Faculty of Science & Engineering
Study Science
Welcome

Whether it’s adapting to climate change, turning waste into high-value products, improving treatment for diseases or developing technologies for the next generation, science and engineering contribute to almost every aspect of our lives.

New Zealand and the world need people with curious minds who are willing to ask the hard questions and who will work towards creating a brighter future.

The grand challenges facing society demand research that transcends disciplinary boundaries, requiring an increased flexibility in the ways we seek to understand the world and prepare our students for the future.

The Faculty of Science & Engineering is designed as a cohesive cross-disciplinary unit providing greater opportunities in teaching and research. We offer flexible, innovative degrees that produce multi-skilled, adaptable graduates who are ready for the challenges of today and have the skills to tackle the obstacles of tomorrow.

Our students’ career prospects are limited only by their interests and imagination, and graduates find themselves employed throughout New Zealand and overseas in a wide range of well-paid, interesting and stimulating occupations.

Our staff have acquired national and international reputations in their subjects and place emphasis on maintaining a good balance between the growth areas of science and technological application. Combined with some of the world’s most advanced laboratory equipment, our staff are well placed to address many of the challenges as outlined by New Zealand’s National Science Challenges and the UN’s Millennium Development Goals.

Professor Chad Hewitt
Dean – Science
University of Waikato
Welcome

Why study science at Waikato?

Studying science in Tauranga

Bachelor of Science

Bachelor of Science (Technology)

Work placements

Graduate and postgraduate study

International students

Scholarships and prizes

Animal Behaviour

Biochemistry

Biological Sciences

Biotechnology

Computer Science

Chemistry

Earth Sciences

Electronics

Environmental Planning

Environmental Sciences

Materials and Processing

Mathematics and Statistics

Psychology
From the natural environment, to our own health and wellbeing, to the technology we use in our everyday lives – science is everywhere.

It is scientists who will solve tomorrow’s problems and the future is calling for the next generation of curious minds that can do just that.

If you’re intrigued by the world around you and enjoy biology, chemistry or physics, a degree in science may be what you’re looking for.

**Career options**

A science degree will open doors to some of the world’s fastest growing industries and most exciting research areas, including the sustainable management of environmental resources.

Scientists also play a vital role within non-government organisations (NGOs), and local and central government.

Career options include:

- Agritech
- Biomedical research
- Biotechnology
- Coastal and land use planning
- Electronics
- Environmental management
- Food and dairy
- Iron and steel manufacturing
- Oil and gas
- Petrochemicals and plastics
- Pharmaceuticals
- Pulp, paper and wood
- Renewable energy
- Restoration ecology
- Software development
- Telecommunications
The University of Waikato’s Faculty of Science & Engineering offers innovative and relevant degrees to ensure you graduate with the theory, technical ability and leadership capability to be successful in the science industry.

World-class research
The University of Waikato is known for research excellence in environmental science, climate change, sustainable land use, biomedical innovation and sustainable industry.

A lot of our scientific research involves collaboration with businesses, other research institutes and local authorities, and it impacts development all over New Zealand and around the world.

Part of our success comes from our investment in world-class research equipment and facilities, most of which is available to students during their studies.

Laboratories and facilities
The School of Science is home to a suite of well-equipped laboratories, where you will spend a significant amount of time during your studies.

Most science papers include weekly laboratory sessions, giving you the chance to put what you’ve learnt in lectures and tutorials into practice. Our small class sizes mean that once you’re in these labs, you will have more one-on-one time with our teaching staff.

Our undergraduate students also have the opportunity to use complex research equipment and techniques, such as nuclear magnetic resonance (NMR) spectroscopy and DNA sequencing.

Field trips
In some papers you will be able to take part in field trips to local beaches, forests and lakes to conduct sampling and learn first-hand about the environments you are studying.

Student support
The Faculty of Science & Engineering has a team of mentors who are available to assist new students with study choices, career paths and anything else you may have questions about.

The Faculty also has a Māori Student Support Officer whose role is to provide ongoing support for students. There is also a team of kaitaki (mentors) available to help you with subject-specific areas, and wānanga (workshops) are offered.

Employer contacts
As a science student you will be exposed to potential employers at every stage of your degree, including guest speakers in your lectures, site visits during field trips and during work placements, Summer Research Scholarships and internships.

Extracurricular opportunities
Many subject areas have social groups that hold quiz nights and other social events, including the Waikato Biological Society.

Annual events
- University Open Day – May
- Osborne Physics and Engineering (OspEn) days – June
- Waikato Experience Biology days – June
- NZIC Analytical Chemistry Competition – June
- Engineering Open Day – July
- Science Open Day – July
- ChemQuest – October
- Hill Laboratories Waikato Science & Engineering Summer School – November/December

Find out more about our events at sci.waikato.ac.nz/news-events/whats-on

Student support

Employer contacts

Extracurricular opportunities

Annual events
Study science in Tauranga

The University of Waikato’s Tauranga campuses offer a growing range of degree programmes, including great opportunities for students interested in science.

We are part of the Bay of Plenty Tertiary Education Partnership, which is made up of several tertiary institutions in the Bay of Plenty including Bay of Plenty Polytechnic, Waikato Institute of Technology and Te Whare Wānanga o Waikato. This means students are provided with more pathways to study in the Bay of Plenty than ever before.

Our campuses
In Tauranga we share our two main campuses with the Bay of Plenty Polytechnic; the Bongard Centre in the heart of the city and the Windermere campus on the city fringe. From 2020 new students will also have access to our brand new Tauranga CBD campus in Durham Street, which will be shared with the three other members of our partnership.

Degrees available in Tauranga

Bachelor of Science (Biological Sciences)
Biological Sciences is the study of life. From botany and ecology through to marine and freshwater sciences, study and career options in this field are abundant.

Pathway options
Start your Bachelor of Science (with a major in Biological Sciences) in Tauranga by first enrolling in the Diploma in Environmental Management Level 6 or the Diploma in Marine Studies Level 6 with the Bay of Plenty Polytechnic. If you complete either diploma with at least a B grade average, you will be guaranteed admission to the Bachelor of Science degree (majoring in Biological Sciences) with a credit of up to 14 papers or 240 points towards the degree. This applies only to those coming through the agreed pathway. All others are on a case-by-case basis.

