Biological Sciences
2027

UC
UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Akonga Undergraduate

UC UNIVERSITY OF CANTERBURY | Biological Sciences
Pūtaiao Koiora

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Ngā kai o roto
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Tauti mai
Welcome

Biology is the study of life. Biologists investigate animals, plants, and microorganisms across a remarkable range of scales, from molecules and cells to whole organisms, populations, and ecosystems.

Studying Biology at UC will prepare you for a wide range of rewarding careers. Graduates go on to work in research, education, policy, conservation, environmental management, and frontline biosecurity, among many other fields. Our courses are designed to be engaging, challenging, and current, reflecting the fact that our lecturers are active researchers working at the forefront of the biological sciences.

Our commitment to teaching excellence is reflected in our achievements, including two National Tertiary Teaching Excellence Awards and seven UC Teaching Awards in recent years. We are also proud to host three Rutherford Discovery Fellows, a programme that supports New Zealand's most talented early- and mid-career researchers.

Some have suggested that the 21st century will belong to the biologist. Advances in technology have transformed our ability to understand and address complex biological challenges, from molecular genetics in the laboratory to sophisticated computer modelling of ecosystems. As our understanding of life continues to grow, biologists play an increasingly important role in shaping a sustainable and healthy future.

This handbook has been designed to help you plan your studies in Biology. If you have any questions, please get in touch.

Welcome to Biology at UC.

Equity, Diversity and Inclusion

The School of Biological Sciences recognises the inherent value of every individual and community. We celebrate diversity in all its forms, including gender, sexuality, ethnicity, religion, culture, and ability. We are committed to promoting equity, diversity, accessibility, and inclusion in science, and to fostering an environment free from bullying, harassment, and discrimination.

The School is also committed to upholding the principles of Te Tiriti o Waitangi and acknowledges the unique status of Māori as tangata whenua. These values underpin our teaching, research, and engagement with the wider community.

Need help? We're here for you

University life can be rewarding, but it can also be challenging. At times, personal circumstances, stress, anxiety, or other difficulties may affect your wellbeing and your ability to focus on your studies. You may even find yourself questioning your confidence or sense of belonging.

Please know that you are not alone, and support is available.

Your lecturers can work with you to identify ways to support your learning during difficult periods. You are also welcome to seek advice from the Biology Undergraduate Advisor or the College of Science Student Advisors.

UC's Student Care Team provides dedicated support for students experiencing personal or academic challenges. Their services are free and available to all students.

We encourage you to reach out whenever you need help. Looking after your wellbeing is an important part of your success at university.

UC is proud to partner with Ngāi Tūāhuriri and Ngāi Tahu to uphold the mana and aspirations of mana whenua.

Rainbow Diversity Support

Āhuatanga Ākonga
Student Profiles

Our undergraduate program is designed to develop your understanding of biological sciences through theory and practical activities. Our graduates perform diverse jobs all over the world, from remote villages to capital cities. UC is ranked in the top 3% of universities in the world. A degree from Canterbury is seen by the world as a quality degree and opens many doors.

Deane Thomas

BSc in Biological Sciences and Statistics

Master of Product Design

Deane Thomas combined her interests in biology, statistics, sustainability, and design to explore innovative solutions to environmental challenges. While studying at UC, she worked on a summer research project developing biodegradable 3D-printed materials for use in long-life pest-control lures, helping to support efforts to protect New Zealand's native biodiversity.

The project brought together expertise from Biological Sciences, Product Design, and the Department of Conservation, giving Deane valuable experience in research, problem-solving, and sustainable product development. Her work contributed to the development of environmentally friendly materials that could reduce waste while supporting biosecurity initiatives.

Deane says one of the biggest lessons she learned at UC was the importance of stepping outside her comfort zone and embracing new opportunities. Her advice to future students is simple: "Give everything a go and don't count yourself out too early."

Deane's journey highlights the flexibility of a Biology degree and the opportunities it creates to combine science with innovation, sustainability, and real-world problem solving.

Farrel Maulana Arsy

BSc in Biological Sciences

Growing up in Jakarta, Indonesia, Farrel Maulana Arsy developed a fascination with marine life and the ways organisms interact with their environment. That curiosity led him to study Biological Sciences at the University of Canterbury, where he could combine classroom learning with hands-on research in laboratories and at field stations across the South Island.

Farrel particularly values the practical nature of the programme, which allows students to apply what they learn through fieldwork and research projects. Through his ecology courses, he has gained experience collecting and analysing data in real-world environments while working alongside researchers and fellow students.

As a recipient of a UC International First-Year Scholarship, Farrel was able to focus on making the most of his university experience. He has enjoyed studying in Christchurch's welcoming and multicultural environment and encourages future students to stay curious, ask questions, and take advantage of the support available.

Farrel plans to continue into postgraduate study, with a particular interest in marine ecology. His journey highlights the opportunities Biology students have to gain practical experience, develop research skills, and pursue their passion for understanding and protecting the natural world.

Flynn Adcock

Certificate in University Preparation (CUP)

BSc in Biochemistry

MSc in Microbiology

After several years working in retail management, Flynn Adcock decided to pursue a new challenge and enrolled at UC to study science. Beginning with the Certificate in University Preparation (CUP), he built the foundations needed to complete degrees in Biochemistry and Microbiology.

Through his studies, Flynn developed practical laboratory and research skills, culminating in a master's project investigating interactions between different groups of bacteria. His research combined laboratory experimentation with fieldwork in geothermal environments, providing valuable experience in scientific investigation.

A highlight of Flynn's postgraduate journey was winning UC's Thesis in Three competition and placing runner-up at the national finals, strengthening his science communication and public speaking skills.

Following graduation, Flynn began a career in the food industry as a Quality Assurance Manager, helping ensure food safety and supporting the development of new food products. His advice to future students is simple: "Once you have acquired the fundamentals, everything else will fall into place."

Tāura Maruwehi Inspirational Alumni

Dr James (Jamie) Ataria

Rongomaiwahine, Ngāti Kahungunu, Ngāti Raukawa

BSc 1991 | MSc 1994

Dr James (Jamie) Ataria has built a distinguished career by bringing together Māori knowledge and scientific research to address environmental challenges. His work has spanned research, education, governance, and community engagement, earning recognition as a leader within both the Māori and scientific communities.

After completing his studies at UC, Jamie undertook a postdoctoral fellowship at Manaaki Whenua Landcare Research, where he later became a Senior Scientist. He also held a joint appointment as Senior Māori Lecturer at Lincoln University, helping to strengthen connections between science, mātauranga Māori, and environmental management.

Today, Jamie contributes to research and leadership initiatives through roles with the Bio-Protection Research Centre, Cawthron Institute, and Ngā Pae o Te Māramatanga. His research brings together scientists, communities, and end users to support more inclusive approaches to environmental decision-making and resource management.

Reflecting on his career, Jamie demonstrates how a Biology degree can lead to opportunities that combine scientific excellence, cultural leadership, and meaningful contributions to communities and the environment.

Dr Wafaa Al-Hussainni

PhD in Biochemistry, 2018

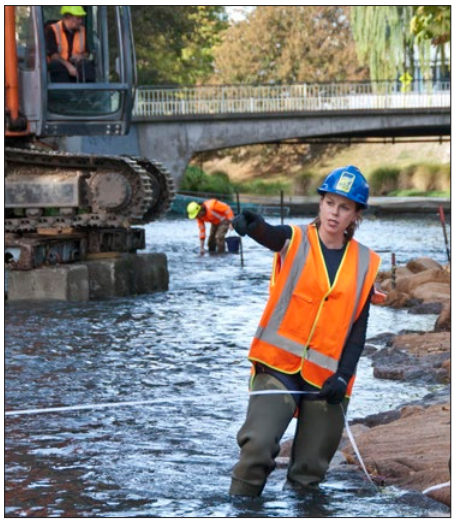
Dr Wafaa Al-Hussainni's lifelong fascination with biochemistry has taken her from clinical laboratories and public health leadership in Iraq to cancer research at the University of Canterbury and back again.

After completing a BSc in Biochemistry in 1992, Wafaa held a range of scientific and leadership positions, including biochemist in a kidney transplant unit and Director of Medical Laboratories for Baghdad's Al-Rusafa district. In 2013, she moved to New Zealand to pursue a PhD in Biochemistry at UC. Despite being far from her family, she found a welcoming and supportive community within the School of Biological Sciences and became a valued contributor to School life, including initiatives such as the Biological Sciences International Food Festival.

Her doctoral research investigated receptors involved in ovarian cancer cell growth, contributing to a better understanding of potential therapeutic targets. Her findings were published in the international journal Cancer Letters.

Following her return to Iraq, Wafaa took on the demanding role of Director of the Central Public Health Laboratories, leading responses to public health threats and disease outbreaks at a national level. She is currently a Health Security Partners Fellow and a lecturer in the College of Medicine at Ibn Sina University.

Wafaa's career demonstrates how a passion for biochemistry can lead to opportunities in research, healthcare, leadership, and public service, creating impact at both community and national levels.



Shelley McMurtrie

BSc 1996 | MSc 2001

Shelley McMurtrie has built a career at the intersection of freshwater science, environmental restoration, and science communication. Combining a passion for aquatic ecology with a commitment to practical solutions, she co-founded EOS Ecology, an environmental science and visual communication consultancy focused on protecting and restoring New Zealand's freshwater and estuarine ecosystems.

As Co-Director and Principal Scientist, Shelley leads research and consulting projects that help communities, councils, and organisations make informed decisions about environmental management. Her expertise in the impacts of urbanisation on aquatic ecosystems and the rehabilitation of waterways has made her a recognised leader in freshwater science.

Following the Canterbury earthquakes, Shelley played a key role in the ecological revitalisation of Christchurch. She was appointed Ecology Technical Lead for major city regeneration projects, including Te Papa Ōtākaro/Avon River Precinct, where she helped guide one of New Zealand's largest urban waterway restoration programmes.

Alongside her professional work, Shelley is an active contributor to community and environmental organisations, regularly volunteering her expertise to support conservation and ecological education initiatives.

Shelley's career highlights how a Biology degree can lead to opportunities that combine scientific research, environmental stewardship, leadership, and meaningful community impact.

Kia whakaweawe āu akoranga
Learn with real impact

The community benefits of learning

Many courses in Biological Sciences are designed to teach students in the context of the "real world". Our courses include a range of activities and outputs that benefit communities, allowing students to contribute while they learn.

Seeking answers for our communities

Courses in **Marine Biology and Ecology** (BIOL 212) and **Science, Maori and Indigenous Knowledge** (SCIM 101) interact with Kaikoura coastal communities. Students learn through field work designed to help answer specific community generated questions relating to the health and future of their marine environment. The new knowledge generated by the students is an especially important contribution after the recent earthquakes as the locals attempt to understand and adapt to the changed environment. Community engagement involves the rūnanga and both primary and secondary schools.

Developing public resources

Students of **Practical Field Botany** (BIOL 305) work together with participants from the Department of Conservation, Environment Canterbury and other organisations to document the plant species in the Cass-Craigieburn-Arthur's Pass area. They collect plant specimens for the UC herbarium and contribute their observation data and photos to public websites such as iNaturalist and the Cass Mountain Research Area Plant Checklist.

Participating in decision making

In **Molecular Genetics** (BIOL 333) students write a submission to a regulatory agency, such as the Environmental Protection Authority (EPA) or the Food Standards Australia New Zealand (FSANZ), as per a publicly notified consultation request. They review the scientific studies supplied to the agency and conduct a critique, with the option to submit this to the agency and thus also participating in the consultation process.

Kia rite ki te korara
Prepared to make a difference

Get hands-on with real-world experiences

Hands-on experiences through the investigation of real world problems and scenarios are an important way to learn at UC. The learnings from these activities and experiences add to each student's toolkit of transferable skills to be applied in their future career, and life as a scientifically literate citizen.

Real life situations

As part of **Advanced Microbiology** (BIOL 313), students write a scientific report, about a microbe that they isolate, in the format used by water monitoring officials. Laboratory classes are complemented by an open lab that allows students to individually plan and conduct experiments. The open labs allow students to develop time management skills and valuable hands-on experiences under real life situations to develop their skills. This specifically includes experimental failure and good microbiological laboratory practise.

A global view

Investigating contemporary global genetic engineering projects of plants is part of **Plant Development and Biotechnology** (BIOL 352). Students reflect on environmental and food safety issues as well as public perceptions of genetic modifications of plants. By the end of the course they are prepared to make an informed difference in contributing to public debates on genetically modified organisms (GMOs).

With a New Zealand context

The **Global Change and Biosecurity** (BIOL 377) course has a two-day research workshop in which students work in teams to assess the ability of potentially invasive species to survive in NZ, both now and with a changing climate. They then consider and model the possible impacts of that invader on a New Zealand ecosystem.

Work ready skills

Students in **Marine Ecosystems** (BIOL 384) develop hands-on sampling techniques that are used in contract work on biodiversity monitoring of near-shore marine communities, such as for the Department of Conservation. Students write reports based on industry standards, and give presentations that stress problems, avenues to solutions and results of experimental testing. The combination of species identification, structured sampling, and oral and written reporting provides good grounding for applied research and future employment.

Mātai Koiora ki UC
Biology at UC

Biology helps us understand life and solve some of the world's most important challenges, from protecting biodiversity and improving human health to developing sustainable technologies for the future.

At UC, our Biology major provides a broad foundation in the biological sciences while allowing you to develop expertise in the areas that interest you most.

