



# Genetics

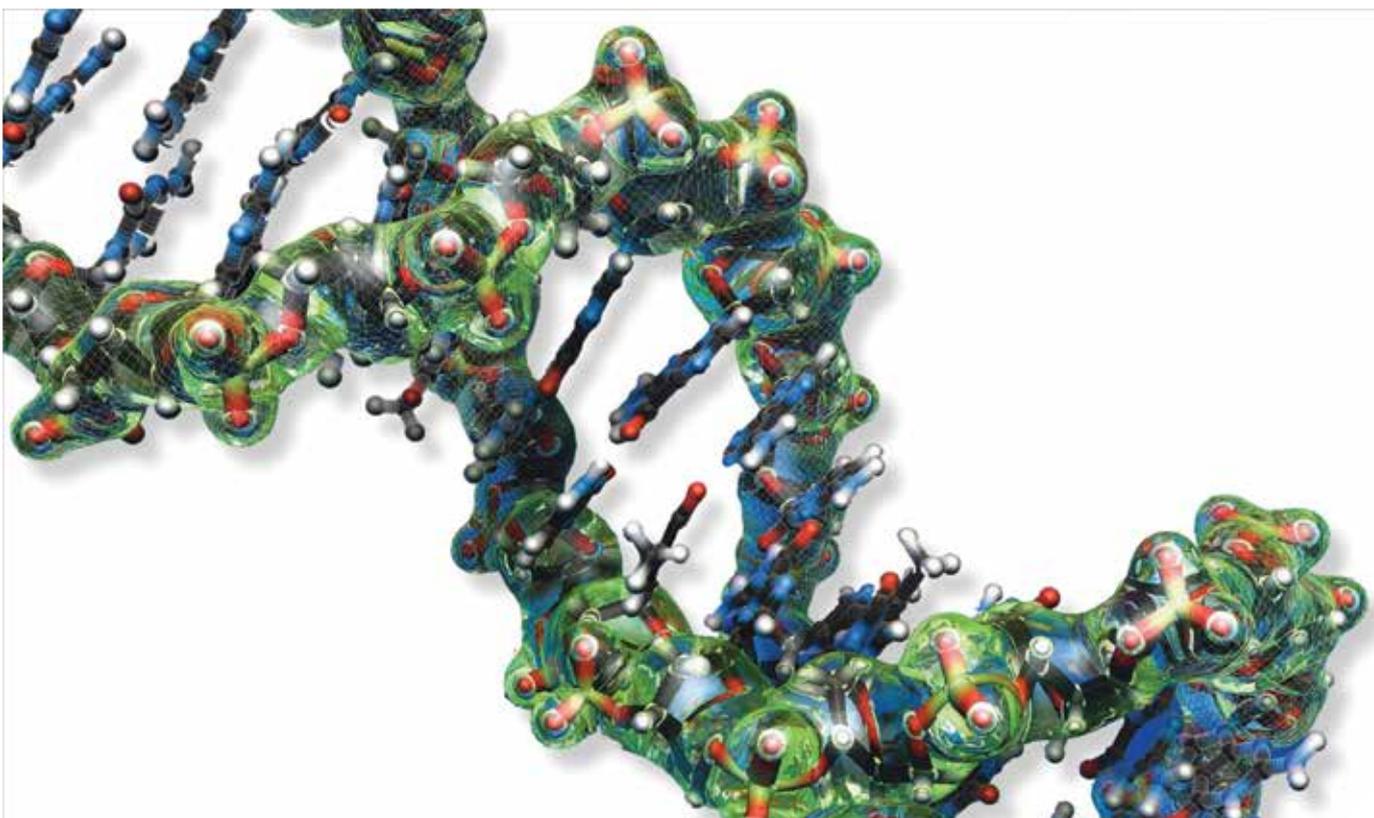
Our past, our present, our future

"Genetics is focused at the elemental level of biological principles and systems. Due to the infancy of many genetic theories it provides a promising and exciting future with the potential to create change."

Kieran Hyslop BSc Graduate

The world of genetics is enormous. It touches our everyday lives in ways we can't even begin to imagine. Genetics is a rapidly-progressing science, a central theme of modern biology, and a critical component of most biological research. With a high demand for genetics graduates within New Zealand and overseas, a degree in this ground-breaking and practical discipline will provide you with many career options.

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## Genetics at Otago

Genetics is a rapidly-progressing science, a central theme of modern biology, and an indispensable component of most biological research.

The Genetics programme at Otago is taught on an interdepartmental basis, drawing together the departments of Biochemistry, Botany, Microbiology and Immunology, Pathology, Women's and Children's Health, and Zoology. This allows staff and students to interact and share ideas across a broader sphere than is possible in any one department.