You can complete the final year of the degree in Tauranga by studying University of Waikato papers at the Windermere Campus.

Bachelor of Science (Computer Science with a specialisation in Applied Computing)
Applied Computing is the point where computing, science, design, and society meet. You will learn how to find out what your users need their software to do and how to design useful and usable software.

Pathway options
Start your major in Computer Science with a specialisation in Applied Computing in Tauranga by first enrolling with the Bay of Plenty Polytechnic in the Level 5 Diploma in Applied Computing (DipAppCompL5), which credits to the first year of the BSc major in Computer Science with a specialisation in Applied Computing. You can then enrol with the Bay of Plenty Polytechnic in the Level 6 Diploma in Applied Computing (DipAppCompL6), which credits to the second year of the BSc major in Computer Science with a specialisation in Applied Computing.

You can complete your major in Computer Science with a specialisation in Applied Computing in Tauranga by studying University of Waikato papers at the Bongard Centre, or by studying at the University of Waikato Hamilton campus.

For more information
Visit boppoly.ac.nz for specific entry requirements, or refer to our Tauranga Prospectus for more information.
Coastal Marine Field Station

Part of the University’s Environmental Research Institute, the Coastal Marine Field Station has become a major centre of marine research excellence.

Located at Sulphur Point in Tauranga, the Coastal Marine Field Station (CMFS) is involved in teaching, environmental monitoring, coastal and marine research and discovery. Since opening in 2011, the CMFS has experienced huge growth in research demand, especially after the grounding of the MV Rena on the Astrolabe Reef.

A growing number of students are now furthering their study by conducting research at Masters and PhD level through the CMFS. Students work in collaboration with industry, government agencies and Crown Research Institutes across a number of areas including biosecurity, coastal sustainability, ecology, and agri-science.

For more information about the Coastal Marine Field Station visit waikato.ac.nz/go/coastal-study-bop
Bachelor of Science (BSc)

The Waikato Bachelor of Science (BSc) equips you for a career that requires a curious mind, logical thinking and practical skills.

The range of career options available to BSc graduates isn’t surprising when you consider the nature of the degree.

It is supremely flexible so you can combine papers to suit your strengths and abilities. We cover all subjects during first year so you can get a taste of everything before specialising.

Putting into practice what you learn in your lectures is a major part of a Waikato science degree. You will gain hands-on experience with some of the most high-tech laboratory equipment available, such as our mass spectrometers for investigating molecular structure. We also organise field trips to give you more chances to apply what you’re learning.

Specialisations
Within some majors, we offer several specialisations that are designed to give you in depth knowledge of a particular area of study. You can choose to specialise in Science International, where a science major is combined with a language, or specialise in Te Pūtaiao me ngā Take Māori where you can also extend your knowledge of Māori language and culture.

- **Within Biological Sciences:** Restoration Ecology
- **Within Environmental Sciences:** Environmental Microbiology, Environmental Modelling, Land and Freshwater Environments or Marine Sciences
- **Within Computer Sciences:** Applied Computing
- **Within Mathematics:** Economics, Finance
- **Within Statistics:** Economics, Databases

**Practical experience**
The BSc is a practical degree with laboratory and/or field work associated with most subjects. For some science subjects, you also have the opportunity to undertake an independent or small-team research project (special topics paper) which may include laboratory, field and literature survey-based work.

**Further study**
In the Faculty of Science & Engineering, entry into an honours year in Biological Sciences, Chemistry, Earth Sciences or Materials and Processing is by invitation-only to exceptional students.

The Faculty of Computing & Mathematical Sciences also offers a one-year BSc Honours programme in Computing, Mathematics or Statistics. You may also transfer into the four-year Bachelor of Computing and Mathematical Sciences.

**Other postgraduate degrees**
- Master of Environmental Sciences
- Master of Science
- Master of Science (Research)
- Master of Science (Technology)
- Doctor of Philosophy

**Career options**
- Animal Welfare Officer
- Biotechnologist
- Chemical Analyst
- Environmental Scientist
- Laboratory Manager
- Software Developer
- Statistician
- Web Architect

Chat to a Future Student Adviser if you’d like to know more about where this degree could lead to.

Email recruitment@waikato.ac.nz
**Entry requirements and prerequisites**

Entry requirements will differ depending on which major you choose to study.

- **Animal Behaviour:** NCEA Level 3 Biology is recommended.

- **Biochemistry:** 16 credits in NCEA Level 3 Chemistry is required. NCEA Level 3 Biology is highly recommended. NCEA Level 3 Mathematics and Physics are also recommended.

- **Biological Sciences:** NCEA Level 3 Biology is highly recommended. NCEA Level 3 Chemistry and Mathematics are also recommended.

- **Biotechnology:** 16 credits in NCEA Level 3 Chemistry is required. NCEA Level 3 Biology, Mathematics and Physics are all recommended.

- **Chemistry:** 16 credits in NCEA Level 3 Chemistry is required for some specific papers.

- **Electronics:** NCEA Level 3 Physics is required, as well as NCEA Level 3 Calculus or Statistics. Some specific papers require at least 14 credits in NCEA Level 3 Physics.

- **Environmental Sciences:** NCEA Level 3 Biology, Chemistry and Geography are recommended.

- **Materials and Processing:** There are no formal prerequisites for entry to Materials and Processing. However, 16 credits in both NCEA Level 3 Chemistry and Calculus are recommended, along with 14 credits in NCEA Level 3 in Physics.

- **Mathematics:** NCEA Level 2 and 3 Mathematics is required. NCEA Level 3 Calculus is strongly recommended.

- **Statistics:** NCEA Level 2 and 3 Mathematics is required. For entry to core paper STAT121 you must have 18 credits in NCEA Level 2 Mathematics, or 14 credits in NCEA Level 3 Statistics, Calculus or Mathematics. Check the paper list carefully for specific prerequisites. If you do not meet the prerequisites listed, please contact science@waikato.ac.nz as there may be other pathways you can take to study in this field.