Our teaching is informed by active research and spans five interconnected areas of biological science:

- **Biochemistry** – the chemistry of life
- **Bioinformatics** – using data, statistics, and computing to understand biological systems
- **Molecular Biology, Microbiology and Systematics** – exploring genes, microorganisms, biodiversity, and evolutionary relationships
- **Cell and Organismal Physiology** – understanding how cells, tissues, plants, and animals function
- **Ecology, Evolution and Behaviour** – investigating how organisms interact with each other and their environments

Together, these areas reflect the breadth of modern biology and provide pathways into biotechnology, conservation, biosecurity, health, environmental management, and data science.

We offer more than 40 undergraduate courses taught by researchers with expertise spanning genetics, ecology, physiology, conservation biology, microbiology, biochemistry, biotechnology, and bioinformatics. Many courses include laboratory, field, and research-based learning, giving you opportunities to develop practical skills alongside theoretical knowledge.

At a glance

- 40+ undergraduate courses
- Internationally accredited Biology major
- Field stations and sites across New Zealand and overseas
- Research-active teaching staff
- Pathways into research, industry, conservation, health and biosecurity

Entry to Biology

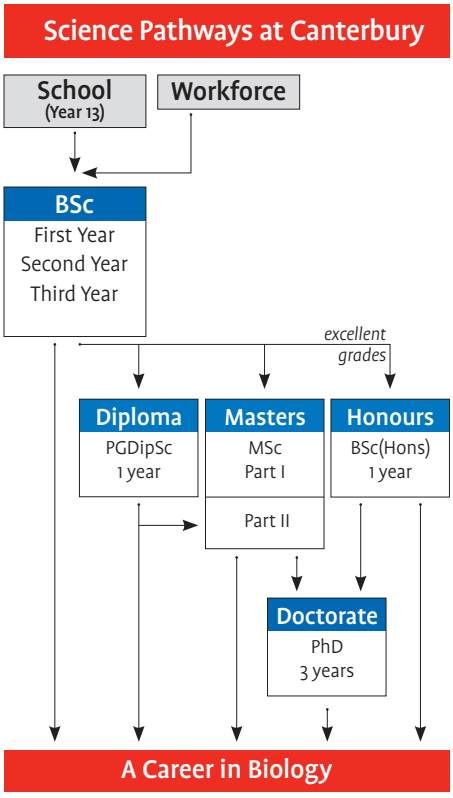
Entry into Biological Sciences is straightforward. We recommend studying mathematics with statistics at Year 13, but students from a wide range of backgrounds successfully study Biology at UC. The diagram opposite illustrates some of the pathways available from undergraduate study through to postgraduate qualifications and research careers.

Should I Study Biology or Environmental Science?

Choose **Biology** if you are most interested in understanding living organisms and biological systems. Topics include ecology, evolution, conservation, genetics, physiology, microbiology, behaviour, biotechnology, and biosecurity.

Choose **Environmental Science** if you are interested in the interactions between people and the environment, including sustainability, environmental management, natural hazards, resource use, and climate change.

Many students combine these interests through a double major in Biological Sciences and Environmental Science, developing a broad skill set for addressing complex environmental challenges.



Internationally Accredited Biology major

The Biological Sciences major at UC is accredited by the Royal Society of Biology (RSB) in the United Kingdom, making it the first Biology degree in New Zealand to receive this internationally recognised accreditation.

Accreditation recognises degrees that provide a strong foundation in biological knowledge, practical scientific skills, and transferable professional capabilities. It gives students confidence that their degree has been independently assessed against international standards and prepares graduates for further study and employment in New Zealand and around the world.

Why accreditation matters

An accredited Biology degree helps you develop the knowledge, skills, and experience valued by employers and postgraduate programmes. Throughout your degree you will gain experience in:

- Laboratory and field-based scientific investigation
- Data analysis, problem-solving, and critical thinking
- Communication of scientific ideas to diverse audiences
- Teamwork, project management, and professional practice
- Independent learning and evidence-based decision making

These capabilities are embedded throughout the curriculum and developed progressively as you advance through your studies.

International recognition

RSB accreditation provides an internationally recognised mark of quality that demonstrates your degree meets the expectations of a leading professional body for the biological sciences. This can enhance your competitiveness in a global employment market and provide additional assurance to employers and postgraduate institutions.

Benefits for graduates

Graduates of accredited programmes are eligible for a complimentary year of membership with the Royal Society of Biology. Membership provides access to a global network of bioscience professionals, career development resources, professional recognition, and updates on emerging developments in the biological sciences.

For more information about accreditation and membership benefits, visit the Royal Society of Biology website.

See www.rsb.org.uk for more information about the Royal Society of Biology

Whakamaheretia
Planning Your BSc in Biology

Biological Sciences Major

A Bachelor of Science (BSc) majoring in Biological Sciences provides a flexible pathway through one of the most diverse areas of science. The major combines a broad foundation in biology with opportunities to specialise in areas such as ecology, conservation, biotechnology, genetics, physiology, bioinformatics, and biochemistry.

All Biology majors complete a common first-year foundation that introduces the core concepts and skills used across the biological sciences. As you progress through your degree, you can build expertise in areas that interest you most by selecting courses from one or more of our recommended themes.

To complete a Biology major, students must include:

BIOL 111, BIOL 112, BIOL 113

BIOL 209 Introduction to Biological Data Analysis

SCIE 101 Science, Society and Me

STAT 101 Statistics 1 (unless exempt through NCEA Level 3 Mathematics with Excellence)

Students considering postgraduate study should strongly consider including BIOL 309 Experimental Design and Data Analysis for Biologists in their degree.

Minor in Biology

A student intending to minor in Biology needs at least 75 points in Biology, which must include at least 45 points at 200-level or above.

Need More Maths or Chemistry?

Not everyone arrives at university with a strong background in mathematics or chemistry. If you would like to strengthen your skills before progressing to higher-level Biology courses, UC offers introductory courses designed specifically for students entering the sciences:

MATH 101 Methods of Mathematics

CHEM 114 Foundations of Chemistry

These courses provide a supportive pathway into university-level science and are strongly recommended for students who have not studied these subjects at Year 13.

If you're unsure which courses are right for you, our advisors are happy to help.

Choosing your first-year courses

Most students begin with the three core Biology courses:

BIOL 111 Cellular Biology and Biochemistry

BIOL 112 Ecology, Evolution and Conservation

BIOL 113 Diversity of Life

Together, these courses provide an introduction to the breadth of modern biology and help you identify the areas that most interest you. You will also complete SCIE 101 and either STAT 101 or an approved equivalent.

Additional first-year options include:

BIOL 116 Human Biology

SCIM 101 Science, Māori and Indigenous Knowledge

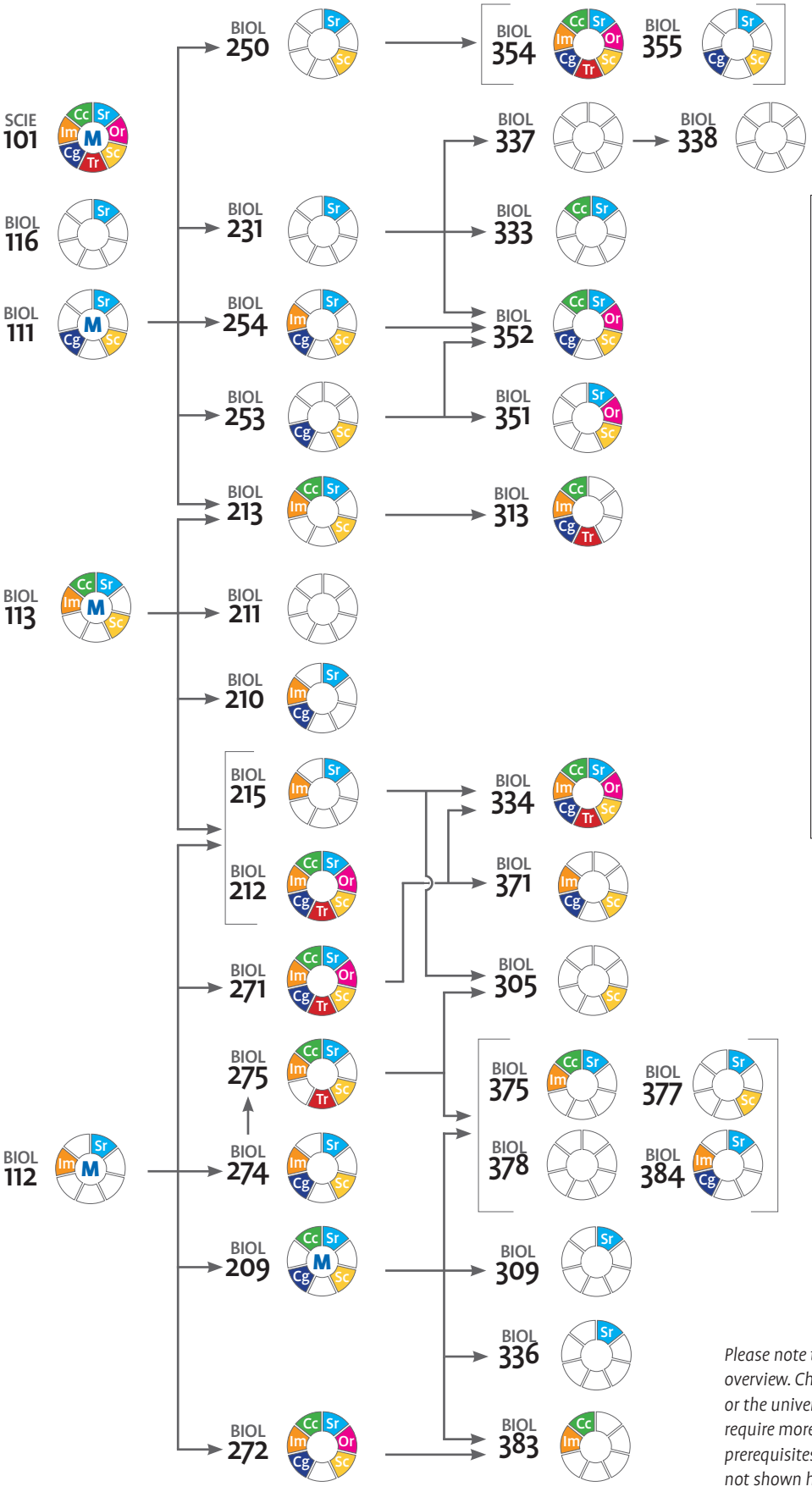
These courses complement the core Biology programme but do not replace the required first-year Biology courses.

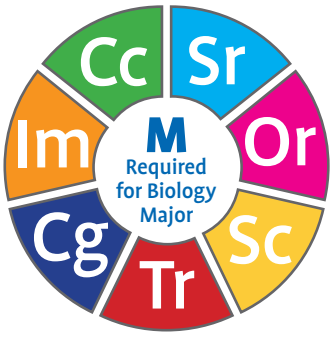
Choosing your second- and third-year courses

To help you plan your degree, we have grouped courses into a series of themes that reflect major areas of biological science. These themes are introduced on the following pages and provide suggested pathways through the programme.

Course map

Simplified overview of course pre-requisites and Bicultural Competence and Confidence (BiCC) touch points.





- **Sr** A process of self-reflection on the nature of 'knowledge' and 'norms'
- **Or** The nature of contemporary Māori organisational structures, e.g. rūnanga, hapū, iwi, iwi corporations
- **Sc** Traditional and contemporary realities of Māori society, e.g. tikanga and kawa, te reo Māori
- **Tr** The Treaty of Waitangi and Aotearoa New Zealand's bicultural history
- **Cg** The process of colonisation and globalisation
- **Im** Other indigenous models of development, knowledge and behaviours
- **Cc** Application of bicultural competence and confidence in a chosen discipline and career

Please note that this diagram is intended as a simplified overview. Check the course descriptions, online course details or the university calendar for full information. Some courses require more than one pre-requisite course, have alternative prerequisites or recommended preparation courses which are not shown here.

Kaupapa Mātai Koiora
Themes in Biology

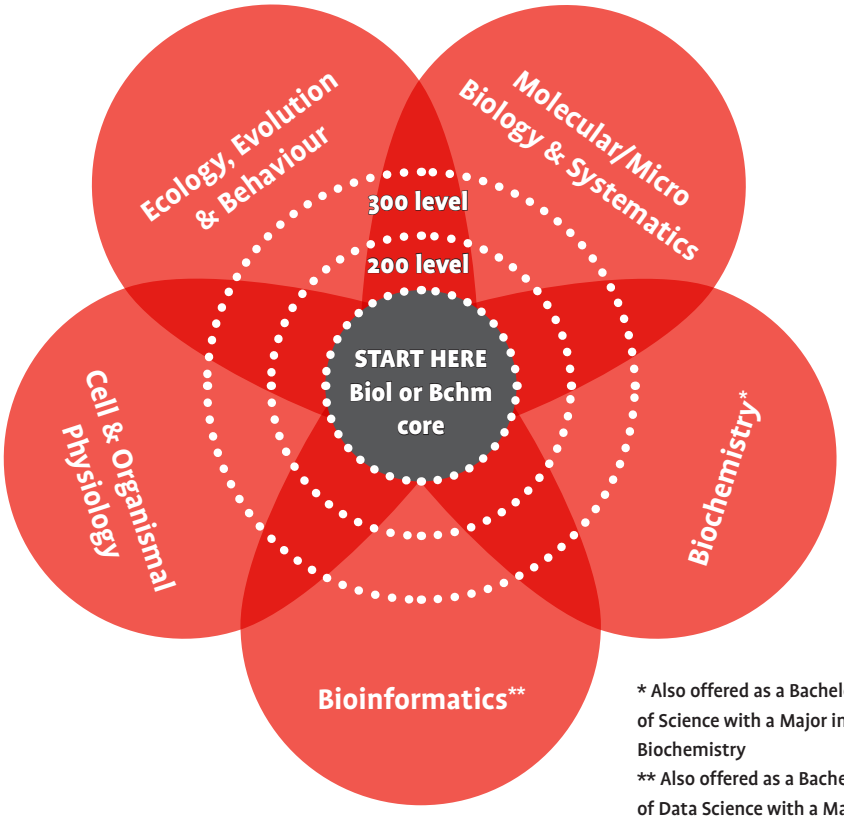
An overview of undergraduate Biology and Biochemistry at UC

The five themes shown in the diagram opposite represent major areas of modern biological science. They are designed to help you explore potential pathways through your degree and identify courses that align with your interests.