### Why should I study Genetics?

Genetics is the study of genes and inheritance. It's fun, interesting, challenging, and relevant to everyday life! It's a very diverse subject, in which you'll learn about the molecular basis of life right through to the study of whole organisms, populations, and evolution.

You will learn to make informed decisions about topics such as genetic engineering, cloning, and your own health. In your lectures, you'll also learn about the cutting-edge research being undertaken at Otago. You'll also have many opportunities to undertake hands-on research.

### Background required

You need to have an interest in the world around you! Year 13 chemistry, biology, and mathematics are strongly recommended (but not essential).

### What papers do I take for a BSc?

You must pass *CELS 191 Cell and Molecular Biology* and *CHEM 191 The Chemical Basis of Biology and Human Health* in your first year to major in genetics from the second year. It is also recommended that you take *BIOC 192 Foundations of Biochemistry*.

Material from these papers forms the foundation for the compulsory 200-level genetics papers:

- GENE 221 Molecular and Microbial Genetics
- GENE 222 Genes, Chromosomes and Populations
- GENE 223 Developmental and Applied Genetics

In second year, we also recommend you take at least one of:

- BIOC 221 Molecular Biology
- MICR 221 Microbes to Medicine
- ZOOL 222 Evolutionary Biology

In third year, you need to take at least four of the following papers:

- BIOC 352 Advanced Molecular Biology
- GENE 312 Evolutionary Genetics
- GENE 313 Medical Genetics
- GENE 314 Developmental Genetics
- GENE 315 Genomes
- MICR 335 Molecular Microbiology

Other papers are also possible depending on your interests.

### Can I combine my Genetics degree with other subjects?

Yes! Genetics and almost anything is a marketable and desirable combination. Popular subjects include law, commerce, bioethics, mathematics, statistics, information science, and computer science. You can combine genetics with other biological sciences such as anatomy, biochemistry, botany, microbiology, and zoology; and other science subjects such as anthropology, geology, and psychology. It is also possible to take genetics papers as part of a BBiomedSc degree. In particular, genetics is an integral component of the Reproduction, Genetics and Development major.

### How will I study?

Genetics is an experimental science with a strong theoretical background, so you will have a combination of lectures and lab-based practicals.

The lab classes in second and third year are extremely varied. You'll examine everything from viruses and bacteria through to fruit flies, worms, and humans. For example, in second year you create genetically-modified bacteria and test for genetically-modified organisms in supermarket products. During third year you'll have the opportunities to look at your own chromosomes, and to analyse a portion of your own DNA to determine which 'Daughter of Eve' you are descended from. You also get to design and carry out your own group projects. Computer simulation labs enable you to study evolutionary genetics.

### Postgraduate study options

A Bachelor of Science (BSc) in genetics can lead to a postgraduate Bachelor of Science with Honours (BSc(Hons)), Master of Science (MSc), or PhD degree. You can apply to enter these postgraduate programmes during the third year of your BSc.

### Career opportunities

Graduates with a genetics degree from Otago can be found all over New Zealand and around the world, doing all sorts of interesting things. A degree in genetics gives you a wide range of marketable skills suitable for employment in biologically-based industries, research organisations, and government departments. You could be a research associate, policy analyst, biotechnologist, conservation worker, or biosecurity analyst, to name but a few!

With further study you could be a patent lawyer, science journalist, or a researcher in human, animal, plant, or microbial genetics. A genetics degree from Otago also provides an excellent foundation for the further training required to be a genetic counsellor or forensic scientist.

## PROFILE

### Kieran Hyslop BSc Graduate

The way that genetics unravels many of the evolutionary, medical, and developmental mysteries of the world really appealed to Kieran Hyslop, who long had an interest in biology and other sciences.

"Genetics is focused at the elemental level of biological principles and systems," he explains. "Due to the infancy of many genetic theories it provides a promising and exciting future with the potential to create change."

Aware of Otago's international reputation, Kieran says he chose to study at Otago because it "provided a fun environment while still maintaining a reputable status amongst tertiary education providers."

"The staff added character to a subject often feared for its complexities," he says. "The lecturers presented their material in an interactive and memorable manner, and the practical laboratory sessions reinforced key components from the lecture material."

Kieran participated in ongoing research that ranged from sequencing New Zealand isolates of an amphibian fungal pathogen, to mapping central nervous system development in flies. These hands-on lab experiences equipped him well for his current position as a Laboratory Technician within Fonterra's Microbiology Department.

At Fonterra, Kieran's involved in the testing and analysis of in-process and final product dairy produce from lower North Island sites including Whareroa – the largest dairy ingredients manufacturing site in the world.

In future Kieran hopes to apply his knowledge and practical skills to scientific research, or perhaps pursue further study in genetics. After all, he says, he still has a "desire to learn more in this exciting science discipline."



For questions about  
Genetics  
[otago.ac.nz/genetics](http://otago.ac.nz/genetics)