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**Bachelor of Science (BSc) degree structure 3 Years 360 Points**

It is recommended that students include 100 level prerequisites for any compulsory papers in their chosen major(s) in the first year of their programme of study.

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<thead>
<tr>
<th>Year 1</th>
<th>120 points</th>
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<tr>
<td>100 level*</td>
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<tr>
<th>Year 2</th>
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<tr>
<td>200 level</td>
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<tr>
<th>Year 3</th>
<th>120 points</th>
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<tr>
<td>300 level</td>
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* These papers should be recognised science papers offered by the Faculties of Science & Engineering and Computing & Mathematical Sciences (except MATH168) and selected Philosophy and Psychology papers, and, at 100 level, should be taken across at least four science subjects.
The Bachelor of Science (Technology) (BSc(Tech))

The Bachelor of Science (Technology) (BSc(Tech)) was the first degree of its kind in New Zealand and offers a unique approach to study.

The BSc(Tech) is a flexible, job-oriented degree that provides you with the necessary knowledge and practical experience to bridge the gap between study and work.

Heading into the workplace with a BSc(Tech) from Waikato means you’ll feel right at home. You’ll have spent 12 months of your degree gaining work experience and being paid for your efforts. Your first stint in the field will be for three months in your second summer, followed by another nine months beginning in the summer break of your third year and continuing into your fourth year.

The BSc(Tech) includes management papers as well as science papers to give you a broad understanding of both disciplines to set you up for a successful career.

Specialisations

Within some majors, there are several specialisations that are designed to give you a good understanding of a particular area of study. You can choose to specialise in Science International, where a science major is combined with a language, or specialise in Te Pūtaiao me ngā Take Māori where you can also extend your knowledge of Māori language and culture.

- Within Biological Sciences:
  - Restoration Ecology

- Within Environmental Sciences:
  - Environmental Microbiology, Environmental Modelling, Land and Freshwater Environments, or Marine Sciences

BSc(Tech) Majors

- Animal Behaviour
- Biochemistry
- Biological Sciences*
- Biotechnology
- Chemistry
- Earth Sciences
- Electronics
- Environmental Planning
- Environmental Sciences*
- Materials and Processing

You can also choose a second major from the list or, alternatively, your second major can be chosen from almost any other undergraduate subject.

*Specialisations are available within these majors.

Career options

- Biotechnologist
- Computer Network Administrator
- Conservation Officer
- Exploration Geologist
- Forensic Technician
- Laboratory Technologist
- Quality Assurance Manager
- Research Assistant
- Software Developer
- Systems Analyst
Practical experience
A total of 800 hours of work experience is a component of this degree. The University of Waikato’s Co-operative Education Unit actively seeks and oversees this placement, ensuring the quality and relevance of your work experience. See page 10 for more information.

Further study
- Bachelor of Science (Honours)
- Master of Environmental Sciences
- Master of Science
- Master of Science (Research)
- Master of Science (Technology)

Entry requirements
Entry requirements will differ depending on which major you choose to study.
- **Animal Behaviour**: NCEA Level 3 Biology is recommended.
- **Biochemistry**: 16 credits in NCEA Level 3 Chemistry is required. NCEA Level 3 Biology is highly recommended. Mathematics and Physics are also recommended.
- **Biological Sciences**: NCEA Level 3 Biology is required. NCEA Level 3 Chemistry and Mathematics are also recommended.
- **Biotechnology**: 16 credits in NCEA Level 3 Chemistry is required. NCEA Level 3 Biology, Mathematics and Physics are also recommended.
- **Chemistry**: 16 credits in NCEA Level 3 Chemistry is required for specific papers.
- **Electronics**: NCEA Level 3 Physics, Calculus or Statistics are recommended. Specific papers require at least 14 credits in NCEA Level 3 Physics.
- **Environmental Sciences**: NCEA Level 3 Biology, Chemistry and Geography are recommended.
- **Materials and Processing**: There are no formal prerequisites for entry to Materials and Processing. However, 16 credits in both NCEA Level 3 Chemistry and Calculus are recommended, along with 14 credits in NCEA Level 3 in Physics.

Check the paper list carefully for specific prerequisites. If you do not meet the prerequisites listed, please contact science@waikato.ac.nz as there may be other pathways you can take to study in this field.
Work placements

Work placements are a major feature of the BSc(Tech) and you will complete 800 hours of relevant work experience during your degree.

Co-operative education is the combination of study and work. The Co-operative Education Unit at the University of Waikato is the leader in New Zealand for co-operative education programmes, with an average of 250 students placed in industry every year.

Our Co-operative Education Unit actively seeks and oversees your industrial work placement, ensuring a good fit for your area of study and career goals, and monitoring the quality of your work experience.

By the time you graduate you will have the credibility of paid experience to take to your interviews.

Work placements help you:
• Get relevant work experience before you graduate
• Earn extra money while you study. Most placements are paid and many students will earn between $5000 and $6500 during each summer placement
• Apply what you have learnt at University in the real world
• Receive possible job offers. Students are often offered full-time positions at the end of their placements
• Learn workplace methods, procedures and skills that aren’t taught at university
• Learn to work in a professional environment and become familiar with workplace-specific terminologies, teamwork skills, communication and workplace norms
• Try a career before you finish your degree. It will refine your study direction and focus your career goals, plus give you a better understanding of what careers are available
• Gain skills in report writing, CV preparation and interview skills
• Gain exposure to employer contacts. The people you will work alongside are valuable contacts and could even be your future employers
• Be graded on your contribution to research or an industry project. Placements are assessed, so to prospective employers your grade will serve as a valuable indication of how well you can work.

ASHLEIGH WEATHERALL
BSc(Tech), Animal Behaviour
Mahurangi College, Warkworth
Placement: Plant and Food Research

Hours spent catching bumblebees at the Hamilton Gardens has been an unusual highlight for Ashleigh. Once caught, a small section is shaved off the bumblebees’ backs and a tracking device is attached. Ashleigh has been working with Plant and Food Research’s pollination and apiculture team to study the use of bumblebees as pollinators in orchards.

The project as a whole has involved building artificial nest boxes that can be installed in orchards to house bumblebees. The researchers have used transmitters to track queen bumblebee nesting preferences, which in turn allows them to modify the design of the nest boxes to be more attractive to bumblebees.