The themes are not formal specialisations, and many courses contribute to more than one area. Biology is inherently interdisciplinary, with connections between molecular biology, physiology, ecology, evolution, biotechnology, bioinformatics, and biochemistry.

Use the themes as a guide when selecting second- and third-year courses. Many students follow more than one theme, creating a programme that reflects their interests, career goals, and curiosity about the living world.

The following pages introduce each theme and provide examples of courses and career pathways associated with them.



* Also offered as a Bachelor of Science with a Major in Biochemistry
** Also offered as a Bachelor of Data Science with a Major in Bioinformatics

Need help planning?

Designing your Biology degree

Start by identifying the topics that interest you most. Then use the themes on the following pages to explore recommended courses and career pathways. Some students combine courses from multiple themes to create a degree that reflects their interests and goals.

Steps to designing your degree

Start with a 100 level core	Select a 200 level theme of courses	Select at least 4 300-level courses in your major	If planning postgraduate study add Biol 309 or BCHM 381	Select additional courses to match your interests	Ensure that you meet all requirements to graduate

Generalized Biological Sciences BSc degree structure

1	Biol 111	Biol 112	Biol 113	Stat 101	Scie 101	100 Level	100 Level	100 Level
2	200 Level	200 Level	200 Level	Biol 209	200 Level	200 Level	200 Level	100 Level
3	300 Level	300 Level	300 Level	300 Level	300 Level	300 Level	200 Level	200 Level

Biology major courses

Other science courses

Courses from science or other degrees

* Biology majors are strongly recommended to take some chemistry, such as CHEM 114.

This diagram shows the minimum requirements for a BSc degree with a major in Biology. Many students take more than 225 points above the 100 level, and most take more than 60 points in their major. Students must take BIOL 111, BIOL 112, BIOL 113, SCIE 101, STAT 101 and BIOL 209 in their degree, and BIOL 309 is strongly recommended, especially for potential postgraduate students. BIOL 309 cannot be used as part of the minimum 60 points needed at 300 level to major in Biological Sciences, but BCHM 305 and BCHM 306 can be used.

Checklist to a BSc major in Biology

The core requirements are, a minimum of:

- 60 points selected from BCHM 305, BCHM 306 and 300 level BIOL ..... ☐
- 90 points at 300 level ..... ☐
- 225 points at 200/300 level ..... ☐
- 255 points from science courses ..... ☐
- 360 credit points ..... ☐
- BIOL 111, BIOL 112, BIOL 113, SCIE 101, STAT 101 and BIOL 209 ..... ☐

Biochemistry

Biochemistry is a major, see the UC Calendar for regulations.

Choose this theme if you are interested in topics such as:

biotechnology, molecular biology, medical science, genetics, chemistry, drug discovery, and human health

How do cells produce energy? How do medicines work? What happens inside your body when you eat, exercise, or become ill?

Biochemistry explores the chemical processes that make life possible. By studying the molecules and reactions that occur within cells, biochemists help answer fundamental questions about health, disease, biotechnology, and the living world.

Biochemistry sits at the intersection of biology and chemistry. It investigates the molecules that make up living organisms and the reactions that allow cells to grow, communicate, reproduce, and respond to their environment. By understanding these processes, biochemists help solve problems in medicine, agriculture, biotechnology, and environmental science.

At its core, biochemistry focuses on molecules such as proteins, DNA, RNA, carbohydrates, and lipids. These molecules form the machinery of life, carrying genetic information, providing energy, building cellular structures, and controlling biological processes. Biochemists study how these molecules interact and how their functions change in health and disease.

One of the most exciting applications of biochemistry is in **human health and medicine**. Biochemists investigate the molecular causes of diseases such as cancer, diabetes, genetic disorders, and infectious diseases. This knowledge helps scientists develop new medicines, improve diagnostic tests, and create more effective treatments.

Molecular biology is closely linked to biochemistry and explores how DNA stores genetic information and how that information is used to build and regulate living organisms. Understanding these processes has led to advances in areas such as genetic engineering, biotechnology, and personalised medicine.

Biochemistry also plays a major role in **biotechnology and industry**. Biochemists work with enzymes, microorganisms, and biological systems to develop products ranging from pharmaceuticals and vaccines to foods, biofuels, and sustainable materials. Their work helps improve agricultural production, food quality, and environmental sustainability.

At UC, biochemistry combines knowledge from both biology and chemistry, giving students a strong foundation in the molecular sciences. You'll learn how modern laboratory techniques are used to investigate biological systems and gain insight into the chemical processes that underpin all living organisms.

By studying Biochemistry, you'll develop a deep understanding of life at the molecular level and gain skills that are valuable in research, healthcare, biotechnology, pharmaceuticals, agriculture, food science, and many other scientific fields. Whether you're interested in discovering new medicines, improving human health, or understanding the chemistry of life itself, biochemistry provides the tools to make a real-world impact.

Career pathways

Health and Medicine

Apply molecular knowledge to improve human health through diagnostics, therapeutics, and biomedical research.

Example careers

- Medical Laboratory Scientist
- Clinical Research Coordinator
- Biomedical Scientist
- Pharmaceutical Development Associate

Biotechnology and Industry

Develop products and technologies using biological systems and processes.

Example careers

- Biotechnology Specialist
- Food Technologist
- Quality Assurance Scientist
- Process Development Scientist

Research and Innovation

Investigate biological processes at the molecular level and contribute to scientific discovery.

Example careers

- Research Scientist
- Research Technician
- Laboratory Manager
- Science Communicator

Many graduates continue into postgraduate study, while others apply their scientific training in industry, government, education, consulting, and community organisations.

Useful links

UC Careers, Internships & Employment
www.canterbury.ac.nz/careers

Careers New Zealand
www.careers.govt.nz

My degree plan

Year 1 *BSc*			2			3			4 *BSc(Hons), PGDipSc, MSc part 1*	
Semester 1	Semester 2	Summer	Semester 1	Semester 2	Summer	Semester 1	Semester 2	Summer	Semester 1	Semester 2
BCHM 111	BCHM 112	*Optional*	BCHM 202	BCHM 222	*Optional*	BCHM 305	BCHM 306	*Optional*		
	SCIE 101	*Optional*	BCHM 212	BCHM 281	*Optional*	BCHM 338	BCHM 339	*Optional*		
			BCHM 253				‡			

‡ BCHM 381 if considering postgraduate study

100 level courses

BCHM 111	Cellular Biology & Biochemistry (S1)
BCHM 112	Structure and Reactivity in Chemistry and Biochemistry [1] (S2)
SCIE 101	Science, Society & Me (S2)

200 level courses

BCHM 202	Foundations in Molecular Biology (aka BIOL 231) (S1)
BCHM 212	Chemical Reactivity (S1)
BCHM 222	Biochemistry B - Metabolism; the reactions of molecules in cells (S2)
BCHM 253	Cell Biology 1 (aka BIOL 253) (S1)
BCHM 281	Practical Biochemistry (S2)

300 level courses

BCHM 305	Protein Science (S1)
BCHM 306	Biochemical Pathology (S2)
BCHM 338	Chemical Biology & Protein Chemistry (S1)
BCHM 339	Bioinorganic & Bioorganic Chemistry (S2)
BCHM 381	Biochemical Techniques (S2) [2]

Notes

[1] If you have fewer than 14 credits of NCEA level 3 chemistry take CHEM 114 before starting BCHM/CHEM 112.

[2] BCHM 381 is usually required for postgraduate Biochemistry.

The Science Student Advisor and Biology Undergraduate Advisor are available to help you plan your degree.

You may also like:

BIOL 112	Ecology, Evolution & Conservation (S2)
BIOL 113	Diversity of Life (S1)
BIOL 116	Human Biology (S2)
HLTH 203	Epidemiology (S1)
CHEM 111	Chemical Principles & Processes (S1,S2)
LAWS 101	Legal System: Legal Method & Institutions (W)
MATH 101	Methods of Mathematics (S1, S2)
SCIM 101	Science, Maori & Indigenous Knowledge (S2)
STAT 101	Statistics 1 (S1, S2, Su) (or MATH 101)
BCHM 206	Organic Chemistry (S2)
BIOL 209	Biological Data Analysis (S1)
BIOL 210	Vertebrate Biology (S2)
BIOL 213	Microbiology (S2)
BIOL 250	Principles of Animal Physiology (S1)
BIOL 254	Principles of Plant Physiology (S2)
CHEM 211	Molecules (S1)
PSYC 206	Introductory Research Methods and Statistics (S1,Su)
BIOL 333	Molecular Genetics (S1)
BIOL 351	Cell Biology 2 (S2)
BIOL 352	Plant Development and Biotechnology (S1)
CHEM 335	Organometallic Chemistry & Catalysis (S2)
CHEM 337	Organic Synthesis (S2)
CHEM 340	Environmental Chemistry and Toxicology (S1)
PSYC 373	Neuroscience and Neurological Disorders (S1)

Bioinformatics

Choose this degree if you are interested in topics such as:
genetics and genomics, computer programming, data science, evolution, artificial intelligence, statistics, and biological databases

How can scientists make sense of billions of DNA sequences? How do researchers track the evolution of viruses? What can biological data reveal about health, biodiversity, and environmental change?

Bioinformatics combines biology, computing, mathematics, and statistics to turn complex biological data into meaningful discoveries. It provides the tools needed to answer biological questions in an increasingly data-driven world.

Bioinformatics uses computers, statistics, and specialised software to collect, manage, analyse, and interpret biological data. It allows scientists to investigate questions that would be impossible to answer using traditional laboratory methods alone. For example, bioinformaticians can compare DNA sequences from thousands of organisms, identify genes linked to diseases, track the evolution of viruses, or analyse environmental DNA to detect rare and endangered species.

Advances in DNA sequencing technology have transformed biological research. Entire genomes can now be sequenced quickly and cost-effectively, creating enormous datasets that require sophisticated computational tools to analyse. Bioinformatics provides the skills needed to work with these datasets, helping scientists understand how genes function, how species evolve, and how biological systems respond to environmental change.

This field plays a critical role in many areas of modern science. In healthcare, bioinformatics helps researchers identify genetic causes of disease and develop personalised treatments. In conservation, it supports the monitoring and protection of biodiversity through genetic analysis. In agriculture, it helps improve crops and livestock. In biosecurity, it assists in detecting invasive species and tracking emerging pests and diseases.

Students in this area learn a unique combination of biological and computational skills. These may include computer programming, data visualisation, statistics, database management, and the analysis of genomic and ecological datasets. You will learn how to ask biological questions, work with large datasets, and use computational tools to uncover patterns and solve real-world problems.

Bioinformatics is one of the fastest-growing areas of science, with increasing demand for graduates who can combine biological knowledge with data analysis and computing skills. The field supports many areas of biology, including genetics, evolution, ecology, microbiology, conservation, and biotechnology.

By studying Bioinformatics, you'll develop a versatile skill set that can be applied across a wide range of industries and research fields. Whether you're interested in human health, environmental science, conservation, biotechnology, or data science, bioinformatics provides powerful tools for understanding life in the age of big data.

This degree major supports other areas of biology, including Systematics, Molecular Biology, Evolution, Ecology, Microbiology, Conservation and Taxonomy.

Career pathways

Data Science and Analytics

Transform biological data into insights that support research, healthcare, and environmental management.

Example careers

- Data Scientist
- Biostatistician
- Genomics Analyst
- Health Data Analyst

Computing and Technology

Develop computational tools and workflows for analysing complex biological data.

Example careers

- Bioinformatician
- Research Software Developer
- Data Engineer
- Computational Biologist

Research and Genomics

Use large-scale biological datasets to address questions in genetics, evolution, conservation, and health.

Example careers

- Research Scientist
- Genomics Specialist
- Biodiversity Data Analyst
- Research Data Manager

Many graduates continue into postgraduate study, while others apply their scientific training in industry, government, education, consulting, and community organisations.

Useful links

UC Careers, Internships & Employment
www.canterbury.ac.nz/careers

Careers New Zealand
www.careers.govt.nz

Bachelor of Data Science with a Bioinformatics Major

You can also design a BSc majoring in Biology with a focus on bioinformatics, computational biology or data science - contact a student advisor for support to plan your degree.

