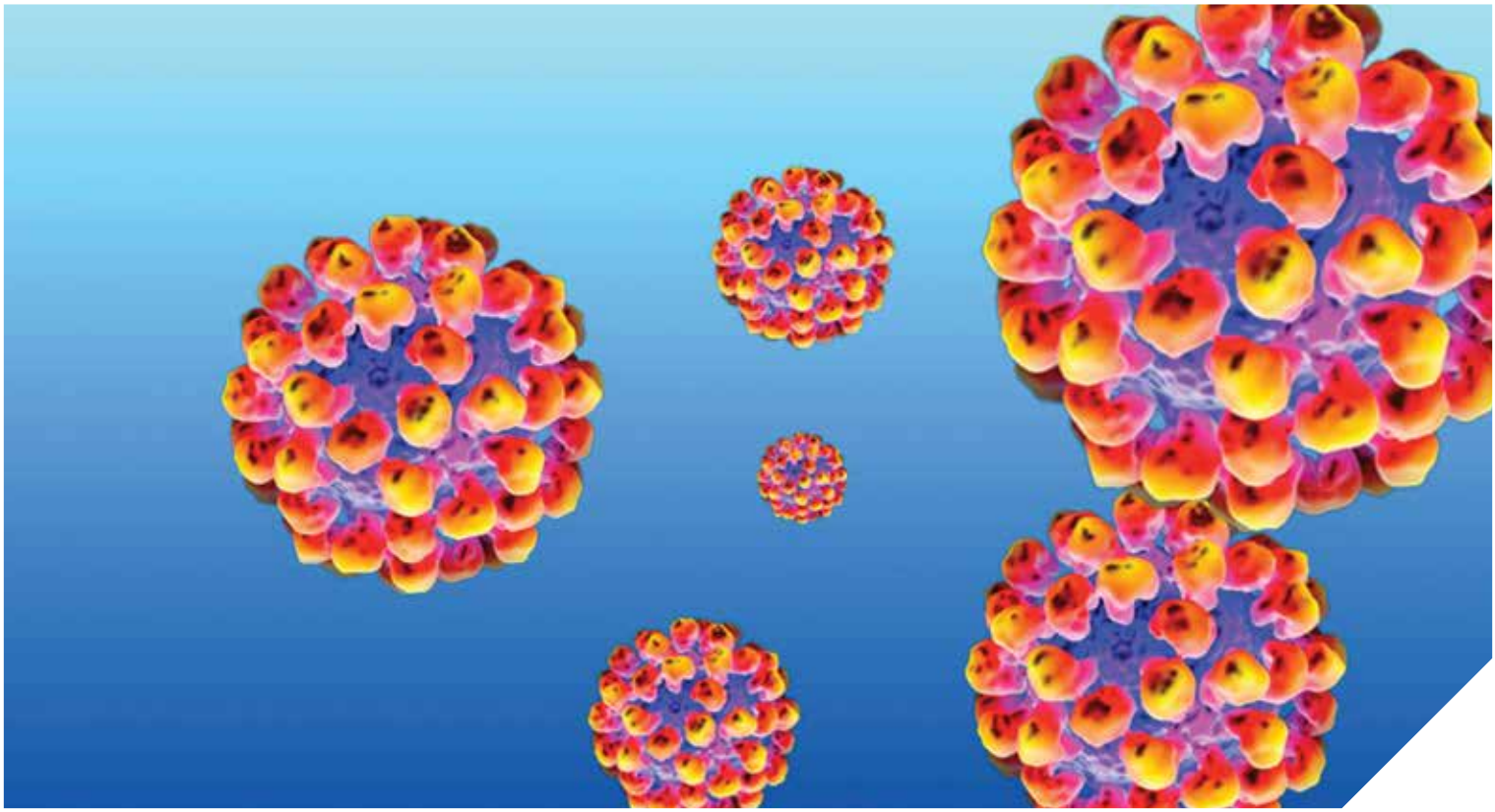

## Why study Microbiology and Immunology?

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.

Microbiology, immunology, and virology are exciting areas of research. As basic biological sciences, they are at the forefront of research into life processes. A Microbiology or Infection and Immunity major at Otago offers a variety of interesting and current topics with many practical applications, and opens up a wide choice of career options.

The Department of Microbiology and Immunology is staffed by many distinguished researchers, five of whom are Fellows of the Royal Society of New Zealand.

## Background required

There are no first-year papers labeled microbiology or infection and immunity – instead you take papers relating to the biology of cells and human health, which 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. The American Society for Microbiology states that: "In recent years there has been an explosion in the types of job opportunities that are available to those with microbiology training, since microbes and their actions pervade all aspects of our increasingly complex society."

Recent developments in fields such as biotechnology, aquaculture, molecular biology, microbial genetics, immunology, and medicine have increased the demand for graduates with microbiology and immunology majors. 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.

A microbiology degree can be used as a stepping-stone for entry into professional courses such as dentistry and medicine. Alternatively, postgraduate courses in the Department allow you to specialise in an area of your choosing and be a part of a world-class research environment.

## Microbiology and Immunology degrees

Microbiology is offered as a major for a three-year Bachelor of Science (BSc) degree. Also offered is an 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 in genetics, pharmacy, medicine, and medical laboratory science degrees.

## What does a BSc in Microbiology involve?

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, biotechnology, applied and environmental microbiology, molecular microbiology, and virology.

## Teaching style

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 examinations and internal assessment.

## Postgraduate study

Fourth-year honours or PGDipSci students undertake an original research project and can continue on 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 Lisa Flanagan

Lisa Flanagan is passionate about microbiology. "It's such an exciting field. It suits both those who want to go into industry and business, and those who want to pursue postgraduate study," she explains. "There also appears to be a huge shortage of microbiologists in industry, which means a job is highly likely at the end of your degree!"

Lisa finds microbiology and immunology interesting because vulnerability to infections and health problems are part of the human condition. "Without microbiological processes, life on our planet would grind to a halt! Microbes are everywhere on earth, and that makes my degree relevant to everyone."

Lisa realised she wanted to study with the Department of Microbiology and Immunology during her second year at the University of Otago. "The lecturers are passionate and inspiring, which makes the Department very popular," she says, "but the highlights of my degree were the third and fourth years. During these years, I was able to apply fundamental skills and build depth to my knowledge, particularly to my research skills. You also become very close to your small class and comfortable presenting and working in groups."

So where has Lisa's degree led her? She is now working as a Graduate Technologist in the Fonterra Graduate Technical Programme. "I never expected to go into the dairy industry," she admits, "but that is the great thing about this degree. It's really versatile and there are so many career options."

Since completing her degree, Lisa has discovered that there is a wealth of opportunities available for microbiologists. "It's such a fascinating industry to be in, both now and in the future. So much is undiscovered and unknown."

For questions about Microbiology and Immunology

otago.ac.nz/microbiology

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