Ashleigh’s role in the study has been to look at whether there are behavioural and physiological effects of attaching transmitters to queen bumblebees, which will quantify the results of the larger research projects. “In addition I’m constructing a flight chamber that can elicit forward flight in bumblebees, and I’m using a high speed camera to record behaviour in the chamber.”
LIANE CLARK  
BSc(Tech), Animal Behaviour  
Kamo High School, Whangarei  
Placement: Otorohanga Kiwi House and Native Bird Park

Educating the public about New Zealand’s native birds is all in a day’s work for Liane. Liane has been involved in food preparation, feeding, handling and dosing the birds, general maintenance and keeper talks.

“The highlight for me has definitely been presenting the keeper talks. Not only has it increased my confidence, but I really enjoy educating people about the different birds. It’s very rewarding to see others get so enthused about topics that I’m so passionate about.”

DANIEL ROHRLACH  
BSc(Tech), Chemistry and Materials and Processing  
Taupo-nui-a-Tia College  
Placement: Genesis Energy Ltd

Daniel is learning the skills he will need for a career in industrial chemistry during a work placement at Huntly Power Station.

He’s part of the chemical and water services team with Genesis Energy which has given him the chance to work on real-world chemistry projects.

“I’ve been assisting the chemistry team with daily environment sampling and testing for Genesis’ resource consents to access the Waikato River. I have also been performing confined-space entry testing throughout the station to ensure the safety of the engineers. I work daily in the laboratory making various chemicals and performing tests for the plant’s water systems, as well as doing a long list of other jobs across the plant.”

TOM ROBERTSON  
BSc(Tech), Earth Sciences  
Takapuna Grammar School, Auckland  
Placement: CRL Energy Ltd, Hamilton

Tom is enjoying the level of responsibility that comes with project-managing air and water quality monitoring at testing sites in Hamilton for consulting company - CRL Energy Ltd.

“During my placement I’ve been involved in the complete process, right from collecting data and field samples out on site, through to lab analysis of those samples and preparation of solutions back in the lab.”

Tom chose to study at the University of Waikato because of the BSc(Tech). “I think completing a work placement has immediately increased my value to potential employers as it shows them I have a comprehensive understanding of what I’ve learned at uni and I can apply these skills competently in the real world.”
As a science student at graduate or postgraduate level you will enjoy smaller class sizes, more lab and field work, more one-on-one time with top academics and greater access to world-class research equipment.

Our industry contacts with local, national and international companies and organisations provides the opportunity for exciting collaborations. To be admitted to a graduate or postgraduate degree, you must have completed a Bachelors degree in a relevant subject and must satisfy the Graduate Convenor that you are academically prepared to enrol in the qualification and that an appropriate research topic can be supported by your school of study.

Graduates of our degrees are well-prepared for jobs in a wide range of science-related industries and organisations, including local and regional councils, Crown Research Institutes, energy companies, environmental agencies, government departments, biomedical/pharmaceutical industries, private research companies, universities, food and dairy industries, agriculture, fisheries and more.

**Diplomas and Certificates**
The following diplomas and certificates are available for science students:

- Postgraduate Diploma
- Postgraduate Certificate
- Graduate Diploma
- Graduate Certificate

**Bachelor of Science (Honours)**
Admission to the BSc(Hons) is by invitation only to students of high academic calibre. The degree requires the completion of 120 points at 500 Level over one year, including a substantial research component. Students considering this degree must have already completed a BSc or BSc(Tech) or an equivalent degree and must first consult with the relevant Graduate Convenor.

The Faculty of Computing & Mathematical Sciences also offers a one-year BSc Honours programme in Computer Science, Mathematics or Statistics, or you may transfer into the four-year Bachelor of Computing and Mathematical Sciences.

**Master of Science (MSc)**
The Master of Science (MSc) is valued for its flexibility and excellence, and can be tailored to suit your needs. It’s an ideal degree for students wishing to improve their employability, and require a qualification that is not research-heavy.

The MSc normally takes 12-18 months of full-time study to complete. The degree requires 180 points, which is made up of 90 points of taught papers and a 90-point thesis (research project).

**Master of Environmental Sciences (MEnvSci)**
The Master of Environmental Sciences (MEnvSci) provides you with practical research skills and advanced theoretical knowledge, along with the chance to study a combination of environmentally themed science papers in the areas of ecology, geochemistry, analytical chemistry, and earth sciences.

While the bulk of your papers will be from within the Faculty of Science & Engineering, you may also include papers from the Faculty of Arts & Social Sciences, Waikato Management School, the School of Māori & Pacific Development and Te Piringa - Faculty of Law.

The degree normally takes 12-18 months of full-time study to complete and requires 180 points. This is made up of 90 points of taught papers and a maximum 90 point thesis (research project).

**DYLAN HARRISON**
BSc(Tech), MSc(Tech), Chemistry
Te Aroha College
Area Manager, NALCO, an Ecolab company, Hamilton

For Waikato graduate Dylan Harrison, a career in science has always been on the cards. A number of university scholarships and awards, work placements at two leading New Zealand science companies and a MSc(Tech) research collaboration with Fonterra, gave Dylan the competitive advantage when seeking employment.

“I manage a team of water treatment experts with the goal of providing value to our customers by implementing water treatment programmes for industries such as dairy, power, hospitals and food and beverage manufacturers.

Our main focus is monitoring chemical programmes on industrial boilers and cooling towers. A typical day would involve travelling to industrial sites to monitor their water treatment programmes based on chemical analysis and make changes or recommendations to optimise the programme based on our on-site test results.”

NALCO is a leading provider of integrated water treatment and process improvement services, chemicals, and equipment programmes for industrial and institutional applications.
Master of Science (Technology)
The Master of Science (Technology) (MSc(Tech)) is an advanced programme of study that builds on the specialisation of the BSc(Tech) degree, which combines taught papers with an applied or industrial-based research thesis.

The MSc(Tech) provides students with advanced technical abilities relevant to their area of specialisation. It will give you a great depth and breadth of knowledge across science and technology, particularly in regards to the technological problems in the industrial sector.