My degree plan

Year 1 *BSc*			2			3			4 *BSc(Hons), PGDipSc, MSc part 1*	
Semester 1	**Semester 2**	**Summer**	**Semester 1**	**Semester 2**	**Summer**	**Semester 1**	**Semester 2**	**Summer**	**Semester 1**	**Semester 2**
BIOL 111	BIOL 112	*Optional*	BIOL 231	BIOL 215	*Optional*	BIOL 333	BIOL 338	*Optional*		
COSC 121	DATA 101	*Optional*	COSC 262	DATA 201	*Optional*	BIOL 337		*Optional*		
MATH 102	COSC 122		DATA 203	PHIL 240		DATA 301	DATA 303			
	SCIE 101		BIOL 271	STAT 202*		STAT 315*				

100 level courses

BIOL 111	Cellular Biology & Biochemistry (S1)
BIOL 112	Ecology, Evolution & Conservation (S2)
COSC 121	Introduction to Computer Programming (S1, S2)
COSC 122	Introduction to Computer Science (S2, Su)
MATH 102	Mathematics 1A (S1, S2)
DATA 101	Introduction to Data Science (S2)
SCIE 101	Science, Society & Me (S2)

200 level courses

BIOL 215	Exploring Biodiversity: Principles and Methods of Systematics (S2)
BIOL 231	Foundations in Molecular Biology (S1)
BIOL 271	Evolution (S1)
DATA 201	Data Wrangling (S2)
DATA 203	Data Science Multivariable Methods (S1)
STAT 202	Regression Modelling (S2) (* or STAT 201 Applied Statistics (S1) or BIOL 209 Biological Data Analysis (S1))
COSC 262	Algorithms (S1)
PHIL 240	Bioethics: Life, Death, and Medicine (S2)

300 level courses

BIOL 333	Molecular Genetics (S1)
BIOL 337	Bioinformatics (S1)
BIOL 338	Bioinformatics Project (S2)
DATA 301	Big Data Computing and Systems (S1)
DATA 303	Computational Data Methods (S2)
STAT 315	Multivariable Statistical Methods & Applications (S1) (* or STAT 318 Statistical Learning (S1))

Notes

The Science Student Advisor and Biology Undergraduate Advisor are available to help you plan your degree.

You may also like:

BIOL courses - ensure your choices give you the prerequisites to proceed to the next level

SCIM 101	Science, Maori & Indigenous Knowledge (S2)
BIOL 113	Diversity of Life (S1)
SENG 201	Software Engineering I (S1)
STAT 318	Statistical Learning (S1)

The Bachelor of Data Science requires a minimum total of 360 points:

195 points of compulsory Data Science core courses

165 points of courses towards your major.

At least 225 points must be from courses above 100-level, with at least 105 points at 300-level.

Each major has specific course requirements, but all consist of a minimum 165 points, with at least 45 points at 200-level or above and at least 60 points at 300-level.

Molecular/Micro Biology & Systematics

Choose this theme if you are interested in topics such as:
microbiology, biotechnology, bioinformatics, molecular biology, genomics, biodiversity, biosecurity, ancient DNA, evolution, taxonomy, and conservation.

How do genes shape the characteristics of living organisms? How do scientists identify and classify species? What roles do microorganisms play in health, industry, and the environment?

Molecular biology, microbiology, and systematics provide powerful tools for understanding life, from individual genes and cells to the diversity of species and ecosystems. Together, these disciplines help address challenges in health, conservation, biotechnology, agriculture, and biosecurity.

Today, genetic technologies are helping scientists tackle some of the world's biggest challenges. Genetics is used to develop new medicines, improve food production, protect endangered species, strengthen biosecurity, and understand how species evolve over time. It also plays an important role in areas such as forensic science, helping to identify individuals and solve crimes. As genetic technologies continue to advance, they create exciting opportunities as well as important social and ethical questions.

Molecular biology explores how genes work at the molecular level. It focuses on DNA, RNA, proteins, and the processes that control how organisms grow, function, and respond to their environment. By studying genes and how they are expressed, scientists can better understand inheritance, genetic variation, disease, and evolution.

Microbiology is the study of microscopic organisms, including bacteria, fungi, algae, and viruses. Although they are too small to see with the naked eye, microorganisms have enormous impacts on our lives. Some cause diseases in humans, animals, and plants, while others are essential for life on Earth. Microbes help produce oxygen, recycle nutrients, support healthy ecosystems, and are used in industries ranging from food production to biotechnology. They can also help solve environmental problems by breaking down pollutants and controlling pests.

Systematics is the science of discovering, identifying, naming, and classifying living organisms, and understanding how they are related through evolution. It helps us answer questions such as: What species exist? How are they related? How did biodiversity evolve? Modern genetic techniques have revolutionised systematics, allowing scientists to uncover evolutionary relationships that were previously impossible to detect. This knowledge is essential for conservation, biosecurity, ecology, and understanding the diversity of life on Earth.

Together, molecular biology, microbiology, and systematics provide powerful tools for understanding life from the level of individual genes to entire ecosystems. They underpin many modern advances in medicine, conservation, biotechnology, agriculture, and environmental management.

Career pathways

Biotechnology and Laboratory Science

Apply molecular and microbial techniques in commercial, environmental, and healthcare settings.

Example careers

- Molecular Biologist
- Microbiologist
- Biotechnology Technician
- Laboratory Scientist

Biosecurity and Biodiversity

Protect ecosystems and manage biological threats through species identification and genetic technologies.

Example careers

- Biosecurity Officer
- Conservation Geneticist
- Environmental DNA Specialist
- Biodiversity Advisor

Research and Discovery

Investigate the diversity, evolution, and function of living organisms.

Example careers

- Research Scientist
- Genetic Services Specialist
- Taxonomist
- Museum or Collection Curator

Many graduates continue into postgraduate study, while others apply their scientific training in industry, government, education, consulting, and community organisations.

Useful links

UC Careers, Internships & Employment
www.canterbury.ac.nz/careers

Careers New Zealand
www.careers.govt.nz

My degree plan

Year 1 *BSc*			2			3			4 *BSc(Hons), PGDipSc, MSc part 1*	
Semester 1	**Semester 2**	**Summer**	**Semester 1**	**Semester 2**	**Summer**	**Semester 1**	**Semester 2**	**Summer**	**Semester 1**	**Semester 2**
BIOL 111	BIOL 112	*Optional* *	BIOL 209	BIOL 213	*Optional*	BIOL 333	BIOL 309	BIOL 305		
BIOL 113	SCIE 101	*Optional*	BIOL 231	BIOL 215	*Optional*	BIOL 352	BIOL 313	*Optional*		
*	*									
							Optional			

* STAT 101 should be taken during first year

100 level courses

BIOL 111	Cellular Biology & Biochemistry (S1)
BIOL 112	Ecology, Evolution & Conservation (S2)
BIOL 113	Diversity of Life (S1)
SCIE 101	Science, Society & Me (S2)
STAT 101	Statistics 1 (S1, S2, Su)

200 level courses

BIOL 209	Biological Data Analysis (S1)
BIOL 213	Microbiology (S2)
BIOL 215	Exploring Biodiversity: Principles and Methods of Systematics (S2)
BIOL 231	Foundations in Molecular Biology (S1)

300 level courses

BIOL 309	Experimental Design & Data Analysis for Biologists (S2) [1]
BIOL 305	Practical Field Botany (Su)
BIOL 313	Advanced Microbiology (S2)
BIOL 333	Molecular Genetics (S1)
BIOL 352	Plant Development & Biotechnology (S1)

Notes

[1] BIOL 309 is usually required for postgraduate Biology.

The Science Student Advisor and Biology Undergraduate Advisor are available to help you plan your degree.

You may also like:

BCHM 112	Structure & Reactivity in Chemistry & Biochemistry (S2)
CHEM 114	Foundations of Chemistry (S1)
LAWS 101	Legal System: Legal Method & Institutions (W)
HLTH 106	Te Wero - Maori Health Issues & Opportunities (S1)
HLTH 203	Epidemiology (S1)
SCIM 101	Science, Maori & Indigenous Knowledge (S2)
BCHM 222	Biochemistry B - Metabolism; the Reactions of Molecules in Cells (S2)
BCHM 281	Practical Biochemistry (S2)
BIOL 211	Insect Biology (S1)
BIOL 250	Principles of Animal Physiology (S1)
BIOL 254	Principles of Plant Physiology (S2)
BIOL 271	Evolution (S1)
BIOS 201	Issues in New Zealand Biosecurity (S2)
BCHM 305	Protein Science (S1)
BCHM 306	Biochemical Pathology (S2)
BCHM 381	Biochemical Techniques (S2)
BIOL 354	Animal Ecophysiology (S2)
BIOL 355	Neurons, Hormones & Behaviour (S1)
BIOL 371	Evolutionary Ecology (S1)

Cell & Organismal Physiology

Choose this theme if you are interested in topics such as:
biotechnology, animal physiology, ecophysiology, plant biology, cell biology, genetics, and biochemistry

How do muscles move? How do plants grow? How do cells communicate and living organisms respond to their environment?

Cell and Organismal Physiology explores how living things function, from the processes occurring inside cells to the complex systems that keep whole organisms alive.

This theme focuses on understanding how biological systems work at different levels, from molecules and cells through to plants, animals, and entire organisms. It brings together ideas from cell biology, genetics, biochemistry, biotechnology, and physiology to explain how life functions.

Cell biology is the study of the basic building blocks of life: cells. Every living organism is made of cells, and each cell contains specialised structures that carry out essential functions. Modern techniques allow scientists to investigate how cells grow, communicate, divide, and respond to their environment. Understanding how cells work is fundamental to research in areas such as human health, cancer biology, genetics, and biotechnology.

Animal physiology explores how animals function and survive. It investigates systems such as circulation, respiration, digestion, movement, reproduction, and the nervous system. By understanding how these systems work together, scientists can better understand health, disease, adaptation, and the effects of environmental change on animals.

Plant biology and physiology examine how plants grow, reproduce, and interact with their environment. Plants are essential for life on Earth, providing oxygen, food, and the foundation of most ecosystems. Plant scientists investigate how plants respond to challenges such as drought, pests, disease, and climate change, helping to improve agriculture, conservation, and food security.

Biotechnology uses living organisms, cells, and biological processes to develop products and technologies that benefit society. Applications include developing new medicines, improving crops, creating sustainable materials, protecting biodiversity, and addressing environmental challenges. Biotechnology is one of the fastest-growing areas of science and plays an important role in New Zealand's agricultural, environmental, and health sectors.

This theme provides a strong foundation for understanding how living systems function and adapt. It combines laboratory and field-based

science with modern biological technologies, helping students develop skills that are valuable in research, healthcare, biotechnology, agriculture, conservation, and environmental management.

By studying Cell and Organismal Physiology, you'll gain insight into the processes that make life possible, from the inner workings of individual cells to the functioning of entire organisms and ecosystems.

Career pathways

Health and Biomedical Science

Apply knowledge of biological function to improve health and understand disease.

Example careers

- Biomedical Research Assistant
- Clinical Research Associate
- Medical Laboratory Scientist
- Health Science Researcher

Agriculture and Biotechnology

Use physiological knowledge to improve plant, animal, and biotechnological systems.

Example careers

- Plant Scientist
- Animal Health Technician
- Biotechnology Research Associate
- Agricultural Scientist

Research and Innovation

Investigate how cells, tissues, and organisms function and respond to their environment.

Example careers

- Physiologist
- Research Scientist
- Bio-imaging Specialist
- Laboratory Research Technician

Many graduates continue into postgraduate study, while others apply their scientific training in industry, government, education, consulting, and community organisations.

Useful links

UC Careers, Internships & Employment
www.canterbury.ac.nz/careers

Careers New Zealand
www.careers.govt.nz

My degree plan

Year 1 *BSc*

Semester 1	Semester 2	Summer
BIOL 111	BIOL 112	*Optional* *
BIOL 113	SCIE 101	*Optional*
*	*	

* one of these must be STAT 101

2

Semester 1	Semester 2	Summer
BIOL 209		*Optional*
BIOL 231		*Optional*
BIOL 253		

3

Semester 1	Semester 2	Summer
	BIOL 351	*Optional*
	‡	*Optional*

‡ BIOL 309 if considering postgraduate study

4 *BSc(Hons), PGDipSc, MSc part 1*

Semester 1	Semester 2

100 level courses

BIOL 111	Cellular Biology & Biochemistry (S1)
BIOL 112	Ecology, Evolution & Conservation (S2)
BIOL 113	Diversity of Life (S1)
SCIE 101	Science, Society & Me (S2)
STAT 101	Statistics 1 (S1, S2, Su)

200 level courses

BIOL 209	Biological Data Analysis (S1)
BIOL 231	Foundations in Molecular Biology (S1)
BIOL 253	Cell Biology 1 (S1)

At least 1 course selected from:

BIOL 213	Microbiology (S2)
BIOL 250	Principles of Animal Physiology (S1)
BIOL 254	Principles of Plant Physiology (S2)

300 level courses

BIOL 309	Experimental Design and Data Analysis for Biologists (S2) [1]
BIOL 351	Cell Biology 2 (S2)

At least 3 courses selected from:

BIOL 313	Advanced Microbiology (S2)
BIOL 333	Molecular Genetics (S1)
BIOL 352	Plant Development & Biotechnology (S1)
BIOL 354	Animal Ecophysiology (S2)
BIOL 355	Neurons, Hormones & Behaviour (S1)

Notes

[1] BIOL 309 is usually required for postgraduate Biology.