This degree normally takes two years of full-time study to complete. The degree requires 240 points, made up of 120 points in taught papers, including two ‘Industrial Technology and Innovation’ papers, and a 120-point thesis (research project) that reports on the results of an investigation relating to an applied industrial study.

Master of Science (Research)
The Master of Science (Research) (MSc(Research)) is suitable for students who want a complete research experience, coupled with taught papers.

A core feature of the degree is the development of independent research skills, including the collection and analysis of data and critical review of the relevant literature.

The MSc(Research) normally takes two years of full-time study to complete. The degree requires 240 points, which is made up of 120 points in taught papers and a 120-point thesis (research project).

Doctor of Philosophy (PhD)
The PhD is the highest degree awarded by the University of Waikato for research that is carried out under the supervision of staff members. The PhD is solely research-based.

Candidates are required to make an original contribution to the field of study by empirical investigation, the formulation of theories, or the innovative reinterpretation of known data and established ideas. The research is written up as a thesis, and must show the research process, arguments, findings and conclusions drawn.

PETER LONGDILL
MSc, PhD Waikato
Macleans College, Auckland
Environmental and Sustainability Manager, New Port Project, Qatar

Peter Longdill is in the Middle East working to reduce the environmental impacts of a major sea port project.

“I’m involved in the establishment and management of processes to ensure that the project adheres to its environmental objectives, commitments and obligations. So this includes ensuring that the project consultants and contractors are implementing effective mitigation measures on site and that the environmental monitoring works are conducted appropriately. This covers everything from air quality, to vibration, noise, soils, groundwater, coastal processes, oceanography and marine ecology.”

Peter completed a Master of Science and a PhD at the University of Waikato, following a two-year stint in Australia as a GIS analyst. “I knew specifically the subject area I was interested in and selected Waikato University because of the excellent reputation of the Coastal Marine Group’s research and staff, great relationships with industry, and a huge selection of field survey equipment and the technicians and capabilities to use it.”
International students

The University of Waikato's Hamilton campus sits in the heart of New Zealand's North Island, 90 minutes south of Auckland.

World-ranked
The University of Waikato is a world-ranked, research-led University. You will learn from lecturers who are experts in their field, so you can be sure you're in great hands.

The latest International Student Barometer survey showed the University of Waikato is ranked number one in New Zealand for student support, and 11th in the world for careers support.

The Waikato region
The Waikato region is fast developing as a centre for high-quality research and is home to many innovative businesses.

We are pioneers of agriculture and agricultural science – the dairy industry is one of New Zealand’s biggest export earners – and the country boasts a core of agricultural scientists and technicians who are constantly at the leading edge of scientific research in biological and life sciences.

Research
The University of Waikato is a high performer in research commercialisation. We also have strength in sustainability and influence international thought in a range of fields and industries.

For more information about the Faculty of Science & Engineering's research and innovation ventures, visit sci.waikato.ac.nz/research

English language requirements
For undergraduate degrees within the Faculty of Science & Engineering:

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<tr>
<th>IELTS</th>
<th>TOEFL Paper based</th>
<th>TOEFL Internet based</th>
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<tbody>
<tr>
<td>Overall band</td>
<td>Writing band</td>
<td>All Bands</td>
</tr>
<tr>
<td>6.0</td>
<td>-</td>
<td>6.0</td>
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For masters degrees, and postgraduate and graduate diplomas within the Faculty of Science & Engineering:

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<thead>
<tr>
<th>IELTS</th>
<th>TOEFL Paper based</th>
<th>TOEFL Internet based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall band</td>
<td>Writing band</td>
<td>All Bands</td>
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<tr>
<td>6.5</td>
<td>6.0</td>
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All English language waivers are considered at the discretion of the Dean of the relevant faculty/school of study on a case by case basis.

TOEFL and IELTS results must be within two years of the enrolment period. For more information refer to the University of Waikato International Prospectus.

International student scholarships
A range of scholarships are available for international students. Find out more at www.waikato.ac.nz/research/scholarships

Costs
Approximate annual tuition fees are based on 120 points (full-time study). Fees are quoted in New Zealand Dollars (NZD $) and include New Zealand Goods and Services Tax (GST).

- Bachelor of Science/Bachelor of Science (Technology): $28,815 a year
- Master of Science (Research): $32,120 a year
- Master of Science/Master of Environmental Sciences: $32,120 a year
- Doctor of Philosophy (PhD): All new international PhD students, studying full-time may be eligible to pay Domestic New Zealand annual tuition fees. Fees may be subject to annual increase. Estimate: $6143 a year.
Scholarships and prizes

School leaver scholarships

- The Vice-Chancellor’s Academic Excellence School Leaver Scholarship ($5000)
- The University of Waikato Academic Merit School Leaver Scholarship ($3000)
- Science Admission Fees Scholarship ($4000). Each year the University of Waikato awards 10 Science Admission Fees Scholarships of up to $4000 each to science students beginning their first year of study
- Brian Perry Charitable Trust Undergraduate Scholarship (up to $2000)
- Computer Science Undergraduate Fees Scholarship ($5000)
- Mathematics Fees Scholarship ($5000)

Summer Research Scholarships

University of Waikato Summer Research Scholarships provide promising undergraduate, final-year honours and first-year masters degree students the opportunity to experience the challenges and rewards of research.

Summer Research Scholarships are each worth $5000 and are offered in various disciplines from November to February every year over a 10-week period.

As a science student completing a research scholarship, you will have the chance to delve into the exciting world of research, and work alongside senior University of Waikato academics.

During the 2014/2015 Summer Research Scholarship programme, 34 Science & Engineering students were awarded scholarships, and 24 of them were science students.

Undergraduate scholarships and prizes

Just some of the awards available to undergraduate science students:

- Dow Agrosciences Prize
- Earth Sciences Excellence Award
- H S Gibbs Prize in Earth Sciences
- Hamilton Zoo – Science and Engineering
- J E Allan Memorial Prize
- Jared Simpson Memorial Prize in Biological and/or Earth Sciences
- Jeanette Gillespie Memorial Prize
- New Zealand Institute of Chemistry
- New Zealand Soil Science Undergraduate Prize
- Orica Chemnet First Year Chemistry Prize
- Shannon Young Award
- Smartrak Software Development Scholarship ($4000)
- Society of Materials Group New Zealand Incorporated (SMNZI) Student Prizes
- Statistics Fees Scholarship
- Tom Shaw Memorial Prize

Scholarships galore for Kiriana

Scholarships have helped a great deal with Kiriana Isgrove’s studies with a whopping $50,000 awarded to her over three years. Most recently Kiriana was awarded the $2000 Sir Apirana Ngata Memorial Scholarship and a $10,000 Dame Te Atairangikahu Waikato Regional Council Scholarship. Before that she was also awarded a $10,000 Whānui Scholarship, which aims to encourage and support Māori as leaders in the agribusiness sector.

And her ambitions don’t end there – she’s already taking her science knowledge to the world by joining a volunteer expedition to South America where she has helped with horticultural conservation work on the Galapagos Islands.

Kiriana is a former student of Hauraki Plains College and she has just begun a Master of Science. At high school Kiriana considered herself an “average” student. “I find university so different, and I excel in most of my papers. I’ve achieved far better grades here and have been given opportunities I never thought I’d have.”
Animal Behaviour

Zoologists study all animal life – from ecology and evolution, to physiology and morphology.

Animal behaviour, or ‘ethology’, is a sub-discipline of zoology focusing on the behaviour of animals in their natural habitats and ecosystems.

New Zealand is popular with zoologists and animal behaviourists, primarily because it’s the only place in the world where you can study a unique native fauna dominated by birds, reptiles and invertebrates. These are animals that have evolved over tens of millions of years in isolation from terrestrial mammals (with the exception of a few bat species).

In the contemporary world, zoologists and animal behaviourists also play a major role in lessening damage to ecosystems wrought by habitat destruction and the introduction of foreign mammals and aquatic pests.

When you study zoology and animal behaviour at the University of Waikato you will investigate a wide range of both fundamental and applied topics, including animal communication, the evolution of mating systems, population ecology, the control of pest species and the conservation biology of native birds.

The combination of applied and fundamental topics allows you to work toward developing solutions to New Zealand’s ecological problems and to better appreciate the unique attributes of our native animals.

Career options
- Animal welfare officer
- Conservation officer
- Research assistant
- Science writer
- Technician
- Zoo curator or keeper

Potential employers
- Agricultural research industry
- Environmental consultancy firms
- National government, local bodies, regional and district councils
- Universities and polytechnics
- Zoos

APRIL MCMURTRIE
BSc(Tech), Animal Behaviour and Biological Sciences
Te Awamutu College
Zoo Keeper, Wellington Zoo

Handling cheetahs, training giraffes and rearing emu chicks are just a few of the things keeping April busy in her career as a zoo keeper. April’s main duty is to ensure that all the animals under her care are healthy and living a high-quality enriched life.

“I prepare and feed-out diets, clean exhibits, and fulfil any behavioural needs of the animals in my care, such as walking the dingoes daily. I also provide enrichment for variability and variety and incorporate training and conditioning into the animals daily lives. For example I train the giraffes to follow a target stick to their crush area for daily weights and to carry out health checks.”

Not only does April care for the animals, she is also tasked with educating the zoo’s human visitors. “I give daily talks and take visitors behind the scenes for animal encounters. I aim to empower visitors to believe in the need for a sustainable co-existence between wildlife and people.”

April was offered a zoo keeper position at Wellington Zoo following a BSc(Tech) at the University of Waikato. As part of the degree she spent a year completing a work placement at Hamilton Zoo.
Biochemistry

Biochemistry is the study of life in chemical terms. It involves looking closely at proteins, lipids, carbohydrates and nucleic acids, which are all fundamental molecules of life.

Biochemists try to understand how molecules interact in living organisms in health and disease. Biochemistry is one of the fastest-growing areas of modern science.

By taking a combination of papers from the areas of biological sciences and chemistry, students will gain a good understanding of the molecular and chemical principles underlying biochemistry.

During your first year you’ll cover topics from the function and energy flow of cells, to analytical and inorganic chemistry, to statistics and data analysis.

JAIN ABRAHAM
BSc, Biochemistry and Chemistry
St Kuriakose Public School, India

Jain Abraham has a new appreciation for the challenges involved in a major research project, following a summer spent studying mānuka honey in Waikato University’s chemistry laboratories.

“During the Summer Research Scholarship I used fluorescence spectroscopy, a novel and rapid technique, which I have utilised to characterise and differentiate mānuka honey from other honeys.”

The technique could come in handy to identify honey products which are being falsely promoted in foreign markets as New Zealand mānuka.

“I’ve acquired many new practical skills, learned about the scientific interpretation of results and gained good time management skills and lots of confidence during my scholarship. Plus I’ll soon be spending time at Hill Laboratories to use modelling software to test the efficacy of my results.”

The research project is part of a wider study by the University of Waikato’s honey team, led by Associate Professor Merilyn Manley-Harris. The project aims to understand why some mānuka trees produce high levels of the precursor of bioactivity in mānuka honey, and the optimal conditions for converting it to the active component as the honey matures.
Whether you enjoy solving problems in a laboratory or working outdoors, our biological sciences programme will take you on a learning adventure.

As a biology student at Waikato you’ll benefit from one-on-one time with world-renowned researchers and enjoy significantly more practical laboratory time throughout your degree than at many other major tertiary providers.

Surrounded by lakes, rivers and intriguing ecosystems, the University of Waikato is uniquely placed in the heart of the North Island to provide the ultimate learning environment. Careers in Biological Sciences come in many shapes and sizes, with many offering opportunities for travel. From managing the Savannah animals at Hamilton Zoo, to working with embryos at a London fertility clinic, our graduates find jobs in exciting and challenging industries in New Zealand and overseas.

**Botany, ecosystems and restoration**

Plants are vital to the continuation of life on our planet, through their role as a source of energy for people, animals, birds and bugs. From humble mosses to towering kauri trees, the study of botany encompasses the structure and evolution of plants, their organisation into communities, their way of functioning and how they reproduce.