The Science Student Advisor and Biology Undergraduate Advisor are available to help you plan your degree.

You may also like:

BCHM 112	Structure & Reactivity in Chemistry & Biochemistry (S2)
BIOL 116	Human Biology (S2)
CHEM 114	Foundations of Chemistry (S1)
LAWS 101	Legal System: Legal Method & Institutions (W)
HLTH 106	Te Wero - Maori Health Issues & Opportunities (S1)
HLTH 203	Epidemiology (S1)
MATH 101	Methods of Mathematics (S1, S2)
PSYC 105	Introductory Psychology - Brain, Behaviour and Cognition (S1, Su)
SCIM 101	Science, Maori & Indigenous Knowledge (S2)
BCHM 222	Biochemistry B - Metabolism; the Reactions of Molecules in Cells (S2)
BCHM 281	Practical Biochemistry (S2)
BIOL 210	Vertebrate Biology (S2)
BIOL 271	Evolution (S1)
BIOL 274	Principles of Ecology (S1)
BIOL 275	Field Ecology (S1)
BCHM 305	Protein Science (S1)
BCHM 306	Biochemical Pathology (S2)
BCHM 381	Biochemical Techniques (S2)
PSYC 373	Neuroscience & Neurological Disorders (S1)

Ecology, Evolution & Behaviour

Choose this theme if you are interested in topics such as:
conservation biology, animal behaviour, ecology, evolution, biosecurity, freshwater and marine science, environmental management, genetics, and biodiversity

Why do some species thrive while others become endangered? How do animals communicate, find mates, and survive in changing environments? What can we do to protect ecosystems and biodiversity in a rapidly changing world?

Ecology, Evolution and Behaviour explores these questions by studying how organisms interact with each other and their environment, how species change over time, and why animals behave the way they do.

Ecology is the study of the relationships between organisms and their environment. Ecologists investigate how plants, animals, and microorganisms interact with each other and with factors such as climate, water, and habitat. This knowledge helps us understand and manage environmental challenges including biodiversity loss, invasive species, pollution, and climate change.

New Zealand's unique ecosystems provide exciting opportunities for ecological research. From braided rivers and alpine environments to forests, wetlands, and coastal ecosystems, ecologists study how these environments function and how they can be protected for future generations.

Evolution is the study of how species change over time. It explains the incredible diversity of life on Earth and helps us understand how organisms adapt to their environments. Evolutionary biology is important in many fields, including conservation, biosecurity, medicine, agriculture, and genetics. Understanding evolution helps scientists predict how species may respond to environmental change, how diseases emerge and spread, and how biodiversity develops and is maintained.

Animal behaviour examines what animals do and why they do it. Scientists investigate how animals communicate, find food, avoid predators, choose mates, care for offspring, and interact with others in their social groups. Studying behaviour helps us understand how animals survive in the wild and provides valuable information for conservation and wildlife management.

Freshwater and marine ecology focus on rivers, lakes, wetlands, estuaries, and oceans. These environments support a huge diversity of life and provide essential resources for people and ecosystems. Scientists working in these areas study water quality, aquatic biodiversity, ecosystem health, and the impacts of human activities and climate change. Their research helps inform decisions about conservation, resource management, and environmental restoration.

This theme combines fieldwork, laboratory research, and modern analytical techniques to investigate some of the most important environmental challenges facing New Zealand and the world. Students may find themselves surveying native wildlife, monitoring ecosystems, analysing environmental data, studying animal behaviour, or investigating the evolutionary relationships between species.

By studying Ecology, Evolution and Behaviour, you'll gain a deeper understanding of the natural world and develop the skills needed to help protect biodiversity, manage natural resources, and address environmental challenges. The knowledge and skills gained in this theme are valuable in careers related to conservation, environmental management, biosecurity, ecological consulting, freshwater and marine science, research, and policy development.

Career pathways

Conservation and Environmental Management

Apply ecological knowledge to protect biodiversity, restore ecosystems, and manage natural resources.

Example careers

- Conservation Advisor
- Biodiversity Specialist
- Restoration Ecologist
- Environmental Consultant

Government and Policy

Support evidence-based decision-making in environmental management, biosecurity, and sustainability.

Example careers

- Biosecurity Officer
- Environmental Policy Analyst
- Resource Management Advisor
- Regional Council Scientist

Research and Science

Investigate ecological processes, species interactions, and environmental change through field, laboratory, and analytical research.

Example careers

- Ecologist
- Freshwater Scientist
- Marine Scientist
- Research Scientist

Many graduates continue into postgraduate study, while others apply their scientific training in industry, government, education, consulting, and community organisations.

Useful links

UC Careers, Internships & Employment
www.canterbury.ac.nz/careers

Careers New Zealand
www.careers.govt.nz

My degree plan

Year 1 *BSc*

Semester 1	Semester 2	Summer
BIOL 111	BIOL 112	*Optional* *
BIOL 113	SCIE 101	*Optional*
*	*	

* one of these must be STAT 101

2

Semester 1	Semester 2	Summer
BIOL 274	BIOL 272	*Optional*
BIOL 275		*Optional*
BIOL 271		
BIOL 209		

3

Semester 1	Semester 2	Summer
	‡	*Optional*
		Optional

‡ BIOL 309 if considering postgraduate study

4 *BSc(Hons), PGDipSc, MSc part 1*

Semester 1	Semester 2

100 level courses

BIOL 111	Cellular Biology & Biochemistry (S1)
BIOL 112	Ecology, Evolution & Conservation (S2)
BIOL 113	Diversity of Life (S1)
SCIE 101	Science, Society & Me (S2)
STAT 101	Statistics 1 (S1, S2, Su)

200 level courses

BIOL 209	Biological Data Analysis (S1)
BIOL 271	Evolution (S1)
BIOL 272	Principles of Animal Behaviour (S2)
BIOL 274	Principles of Ecology (S1)
BIOL 275	Field Ecology (S1)

300 level courses

BIOL 309	Experimental Design & Data Analysis for Biologists (S2) [1]

At least 4 courses selected from:

BIOL 305	Practical Field Botany (Su)
BIOL 354	Animal Ecophysiology (S2)
BIOL 355	Neurons, Hormones & Behaviour (S1)
BIOL 371	Evolutionary Ecology (S1)
BIOL 375	Freshwater Ecosystems (S2)
BIOL 377	Global Change Ecology and Biosecurity (S1)
BIOL 378	Population Ecology & Conservation (S1)
BIOL 383	Behavioural Ecology (S1)
BIOL 384	Marine Ecosystems (S2)

Notes

[1] BIOL 309 is usually required for postgraduate Biology.

The Science Student Advisor and Biology Undergraduate Advisor are available to help you plan your degree.

You may also like:

ENVR 101	Introduction to Environmental Science (S1)
GEOG 106	Global Environmental Change (S2)
GEOL 101	Planet Earth: Fundamentals of Earth Science (S1)
GEOL 102	Environmental Earth System Science (S2)
FORE 111	Trees, Forests & the Enviroment (S1)
MATH 101	Methods of Mathematics (S1, S2)
PSYC 105	Introductory Psychology - Brain, Behaviour & Cognition (S1, Su)
SCIM 101	Science, Maori & Indigenous Knowledge (S2)
ANTA 201	Antarctica & Global Change (S1)
BIOL 211	Insect Biology (S1)
BIOL 212	Marine Biology & Ecology (S1)
BIOL 215	Exploring Biodiversity: Principles and Methods of Systematics (S2)
BIOL 250	Principles of Animal Physiology (S1)
BIOL 254	Principles of Plant Physiology (S2)
GEOG 201	Environmental Processes: Principles & Applications (S1)
GEOG 205	Introduction to Geographic Information Systems & Science (S1)
MGMT 230	Business, Society & the Environment (S1, S2)
WATR 201	Freshwater Resources (S2)
WATR 203	Freshwater Science Field Skills (Su)
BIOL 355	Neurons, Hormones & Behaviour (S1)
WATR 301	Water Resource Management (S1)

Akoranga Mātai Koiora Biology Courses

See www.canterbury.ac.nz/study/getting-started/about-our-qualifications for full details of each course.

Key

P: Pre-requisite
C: Co-requisite
RP: Recommended Preparation
R: Restrictions
EQ: Equivalent Course

BIOL 111

Cellular Biology and Biochemistry

Semester 1 15 points

A foundation course that will introduce you to the basic processes of cellular biology. The cell is considered the basic unit of life because every organism whether animal, plant, or micro-organism consists of cells or is itself a single cell. As such the structure and function of the cell impacts on all other levels of life including organisms, ecosystems and the biosphere. For this reason it is essential for all biologists to understand the fundamentals of cell biology. In this course you will learn the basic concepts of cell function and how these are related to cell structure, which is in turn dependent on molecular structure and biochemical interactions between molecules.

R: ENCH 281 and BCHM 111

EQ: BCHM 111

BIOL 112

Ecology, Evolution and Conservation

Semester 2 15 points

In this course you will learn the basics of evolution, ecology and conservation biology. You will see how evolution underpins both ecology and conservation and discover how these areas of biology impact every-day life. The first part of the course has an evolution focus and we will look at both genes (micro) and species (macro) evolution. We'll explore human diseases, drug resistance and invasive species. We'll also understand how fossils have contributed to our understanding of life on Earth today. The second term has a focus on ecology and conservation, with lots of examples demonstrating how New Zealand science is saving our unique ecosystems.

BIOL 113

Diversity of Life

Semester 1 15 points

This course provides an overview of the vast diversity of life on Earth. You will hear about the evolution, structure, function and importance of animals, plants and microbes. The first part of the course focuses on the diversity, reproduction and structure of bacteria, protists and fungi. The second part focuses on plants whilst the third part examines animals and includes discussion of locomotion, respiration, circulation, nervous and endocrine systems. Hands-on investigation of a variety of organisms in laboratory classes is an important part of the course.

BIOL 116

Human Biology

Semester 2 15 points

Human Biology is an introductory course that looks at the biology of Homo sapiens from a number of different viewpoints including the actions of individual cells and even individual molecules. The course is not only for the students who want to pursue Health Science studies but also for anyone who is interested in learning about aspects of human biology and health. The broad lecture themes include basic anatomy of the organs, nutrition, genetics, immune response, and human body / microorganism interface. Labs in the course have been designed to assist the learning of these broad lecture themes.

SCIM 101

Science, Maori and Indigenous Knowledge

Semester 2 15 points

This is an integrated multi-disciplinary course between the School of Maori and Indigenous Studies and the College of Science, studying Maori and other indigenous peoples knowledge and its relevance to today's western science.

R: MAOR 172

EQ: MAOR 172

BIOL 209

Biological Data Analysis

Semester 1 15 points

This course develops skills required by students and scientists in all branches of biology. It covers the scientific method, experimental design, development and testing of hypotheses, and fundamentals of probability. Then we cover essential statistical methods for biology including t-tests, chi-square, regression, and

Analysis of Variance. There is a strong hands-on component in computer-based labs. The course prepares students for running their own tests in projects and assignments, and interpreting tests

presented in the scientific and popular literature. This course is required for all students in Biology.

P: STAT 101 or 15 points of 100 level MATH

BIOL 210

Vertebrate Biology

Semester 2 15 points

This course deals with the biology and evolution of the phylum Chordata and in particular the subphylum Vertebrata, animals with backbones. The course gives an overview of the phylum highlighting form and function and gives information on evolutionary relationships.

P: BIOL 113

BIOL 211

Insect Biology

Offered in even years, next offered in 2028

Semester 1 15 points

The biology of insects and other non-marine arthropods, with emphasis on environmental relationships and management.

P: BIOL 113

BIOL 212

Marine Biology and Ecology

Semester 1 15 points

An introduction to the ecology and biology of the marine environment. Including description and analysis of marine communities and the biodiversity, ecology and behaviour of marine organisms. Includes a field trip.

P: BIOL 112 and BIOL 113

BIOL 213

Microbiology

Semester 2 15 points

The Mātai koiora moroiti | Microbiology course provides a broad overview on microbial physiology, microbial activity and the roles microorganisms play from the molecular to the global scale. It is intended for students with a broad interest in microbiology, mycology, biodiversity, and microbial ecology. You will learn about microbial genetics, metabolism and physiology, diversity, host-microbe and microbe-ecosystem interactions.

The laboratory component of this course emphasises practical microbiology skills such as microscopy, aseptic technique, experimental design and planning, and methods for controlling microbial growth. The course also includes a field trip as part of the laboratory.

The course interfaces with BIOL 231 / BCHM 202 and is an essential preparation for BIOL 313.

P: BIOL 111 or BIOL 113

RP: BIOL 231 or BCHM 202

BIOL 215

Exploring Biodiversity: Principles and Methods of Systematics

Semester 2 15 points

This course takes a broad view of the ways biological diversity can be described and classified, and its origins understood. Systematics is the scientific discipline that encompasses the description, identification, nomenclature, and classification of organisms (Taxonomy) and the reconstruction of their macro-evolutionary history (Phylogenetics). Knowing the identity and evolutionary relationships of organisms is crucial to any biological study, but functional classifications are also important. This course is an introduction to the methodology and principles of systematics across all forms of biodiversity (bacteria, plants, fungi, protists, and animals), from morphological to next-generation DNA-based approaches and including functional methods.

P: Biol 112 or Biol 113

RP: BIOL 111

BIOL 231

Foundations in Molecular Biology

Semester 1 15 points

Molecular biology is the science of how genes work. This understanding underpins the sciences of biochemistry, bioinformatics, evolution, systematics and ecology by both providing tools that are used by these sciences and by explaining how organisms produce the characteristics observed by these other sciences. This course goes will take you from familiarity with the concepts of DNA replication, transcription and translation to a foundation understanding of these reactions in living cells seen through gene regulation. It is intended for anyone who wants to begin to understand how genetics relates to life and seeks skills related to working at the molecular scale. The course is a foundation to further work that involves understanding patterns in DNA, structure and function of proteins, or developing new biotechnologies.

P: BIOL 111 (=BCHM 111) or ENCH 281

RP: CHEM 112 or BCHM 112 or CHEM 114

R: BCHM 202, ENCH 480

EQ: BCHM 202, ENCH 480

BIOL 250

Principles of Animal Physiology

Semester 1 15 points

This is a broad-based, elementary course in animal physiology providing an introduction to the principal physiological systems in animals, how they operate and how they are regulated. Topics include gas exchange, blood and circulation, osmoregulation and excretion, digestion, nervous and muscle systems, immunology, and endocrinology. The treatment is comparative although human and mammalian physiology receives greatest emphasis. Selected examples from lower vertebrates and invertebrates are used to illustrate physiological principles.

P: BIOL 111 (=BCHM 111) or ENCH 281

BIOL 253

Cell Biology 1

Semester 1 15 points

The course will cover membrane structure, membrane transport of small molecules and the electrical properties of membranes, intracellular compartments and protein sorting, intracellular vesicle transport, aspects of the cytoskeleton, the cell cycle and apoptosis. These topics will give the students a comprehensive grounding in cells as single entities. This will prepare students for an updated 3rd year cell biology course that will consider cells in their social context i.e. how they interact with other cells.

P: BIOL 111 (=BCHM 111) or ENCH 281

RP: 15 points of Chemistry at 100 level

R: BCHM 253

EQ: BCHM 253

BIOL 254

Principles of Plant Physiology

Semester 2 15 points

This course provides an introduction to the principles of plant development, including the basic anatomy of higher plants, and how they grow and reproduce. There will be a broad overview of the processes associated with the transport of water and mineral nutrients in plants, and the responses of plants to external stimuli and adverse growth conditions. In this course, the students have the opportunity to participate in trying a few practical basic plant science skills which would be useful to the study of plant ecology, plant-microorganism interactions, agriculture, horticulture and forestry. The students will appreciate the relevance of plant physiology principles to developments in agriculture and biotechnology.

P: BIOL 111 (=BCHM 111) or ENCH 281

BIOL 271

Evolution

Semester 1 15 points

This course provides an introduction to evolution including the patterns and processes of evolution, the evolution of life history traits, mechanisms of evolution, adaptation, speciation and extinction. It uses a partial Team Based Learning (TBL) approach in which most internal assessment is completed in structured, permanent learning teams: two lectures per week are traditional "we talk, you listen" sessions but every third lecture is a TBL session, and all tutorial sessions follow a similar "you talk, we guide" approach. The course is intended for anyone interested in gaining an understanding of evolutionary theory and its role in our understanding of questions such as where species have come from, why are there so many different species, and the importance of evolution in everyday life.

P: BIOL 112

BIOL 272

Principles of Animal Behaviour

Semester 2 15 points

Using a mix of traditional lectures, selected case studies, and fieldwork, this course aims to provide a broad understanding of the adaptive significance of behaviour: how animals interact with each other and with their environment. We explore the neural and hormonal basis of behaviour, as well as core subjects, like why and how animals communicate or have sex. This course is suited to anyone who may have wondered if animals can be dishonest, and if so, whether they are 'actively lying', and thus self-aware?

P: BIOL 112 or PSYC 105

BIOL 274

Principles of Ecology

Semester 1 15 points

This course provides a fundamental grounding in the main concepts in and applications of ecology, the study of relationships between organisms and their environment. The most important concepts in population, community, landscape and ecosystem ecology are covered. These are considered using examples from across marine, freshwater, forest, grassland, urban and production ecosystems, and with particular reference to the factors controlling the distribution of plants, animals and microbes in Aotearoa New Zealand, and their differences to other countries.

Overall, this course provides a thorough overview for those wanting to compliment other environmental knowledge. It can be combined with BIOL 275 Field Ecology to provide a comprehensive platform for those wanting to undertake more advanced ecological study.

P: BIOL 112

BIOL 275

Field Ecology

Semester 1 15 points

This course provides a fundamental grounding in the practical skills used in ecology, the study of relationships between organisms and their environment. It is designed to add to the co-requisite course BIOL 274 Principles of Ecology if students want to advance to 300-level ecology courses. There is a particular emphasis on the problems and issues affecting natural systems, and how ecological knowledge can be applied to achieve solutions. The focus of the course is a four-day field trip to the UC Cass field station near Arthur's Pass National Park. Combined with laboratory sessions prior to cultivate basic skills, the field course allows students to develop expertise in field experimental design and sampling, data analysis and interpretation, as well as providing practical experience in some wonderful high country environments. We will also recognise taonga species and consider appropriate Māori protocols (tikanga) for sampling in the field and the need for consultation.

To undertake all aspects of the course, students will need to have a reasonable level of fitness that allows them to travel over untracked forest and grassland, and have footwear and clothing that allows them to undertake field work safely in a mountain environment.

C: BIOL 274

WATR 203

Freshwater Science Field Skills

Summer (Nov – Dec) 15 points

A field and laboratory course which focuses on practical skills in identifying and measuring physical freshwater habitats, aquatic plants, invertebrates and fish and in analysing water chemistry.

P: A freshwater-related course of study or appropriate freshwater-related work experience subject to approval by the Head of the School of Biological Sciences.

BIOL 305

Practical Field Botany

Summer (Jan) 15 points

During eight consecutive days in summer, this intensive field course at the Cass field station in the Southern Alps prepares you for careers in field biology, ecology, conservation and taxonomy. You will learn how to document, identify, collect and preserve plants. BIOL 305 complements other courses in the Ecology, Evolution & Behaviour theme and also provides a base for further training in plant taxonomy. The course uses examples from the montane and alpine flora of Canterbury, but most acquired skills will be transferable to other regions and other groups of organisms. BIOL 305 is an inverted classroom course in which you learn by doing instead of listening. It is unique in attracting undergraduate students as well as members from the workforce (e.g., DoC and regional council staff) and plant enthusiasts.

This is a residential summer course at Cass field station running 17–25 January 2023.

P: BIOL 215 or BIOL 273 or BIOL 274 and BIOL 275 or approval by the Head of the School of Biological Sciences.

BIOL 309

Experimental Design & Data Analysis for Biologists

Semester 2 15 points

This course provides a detailed understanding of how the interpretation and analysis of data depends on the way the data were collected. It covers various aspects of experimental design, a variety of statistical methods to analyse data, basic programming in R, and places a heavy

emphasis on interpreting the results of analysis. It is intended for anyone who would like to know more about designing robust research, analysing datasets of various kinds, or who wishes to better identify the misleading use of statistics in the media or in research. The experimental design component is particularly suited for anyone who plans to do postgraduate research in any theme of biological sciences, or who would like to pursue a career in any field where it is useful to identify patterns in data.

This course is available as an online distance course.

P: BIOL 209 or appropriate statistical background as determined by the Head of School.

BIOL 313
Advanced Microbiology

Semester 2 15 points

This course builds on BIOL 213 and explores microbial ecology, advanced food and agricultural microbiology, disease and pathogenesis. The course emphasises bacteria and fungi, with other microbes also considered. Both fundamental and applied microbiology will be covered. The practical component of the course consists of isolating and characterising novel microbial strains, using both molecular and traditional approaches.

P: BIOL 213

RP: BIOL 253

BIOL 333
Molecular Genetics

Semester 1 15 points

This course provides a detailed understanding of the relationship between genes and phenotypes. The course assists you in transitioning from an intermediate knowledge of the core reactions involved in DNA replication, transcription, translation and gene regulation to an appreciation of the molecular diversity of living things. This diversity is at the root of the unexpected ways that organisms behave, why medicines work or fail, why biotechnologies succeed, are safe, or fail or cause harm. This course places an emphasis on the skills for discovery, rewards curiosity, and guides you to greater levels of competence in criticism and preparing for work.

P: BIOL 231 (=BCHM 202)

RP: BIOL 213

BIOL 334
Evolutionary Genetics and Genomics

Semester 2 15 points

This course provides an advanced understanding of mechanisms of evolutionary genetics and genomics, including applications to human health and conservation biology. Specific topics include epigenetics, evolution and development (evo-devo), genomic interactions with the environment, as well as, the genetic and genomic consequences of small population size, intra- and interspecific hybridization and the resolution of taxonomic uncertainties. Te Tiriti o Waitangi (The Treaty of Waitangi) is embedded in the course, and students will learn about the cultural considerations associated with the generation, storage, access and use of genetic/genomic data for research. This course is intended for anyone with an interest in both fundamental and applied research, or who wishes to gain bioinformatic experience working with large genetic and genomic data sets. It is also particularly well suited for anyone who plans to pursue a career in genetics or genomics that is responsive to the needs and aspirations of indigenous communities.

P: BIOL 215 and BIOL 271

BIOL 336
Ecological and Evolutionary Models

Semester 1 15 points

The general aim of the course is to introduce you to the major concepts in developing theoretical biological models. This is achieved by examining key ecological and evolutionary models. The central focus is on understanding, creating, and analysing basic biological models. We will highlight the importance of theoretical modelling to the fields of ecology and evolution and help you develop key computational and mathematical skills.

P: BIOL 209 or 15 Points of 200-level COSC or DATA or EMATH or ENCE or PHYS or MATH or STAT.

RP: BIOL 271 or BIOL 274

BIOL 337

Bioinformatics

Semester 1 15 points

The general aim of this course is to discuss major concepts in the bioinformatic analysis, application, handling and management of large-scale biological data, and apply these bioinformatics methods to real-world issues. The central focus will be on bringing together previously developed skills in programming, computing and data wrangling, and evaluating how these skills apply to biological datasets. This paper will also discuss the cultural, political, social and legal issues regarding data ownership, use and governance. The course will consist of regular lectures and computer labs, where students will be able to explore biological datasets using their knowledge of bioinformatics. The emphasis is on the amalgamation of students' previous two years of training and experience, providing students with the context and the background required to apply their skills in the real world.

P: [BIOL 231 or BIOL215 or BIOL 271] and [STAT 201 or STAT 202 or BIOL 209]

Callum and Marten won the *Peoples Choice Award* during the Biology 383 poster session for their project on bees.

BIOL 338

Bioinformatics Project

Semester 2 30 points

This course will develop your ability to undertake research in bioinformatics. Drawing on existing datasets, you will design and complete a research project. The aim is for most projects to be based on real-world problems with data provided in collaboration with a research partner. The training, practice and critical evaluation of the research will be carried out in groups, and you will communicate your research findings using spoken, statistical and written skills. The course consists of regular lectures/tutorials and project group meetings, supported by web-based resources. It concludes with a public conference, where you will present your findings. The emphasis is on students working together to solve real-world bioinformatic problems using skills that are transferable to the workplace.

P: BIOL 337

BIOL 351

Cell Biology 2

Semester 2 15 points

This course examines the relationships between molecular structure and organelle and cell function. It focuses on structure, physiology, biochemistry and molecular biology of cells.

P: BIOL 253 (=BCHM 253)

BIOL 352

Plant Development and Biotechnology

Semester 1 15 points

This course highlights how a knowledge of plant development is necessary to drive new applications of plant biotechnology.

Topics covered include the applications of tissue culture and genetic engineering of plants; examination of issues associated with the potential use of genetically modified plants; research advances and applied aspects of plant hormone biology, secondary metabolism, cell wall biology and disease resistance. The laboratories will provide skills used in plant biotechnology research.

P: BIOL 254 or BIOL 253 (=BCHM 253) or BIOL 231 (=BCHM 202)

BIOL 354

Animal Ecophysiology

Semester 2 15 points

This course is designed to help you understand the physiological mechanisms that enable animals to withstand environmental challenges posed by nature and humans. It includes examinations of the adaptations that permit survival of animals in the diverse range of environments they inhabit, and enable them to survive environmental fluctuation. Aspects of human impacts on the environment and their consequences for the animals therein are also addressed (e.g. pollutants, climate change). The approach is comparative, drawing on both vertebrate and invertebrate examples. A major emphasis of the course is on practical learning, with laboratories that provide hands-on experience with a number of physiological techniques, in a diverse group of animals, exposed to a wide range of environmental variables.

P: BIOL 250

BIOL 355

Neurons, Hormones and Behaviour

Semester 1 15 points

Largely through the use of case studies, this course will cover how, and why, nervous systems communicate. Sensory systems imaginable and unimaginable to us will be explored, as well as how learning physically happens. It will also cover the general principles of communication via the endocrine system, hormonal control of basic behaviours, such as feeding, social behaviour and pair bonding. These subjects will be taught with a strong emphasis on their adaptive value to the animal. This course is suited to anyone interested in how different animal minds work, and how these interface with the environment through the sensory and endocrine systems.