Terrestrial ecology introduces you to the interactions between organisms and their environment, adaptation to environmental change and restoration principles. Naturally, this involves field trips to fascinating places such as Mount Taranaki, Waingaro Forest, Maungatuiti Ecological Island and Pureora Forest Park.

Restoration ecology is a specialisation within science relating to land, freshwater and marine ecology. You will learn about the consequences of environmental change and destruction and how to set about the delicate and complicated task of recreating communities consisting of interdependent ecosystems.

You will experience the thrill of helping to secure the future of endangered species and witness the eradication of predators in communities of animals and birds.

**Cells, microbes and molecules**

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Whether you’re in a field covered in mud or in a pristine laboratory, cells, microbes and molecules are all around.

Cell and molecular biology is the study of the machinery by which cells and whole organisms function. It combines genetics, biochemistry and cell biology to discover the role of proteins in all living organisms.

Microbiology concerns micro-organisms, typically bacteria and fungi; how to identify and culture them; how they live; how some infect and cause disease in plants and animals; and how we can make use of their activities. Micro-organisms are crucial to the function of an ecosystem and are an important component in biotechnology.

The University of Waikato’s research in the discipline of thermophiles is highly regarded. Thermophiles are micro-organisms living in extreme environments such as the freezing temperatures of Antarctica and Rotorua’s thermal hot pools. In these areas, scientists find a collection of organisms, genes and enzymes which can be used in biotechnology studies.

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**Career options**

- Agricultural researcher
- Biosecurity officer
- Chemical analyst
- Conservation officer
- Fisheries scientist
- Forensic technician
- Geneticist
- Marine biologist
- Medical sciences technician
- Plant pathologist/physiologist
- Quarantine officer

**Potential employers**

- Agricultural and fisheries sectors
- Biotechnology industry
- Conservation sector
- Crown research industries
- Medical and animal health diagnostic laboratories
- National government, local bodies, regional and district councils
- Non governmental organisations
- Zoos
Marine and freshwater environments

Water is the driving force in nature: it is one of our most valuable resources and the one most under threat. As a biologist you can study freshwater ecosystems including lakes, rivers, streams and wetlands, as well as marine environments such as the ocean and estuaries.

At Waikato you’ll experience these environments first-hand, with field trips to areas including Raglan beach and Rotorua lakes. Studying these ecosystems involves looking at the plant, animal and microbial populations that inhabit them and the structure and function of the water.

Knowledge of organisms that live in these environments leads to an understanding of the processes and factors controlling populations, which is critical to an organism’s conservation and sustainable management. The distribution and abundance of organisms and how they carry out basic functions, such as feeding, metabolism and reproduction, is integral to this knowledge. Teaching is closely related to research that involves the restoration of biodiversity in marine and freshwater habitats.

Start your degree in Tauranga

In Tauranga, you may start by enrolling in either the Diploma in Environmental Management Level 6 or the Diploma in Marine Studies Level 6 with Bay of Plenty Polytechnic. Once you complete the full two years of either diploma (with a B average), you can then apply to enrol in the University’s Biological Sciences papers offered in Tauranga. See page 4 for more information.

ELLA GRIERSON

BSc, MSc, Biological Sciences
Mercury Bay Area School, Whitianga
Research Associate, Plant and Food Research

Undergraduate and postgraduate study in biology has led to an exciting role in plant genetics for graduate Ella Grierson.

Ella works in the plant pigments team at Plant and Food Research in Palmerston North.

“I’m assisting with research focussed on understanding the genes responsible for certain valuable traits, to enable us to develop new plant cultivars faster. We use a wide range of techniques, and I’m currently working on projects involving molecular biology as well as tissue culture.”

Ella says that no two days are the same and she’s enjoying working with like-minded people who share her enthusiasm for plant biology. “Being part of such a friendly team and to be contributing to our understanding of plant genetics is really exciting.”
Biotechnology is the application of science and engineering to develop useful products and technologies from biological materials.

The study of Biotechnology at the University of Waikato examines the extraction, recovery and purification of biochemicals from meat, dairy and other industries and explores technological applications at industrial and molecular levels.

Uses can stretch from cloning human cells and creating antibiotics, through to cheese making and beer brewing, or waste management and biofuels.

In New Zealand, a country which relies heavily on the agriculture industry for a strong economy, biotechnologists work to increase yields from livestock and horticulture, while also ensuring farmers reduce their own impact on the environment.

Due to the diverse range of uses for biotechnological research, the study of this subject has become crucial in healing, fuelling and feeding the world both now and for future generations.

COURTENEY NIELSEN
BSc, Biotechnology
Cambridge High School
Laboratory Technician, MilkTestNZ

Courteney Nielsen is enjoying the ‘aha!’ moments, in her position as a Laboratory Technician at MilkTestNZ. “I love being able to use my degree in a practical way and the times when a piece of information just clicks, which is usually because of something I learnt at uni.”

MilkTestNZ tests farm-supplier milk samples from across the country for milk composition and microbial quality. Courteney works in a lab environment across a range of different tests and machines with a team of 15-20 technicians.

“The lab work involves sample sorting, component testing, BactoScan (a machine that provides a quick approximation of total bacterial count), plating and colony counting for specific organisms, and inhibitory substance testing. We are regularly rotated around the different roles in the laboratory and we are always learning new things, which means it’s always kept interesting and no two days are the same.”

Courteney says her BSc gave her a good springboard to start from. “On-the-job training will always be necessary, but the practical training at university meant I was familiar with lab equipment, and the theory I learnt has helped me understand the reasons why we do what we do in the lab.”

As for the future, Courteney is happy to have found such a great role straight out of study. “The company has a clear progression up the levels of technician, so I will always be up-skilling while I’m at MilkTestNZ.”

Career options
- Bioengineer
- Biotechnologist
- Food technologist
- Laboratory technician
- Pharmaceutical engineer
- Quality assurance officer

Potential employers
- Crown research institutes
- Food and dairy industry
- Pharmaceutical industry
- Private research companies
- Universities and polytechnics
Computer Science

The use of computing technologies in entertainment, industry, business, education and government is growing, meaning there is a greater need for qualified professionals.