P: BIOL 250

RP: BIOL 272

BIOL 371

Evolutionary Ecology

Semester 1 15 points

Evolutionary ecology is the branch of ecology that considers how organisms have evolved to become adapted to their physical environment and interact with members of their own and other species. It has a focus on real time, rapid evolution and thus is particularly relevant to applied problems in human health, agriculture and conservation. In this course we examine selective pressures imposed by the environment and evolutionary response to these pressures. We also explore the reverse- how evolutionary processes affect evolutionary traits- and the feedback loops that ensue. Unifying ideas in this course are evolution within ecological timeframes and evolutionary mechanisms leading to the evolution of new species.

P: BIOL 271

BIOL 375

Freshwater Ecosystems

Semester 2 15 points

This course provides a thorough grounding in the ecology of freshwater ecosystems, including lakes, wetlands and rivers. It covers the most important concepts that underpin our understanding of these systems. Given the imperilled plight of fresh waters around the world, there is also a heavy emphasis on practical applications for solving current problems. A highlight of the course is field work at the University's Cass field station. This field work hones practical skills in association with quantitative state-of-the-environment monitoring and team-based project work. Laboratory sessions prior to the field trip develop basic physical and chemical sampling procedures, as well as macro-invertebrate identification. They are complemented by fish sampling and investigation of the wide range of aquatic systems in the Canterbury High Country around. By combining this practical expertise with detailed knowledge of how freshwater ecosystems work and of the main approaches to managing them, students will be well placed for a diverse range of careers connected to freshwater ecosystems and the resources they provide.

P: BIOL 209, BIOL 274 and BIOL 275

BIOL 377

Global Change Ecology and Biosecurity

Semester 1 15 points

A discussion of major concepts in community and ecosystems ecology in the context of anthropogenic changes to the environment and pressure from invasive exotic species. Note: fieldwork is required.

P: BIOL 209 and BIOL 274

BIOL 378

Population Ecology and Conservation

Semester 1 15 points

This course covers advanced concepts in population ecology, particularly those most relevant to the New Zealand region and to the conservation of the New Zealand biota. We cover topics including life histories, species interactions (mutualisms and predation), population modelling, and biological aspects of species conservation. There is a focus on New Zealand's terrestrial forests, birds and mammals (both native and exotic). The course has a strong practical emphasis, with field methods and species identification skills developed through a 3-day residential field trip to Kaikōura and a project write-up based on that, all of which develop skills you would need for work in this area after graduation. The field trip is also a lot of fun in a beautiful patch of native forest.

P: BIOL 209, BIOL 274 and BIOL 275

BIOL 383

Behavioural Ecology

Semester 1 15 points

The development and adaptive significance of behaviour with emphasis on the relationship between ecology and behaviour.

P: BIOL 272 and BIOL 209
RP: BIOL 271

BIOL 384

Marine Ecosystems

Semester 2 15 points

This course advances the concepts of how marine species interact with each other and the environment to form functional populations and communities. The oceans cover 71% of earth's surface and span estuaries, near-shore rocky reefs, deep water benthic communities, and the surface and deeper waters of the open ocean. They are interconnected through ocean currents, tides and an increasingly changing physical environment. This course uses a mixed platform of lectures, tutorials, computer labs and field-based exercises to understand current issues and processes affecting marine ecosystems, with New Zealand and worldwide examples. Students are taught hands-on field sampling techniques for monitoring biodiversity in near-shore marine benthic communities, and give oral presentations and written reports that stress problems, avenues to solutions and results of experimental testing. This course is intended for those interested in a deeper understanding of how marine ecosystems function, and the natural and human-induced changes affecting them. It is particularly useful for those who wish to have a good grounding for applied research and future employment, and who intend to pursue careers involving biodiversity, monitoring, report-writing and oral presentations.

P: BIOL 209, BIOL 221 and BIOL 274

R: BIOL 374

RP: BIOL 212

Key

P: Pre-requisites
RP: Recommended Preparation
R: Restrictions
EQ: Equivalent Course

Akoranga Mātai Matū Koiora Biochemistry Courses

BCHM 111 (co-coded as BIOL 111)
Cellular Biology and Biochemistry

Semester 1 15 points

A foundation course that will introduce you to the basic processes of cellular biology. The cell is considered the basic unit of life because every organism whether animal, plant, or micro-organism consists of cells or is itself a single cell. As such the structure and function of the cell impacts on all other levels of life including organisms, ecosystems and the biosphere. For this reason it is essential for all biologists to understand the fundamentals of cell biology. In this course you will learn the basic concepts of cell function and how these are related to cell structure, which is in turn dependent on molecular structure and biochemical interactions between molecules.

R: ENCH 281 and BIOL 111

EQ: BIOL 111

BCHM 112 (co-coded as CHEM 112)
Structure and Reactivity in Chemistry and Biochemistry

Semester 2 15 points

Structure, isomerism, stereochemistry, synthesis, and reaction mechanisms in organic chemistry; transition metal chemistry and electrochemistry.

P: (1) NCEA: at least 14 credits NCEA Level 3 Chemistry, or (2) CIE: at least D grade in CIE AL Chemistry or A grade in CIE ASL Chemistry, or (3) IB: at least Grade 4 in IB HL Chemistry or Grade 6 in IB SL Chemistry, or (4) CHEM 114, or at least B Grade in BRDG 022.

R: CHEM 112

EQ: CHEM 112

BCHM 202 (co-coded as BIOL 231)
Foundations of Molecular Biology

Semester 1 15 points

Molecular biology is the science of how genes work. This understanding underpins the sciences of biochemistry, bioinformatics, evolution, systematics and ecology by both providing tools that are used by these sciences and by explaining how organisms produce the characteristics observed by these other sciences. This course goes will take you from familiarity with the concepts of DNA replication, transcription and translation to a foundation understanding of these reactions in living cells seen through gene regulation. It is intended for anyone who wants to begin to understand how genetics relates to life and seeks skills related to working at the molecular scale. The course is a foundation to further work that involves understanding patterns in DNA, structure and function of proteins, or developing new biotechnologies.

P: BCHM 111 (=BIOL 111) or ENCH 281

RP: CHEM 112 (=BCHM 112) or CHEM 114

R: BIOL 231, ENCH 480

EQ: BIOL 231, ENCH 480

BCHM 206
Organic Chemistry

Semester 2 15 points

The organic chemistry of π-bonded systems; alkenes, alkynes and aromatic compounds. The organic chemistry of carbonyl compounds: aldehydes/ketones and carboxylic acid derivatives; their reactivity, inter-conversions and use for C-C bond forming reactions. An introduction to ring compounds; the special properties of cyclic molecules and how strain affects their reactivity. An introduction to bioorganic chemistry; carbohydrates and the mechanisms of some important enzyme catalysed processes, including the biosynthesis of polyketides and some amino acids.

P: BCHM 212 (=CHEM 212)

R: CHEM 242

EQ: CHEM 242

BCHM 212
Chemical Reactivity

Semester 1 15 points

Structures and properties of organic and biological molecules; application of kinetics and thermodynamics to organic and biochemical reactions; substitution and elimination chemistry; bioinorganic chemistry and electrochemistry.

P: CHEM 112 or ENCH 241

R: CHEM 212

EQ: CHEM 212

BCHM 222
Biochemistry B - Metabolism; the reactions of molecules in cells

Semester 2 15 points

General principles of metabolism, particularly how the pathways are controlled in response to the changing needs within the cell. These general principles will be illustrated by an in-depth look at particular metabolic pathways, especially glycolysis and the Krebs' cycle. Bioenergetics: membranes and energy transduction, the chemiosmotic theory, oxidative phosphorylation and photosynthesis.

P: BCHM 221 or BCHM 253 (=BIOL 253)
R: BCHM 201, ENCH 323

BCHM 253 (co-coded as BIOL 253)
Cell Biology 1

Semester 1 15 points

The course will cover membrane structure, membrane transport of small molecules and the electrical properties of membranes, intracellular compartments and protein sorting, intracellular vesicle transport, aspects of the cytoskeleton, the cell cycle and apoptosis. These topics will give the students a comprehensive grounding in cells as single entities. This will prepare students for an updated 3rd year cell biology course that will consider cells in their social context i.e. how they interact with other cells.

P: BIOL 111 (=BCHM 111) or ENCH 281

RP: 15 pts of CHEM at 100 level

R: BIOL 253

EQ: BIOL 253

BCHM 281
Practical Biochemistry

Semester 2 15 points

Experimental biochemistry, synthetic organic and inorganic chemistry with an emphasis on preparation, separation, isolation, and characterisation techniques that are used in chemistry and biochemistry. Safety and library elements will be integrated into the course, biochemistry and chemistry options will be available.

P: BCHM 112 (=BCHM 112) or CHEM 111 or CHEM 114

R: CHEM 281

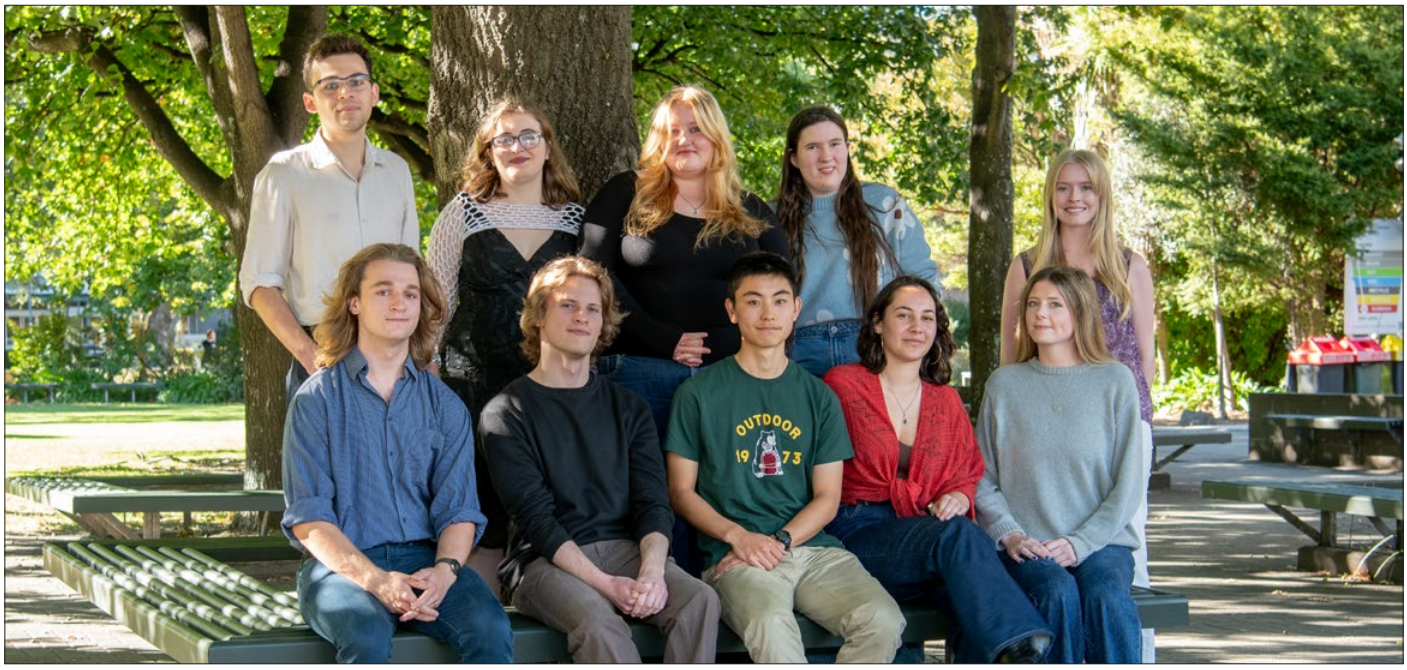
BCHM 305
Protein Science

Semester 1 15 points

This course is designed to help you to understand how different proteins function and how biochemists seek to investigate protein structure and function. The course aims to introduce you to modern biochemical ideas and research, and will include a substantial amount of reading from the biochemical literature, as well as from your standard textbook.

P: BCHM 253 (=BIOL 253) and BCHM 222

RP: BCHM 202 (=BIOL 231) and BCHM 206 (=CHEM 242)



The UC iGEM team brings together undergraduate students from biology, biochemistry, and engineering to design innovative research projects with global impact. Their 2026 Nanobrew project explored using synthetic biology to convert brewery waste into nanocellulose, a versatile material used in products ranging from cosmetics to sustainable packaging. Students present their work at the prestigious international iGEM competition, held annually around the world.

BCHM 306

Biochemical Pathology

Semester 2 15 points

This course is designed to help you to understand the biochemistry underpinning disease (e.g. cancer), how diseases are diagnosed using biochemical markers (e.g. heart disease), mechanisms of cell and organ toxicity, and how toxic molecules can be used to our benefit (e.g. in cancer chemotherapy).

P: BCHM 253 (=BIOL 253) and BCHM 222, and 15 points from BCHM 206 (=CHEM 242), BCHM 212 (=CHEM 212)

R: BCHM 301, BCHM 302

RP: BCHM 202 (=BIOL 231)

BCHM 338

Chemical Biology & Protein Chemistry

Semester 1 15 points

This course covers important concepts in chemical biology: the application of chemical techniques, tools, analyses, and synthetic chemicals, to the study and manipulation of the molecular processes taking place within cells.

P: BCHM 212 (=CHEM 212)

R: CHEM 325

BCHM 339

Bioinorganic and Bioorganic Chemistry

Semester 2 15 points

This course covers the chemical principles underlying selected important biological processes. The topics covered will be: bio-inorganic chemistry and electrochemistry; metal ions in biology & toxicology; case-studies in contemporary bio-organic chemistry.

P: BCHM 212 (=CHEM 212)

R: CHEM 325

BCHM 381

Biochemical Techniques

Semester 2 15 points

Biochemical experiments and analysis such as transport kinetics, DNA sequence analysis and manipulation, lipid isolation and characterisation. Safety, bioethical and library elements will be integrated into the coursework.

P: BCHM 281 (=CHEM 281)

Key

P: Pre-requisite
C: Co-requisite
RP: Recommended Preparation
R: Restrictions
EQ: Equivalent Course

Paenga Kura School Facilities

The School of Biological Sciences provides access to modern laboratories, specialist collections, advanced analytical equipment, and computational resources that support teaching and research across the biological sciences. From molecular biology and biotechnology to ecology, conservation, and bioinformatics, our facilities allow students to investigate biological questions in the laboratory, the field, and through computational analysis.

Many undergraduate and postgraduate students gain hands-on experience using these facilities through laboratory classes, field courses, summer scholarships, internships, and research projects. These experiences help develop practical skills that are highly valued in research, healthcare, biotechnology, conservation, environmental management, and industry.

Exploring Life from Molecules to Ecosystems

Students and researchers have access to facilities that support investigations across the full spectrum of biology. Molecular biology, genetics, and biotechnology laboratories support DNA, RNA, and protein analysis, gene technologies, real-time PCR, recombinant DNA techniques, and cellular microinjection. The School also hosts the Canterbury Sequencing Facility and an Ancient DNA laboratory.

Advanced imaging facilities, including confocal microscopy, enable detailed examination of cells, tissues, and organisms. These are complemented by specialist collections such as the School's herbarium and insect collections, which support research in biodiversity, taxonomy, ecology, and conservation.

Facilities for Discovery and Innovation

Our physiology laboratories support research into how plants and animals function and respond to their environments. Facilities include specialised equipment for neurophysiology, cardiovascular, respiratory, exercise, and environmental physiology, alongside plant growth rooms and glasshouse facilities that support plant biology and biotechnology research.

Biochemistry and microbiology laboratories provide opportunities to investigate biological processes at the molecular level, from enzyme function and cellular metabolism to the genetics, physiology, and ecology of microorganisms. These facilities support research relevant to health, food production, biotechnology, biosecurity, and environmental sustainability.

Data-Driven Biology

Modern biology increasingly relies on large datasets and advanced analytical tools. The School maintains dedicated computational resources for bioinformatics, ecological modelling, and data-intensive research, with additional access to the University's high-performance computing infrastructure. These facilities enable students and researchers to analyse genomic data, model ecological systems, and address complex biological questions using computational approaches.

Whaitua
Field Stations – *learning beyond the laboratory*

Field stations play a vital role in Biological Sciences research and teaching, providing access to diverse environments for field-based learning and discovery. Through UC's network of field stations and research partnerships, students and researchers can undertake studies in ecosystems ranging from alpine grasslands and braided rivers to coastal marine environments, Antarctic landscapes, and tropical forests.

Students of BIOL 305 stay at the UC Cass field station and learn practical field taxonomy skills in the surrounding area.

Many Biological Sciences students gain hands-on experience through field courses, summer research projects, and postgraduate research at UC's field stations and partner research sites.

Cass Field Station, Mid Canterbury

Located in the upper Waimakariri Basin, approximately 105 km west of Christchurch, Cass Field Station has supported biological and environmental research for more than a century. Surrounded by a remarkable diversity of habitats including grasslands, wetlands, rivers, lakes, beech forest, and alpine environments, Cass provides opportunities for research in ecology, evolution, conservation biology, physiology, and environmental science. Its proximity to Arthur's Pass and the Craigieburn Range further expands access to a wide range of natural ecosystems.

Kaikōura

UC's Kaikōura field facilities provide access to one of New Zealand's most distinctive coastal environments. The region supports research and teaching in marine ecology, animal behaviour, conservation, and environmental change, with study sites ranging from rocky shorelines and coastal waters to native forest habitats.

Mount John, Tekapo

Researchers have access to facilities at Mount John in the Mackenzie Basin, providing opportunities for biological and environmental research in high-country ecosystems. Current research in the region includes work on threatened species, invasive plants, and ecosystem management.

Scott Base, Antarctica

Through collaborations with Gateway Antarctica and other research partners, Biological Sciences staff and students undertake research in Antarctica. Projects span a wide range of organisms and ecosystems, including microbes, plants, soils, fish, birds, and marine mammals, helping to improve our understanding of life in one of Earth's most extreme environments.

Ngel Nyaki, Nigeria

UC researchers also contribute to the Nigerian Montane Forest Project, based in the Ngel Nyaki Forest Reserve on the Mambilla Plateau in eastern Nigeria. Led by Associate Professor Hazel Chapman, the project supports long-term research in tropical ecology, conservation, forest restoration, and biodiversity, while providing opportunities for collaboration with researchers and students from around the world. Find out more at www.canterbury.ac.nz/afromontane/

Rangahau Research

As a Biology student at UC, you'll learn from researchers who are tackling some of the biggest challenges facing society, from biodiversity loss and biosecurity to human health and climate change.

Many of the examples, case studies, field activities, and laboratory exercises used throughout our courses are drawn directly from current research being undertaken by our staff and students.

Research is at the heart of the School of Biological Sciences. Our researchers explore the living world at every scale, from molecules and cells to ecosystems and global biodiversity. Through our work, we seek solutions to some of the most pressing challenges facing society, including climate change, biodiversity loss, food security, biosecurity, and human health.

As a Biology student at UC, you will learn from active researchers whose discoveries are advancing knowledge and creating real-world impact. Our research combines fieldwork, laboratory science, and computational approaches, providing opportunities to investigate everything from Antarctic ecosystems and endangered species to biotechnology, genetics, and disease.

Our researchers work throughout Aotearoa New Zealand and around the world, collaborating with communities, industry, government agencies, and international partners. Supported by specialist laboratories, advanced analytical equipment, and field stations such as Cass, we provide an environment where curiosity, discovery, and innovation thrive.

Our research themes

Our researchers work across the full breadth of the biological sciences, from molecules and cells to ecosystems and global biodiversity. While our research spans many disciplines, it is united by a common goal: generating knowledge that helps address challenges facing people, communities, and the natural world.

The ecological landscape – from individuals to ecosystems

How do ecosystems respond to climate change, disturbance, invasive species, and human activities?

Our researchers investigate ecological processes from individuals to ecosystems, helping us understand and predict environmental change. Research spans forests, rivers, oceans, alpine environments, and Antarctic ecosystems, with a strong focus on Aotearoa New Zealand and global environmental challenges.

Species diversity and conservation

How can we understand and protect species in a rapidly changing world?

From genomics and systematics to ecology and animal behaviour, our researchers investigate the origins, diversity, and conservation of life. This work helps inform the management of threatened species, biosecurity challenges, and ecosystem restoration.

Biological structure and activity

How do biological molecules shape life, health, and innovation?

Researchers investigate genes, proteins, cells, and biological systems to better understand health, disease, and biological function. This knowledge supports advances in biotechnology, medicine, agriculture, and the development of sustainable products and technologies.

Biomolecular Interaction Centre

Biomolecular Interaction Centre (BIC)

The Biomolecular Interaction Centre (BIC) is a multidisciplinary research centre dedicated to understanding the molecular interactions that underpin life. This research is helping to address some of today's biggest challenges, from developing new treatments for disease and sustainable materials to protecting the environment and advancing biotechnology.

Based at the University of Canterbury, BIC brings together a network of more than 70 researchers from universities, Crown Research Institutes, industry, and international partners. The Centre supports collaborative research across areas including health, biotechnology, biomaterials, environmental science, and molecular design.

With twelve Principal Investigators, postdoctoral researchers, and more than 30 postgraduate students, BIC provides a dynamic and supportive research environment. Through research symposia, seed funding, scholarships, and collaborative projects, the Centre creates exciting opportunities for students to engage in world-class interdisciplinary research.

Tāura Postgraduate

Postgraduate degrees taken by students include a Bachelor of Science (Honours), a Postgraduate Diploma, a Master of Science, or a Doctor of Philosophy.

Any student who wishes to enrol for a research degree should contact an academic staff member of the School for further information and advice. Also visit our website (www.canterbury.ac.nz/science/biology) or contact us for a copy of the *Biological Sciences Postgraduate Handbook*.

An interdisciplinary course, Environmental Science, is also offered at postgraduate level by Biological Sciences and the School of Earth and Environment. Details can be obtained from www.canterbury.ac.nz/study/academic-study/subjects/environmental-science or the Environmental Science Coordinator, earthandenvironment@canterbury.ac.nz.

400-level Biology Courses

Full descriptions on our website

BIOL 411 Research Preparation
BIOL 412 Research Proposal
BIOL 423 Evolutionary Ecology
BIOL 424 Community Ecology
BIOL 425 Freshwater Ecology
BIOL 426 Conservation Biology
BIOL 427 Global Change Biology
BIOL 428 Marine Biology and Ecology
BIOL 429 Conservation Genetics
BIOL 438 Behaviour
BIOL 455 Applied and Molecular Microbiology
BIOL 456 Dynamics of Microbiological Interactions
BIOL 457 Macromolecular Evolution & Engineering
BIOL 459 Genomics
BIOL 460 Molecular Biology in Society
BIOL 461 Protein Science
BIOL 462 Medical Biochemistry
BIOL 463 Cell Biology
BIOL 480 Project
BIOL 481 Conservation Physiology
BIOL 496 Plant Developmental Biology and Biotechnology

BSc (Hons)

Honours is an intensive one-year programme designed for high achieving students seeking to fast-track to a PhD.

Honours students must take four 400-level courses and a research project.

We recommend this option only for students with an A- average (GPA 7) or higher at 300-level.

PgDipSc

The Postgraduate Diploma of Science is a one-year program equivalent to the first year of an MSc. Students take four 400-level courses, but do not carry out research. *See left column for the list of courses we offer, full course details are on our website.*

The PgDipSc is a great option if you are unsure whether you want to commit to an MSc or if you want to extend your theoretical grounding in biology prior to entering the workforce.

It is common for students enrolled in a PgDipSc to transfer to MSc part II providing they achieve a B average or better in their 400-level courses.

MSc

A Master of Science degree comprises one year of coursework (part I) and a 12 month research project (part II).

The MSc degree provides a solid grounding in the scientific process and provides sought after research skills applicable to a wide range of careers. This degree is also arguably the best route into a PhD because you gain more in-depth research experience than is possible during an Honours degree.

PhD

The PhD at UC is a research degree that typically requires three, but no more than four years of study. It is the highest academic qualification available at the University. Completing a doctorate is a mark of academic achievement and requires self-discipline and commitment.

A PhD prepares you for an academic or research career and the skills you gain are increasingly sought after in the international job market.

Many Biology students continue into postgraduate study to develop specialist knowledge, undertake original research, and expand their career opportunities. Talk to an academic advisor early if postgraduate study interests you.

Whakapā Mai
Contact Information

Please contact us if you have further questions regarding our courses or research, questions for individual staff members can be sent via email using the format firstname.surname@canterbury.ac.nz.

Head of School

Prof Elissa Cameron

Enquiries

Phone: +64 3 369-5200

E-mail: biology@canterbury.ac.nz

Web: ***www.canterbury.ac.nz/science/biology***

Biology Undergraduate Coordinator

Our coordinator can offer advice and help you plan your biology degree

Dr Grant Pearce
grant.pearce@canterbury.ac.nz

Biology Postgraduate Coordinators

If you have questions about how to proceed beyond undergraduate onto further degrees and diplomas contact our postgraduate coordinators

Fourth-Year Coordinator
Professor Jono Tonkin
jonathan.tonkin@canterbury.ac.nz

MSc Part 2 Coordinator
Assoc Prof Robyn Hetem
robyn.hetem@canterbury.ac.nz

PhD Coordinator
Prof Hazel Chapman
hazel.chapman@canterbury.ac.nz

Student advisors for future students

Staff in the Future Students Office provide advice to future students who are new to university study, and looking to start the first year of their first degree. They can assist with information on degrees, scholarships, accommodation, and other aspects of university life.
www.canterbury.ac.nz/study/getting-started/future-students-office

New Students

Te Pātaka, the Student Services Hub

Visit the Puaka-James Hight building to get advice and support from your Kaitoko (first year student advisor) at Te Pātaka.
www.canterbury.ac.nz/life/support-and-wellbeing/uc-support-services/student-services-hub

Student Advisors, Faculty of Science

The Science Student Advisors are available to provide accurate and timely academic advice and assistance on course options and/or degree programmes in science subjects.
scienceugadvice@canterbury.ac.nz

University of Canterbury Contact Centre

For more information about study options or an enrolment pack get in touch with the Contact Centre on:

Freephone: 0800 VARSITY (0800 827 748) in NZ

Or phone: +64 3 369 3999

Email: enrol@canterbury.ac.nz

Web: ***www.canterbury.ac.nz***

The School of Biological Sciences is housed in the Julius von Haast building with teaching laboratories in the adjacent Ernest Rutherford and West buildings.

At a glance

- 40+ undergraduate courses
- Internationally accredited Biology major
- Field stations and sites across New Zealand and overseas
- Research-active teaching staff
- Pathways into research, industry, conservation, health and biosecurity

From molecules to ecosystems, Biology at UC prepares you to understand life and shape the future.

School of Biological Sciences
Te Kura Pūtaiao Koiora:

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