Computer Science is the body of knowledge that answers the fundamental question: What can be efficiently automated?

Computer scientists look at ways to systematically describe and transform information. Some focus on theory, some on implementing computations, others on programming languages and others on ways to improve human-computer interaction.

As a computer science student, you’ll learn about software systems and how people and computers interact. You’ll learn how to create new software, how to ensure it works well and does what it is supposed to, and how to make it easy for people to use.

Within the subject of Computer Science, there are several focus areas:

- Artificial intelligence
- Computer technology
- Data mining
- Games and multimedia
- Information systems
- Interaction design
- Internet applications
- Networks
- Software development

Further study

- Master of Cyber Security
- Master of Information Technology
- Master of Science
- Master of Science (Research)

Facilities and equipment

The computer science facilities and equipment available to our students are among some of the best in New Zealand, ranging from phones and tablets for mobile app development, to cluster computers to massive parallel processing. Because our degrees are highly practical you’ll be working with these facilities and equipment right from your first semester.

Career options

- Web architect
- Network engineer
- Programmer
- Software developer
- Systems analyst
- Usability engineer

Potential employers

- Consulting firms
- Hardware manufacturers
- Major private companies
- Software companies
- Telecommunications firms
- Web development firms

CLAUDIA WU

BSc with First Class Honours, Computer Science
Avondale College, Auckland
ANZ, Senior Portfolio Analyst

Claudia Wu spends her days making sense of numbers, to ensure ANZ is lending responsibly.

“Our team manages ANZ’s policies and strategies for retail and business banking. In a typical day, I look after an analytical ‘data mart’ and make sure the data that comes in is accurate for analytical purposes.”

Claudia monitored job ads online and found that analyst positions appeared frequently and were advertised for longer periods than others, indicating a shortage in the industry.

She structured her degree accordingly, studying Computer Science, with supporting papers in Statistics and Mathematics. Her hard work paid off when she secured the position with ANZ.
Knowledge of basic chemical principles is important in all branches of science and for a wide range of industries.

Better building materials and textiles, improved medical aids, new alloys, more productive agriculture, better environmental control – they all rely on chemical expertise.

Chemistry forms a major growth area in modern science for both research and employment.

The Faculty of Science & Engineering covers a wide range of specialist areas including the interface between chemistry and the other sciences, such as analytical chemistry, geochemistry, environmental chemistry, forensic science, industrial chemistry, materials chemistry and biochemistry.

We pride ourselves on the quality and extent of the practical experience our students receive while studying. As a result, our graduates are sought after both for their hands-on bench and modern instrumentation skills and their theoretical excellence. Waikato chemistry graduates can expect to find employment in fields ranging from forensics to environmental monitoring.

Career options
- Biochemist
- Biosecurity officer
- Chemical technologist
- Environmental scientist
- Food technologist
- Forensic scientist
- Marine studies
- Material science
- Microbiologist

Potential employers
- Agricultural industry
- Crown research institutes
- Education sector
- Food and dairy industry
- Forestry industry
- Medical research
- Pharmaceutical companies

Nicholas Kuan
BSc(Tech), Chemistry
St John’s College, Hamilton

With an excellent reputation for chemistry research, a relaxed campus, and a handful of scholarships on offer, former St John’s College student Nicholas Kuan knew the University of Waikato was the right choice for him.

The opportunity to complete a summer research project after his first year of a BSc(Tech) has been a highlight for Nicholas, who says the new challenges he faced during his study meant he learnt a range of different chemistry techniques in a short time. Alongside experts in the field, his research project looked into the antibacterial properties of mānuka honey.

The research investigated the limitations of a recently-published method for quantifying dihydroxyacetone (DHA), which is one of the components involved when determining the Unique Mānuka Factor (UMF) of a sample of honey.

“I have a real interest in food chemistry and hope to work towards a career in this industry. However, at the moment I’m focused on learning the fundamentals of chemistry, alongside papers in physics, biological sciences and calculus.”
Chemistry major
For students with a passion for chemistry, the structure of our Chemistry major will provide a solid foundation of knowledge in the subject.

In your first year of study you’ll need to complete two compulsory chemistry papers. The remaining six papers required for the degree can be taken in other areas of science and engineering or from other faculties.

During your second year, chemistry papers will become more specialised, allowing you to focus on analytical, organic, inorganic or physical chemistry, with papers covering theory and practical laboratory work.

For normal entry into 100 Level Chemistry papers for a Chemistry major you need 16 credits at NCEA Level 3 (or equivalent).

Pathways are available if you do not have the credits for this area of study.

Chemistry as a supporting subject
Chemistry is a central science and is an integral part of the study required for biochemistry, engineering, environmental sciences, earth sciences, biological sciences and more.

For students in their first year of study who require a background in chemistry for a major outside of this subject, our paper CHEM100 – ‘Chemistry in Context’ is an ideal first step. It places an emphasis on chemical concepts within the broader context of the world.

CODY WRIGHT
BSc, MSc(Research), Chemistry
Katikati College
Technologist, Hill Laboratories, Hamilton

As a Technologist at Hill Laboratories, Cody is using chemistry to help ensure that horticultural products are safe to eat.

Hill Laboratories supplies testing services to a large range of clients from New Zealand and overseas to make sure that what people consume at the end of the production process meets regulations and has no harmful chemicals.

Products as diverse as kiwifruit through to dried spices are tested for pesticide and other residue levels using a suite of high-tech equipment.

“My main role as a Technologist involves developing new testing methods and improving existing methods in the lab and assessing how the lab instruments will handle the tests I design.”

Cody was offered his current position soon after graduating and cites choosing to study at Waikato as the best career decision he could have made.

“During my undergraduate studies I received a Summer Research Scholarship which gave me a head start on my masters thesis research. The MSc(Research) gave me a real enthusiasm for research and so it’s been a real buzz to work in a research and development orientated job.”
The demand for experts in earth sciences continues to grow as we look to better manage our soil, water, minerals, energy and coastal and marine resources, as well as understand natural hazards.

The Faculty of Science & Engineering is a leader in teaching and research related to the Earth’s environment. Earth sciences cover volcanology, coastal and marine sciences, environmental sciences, soil science, hydrology, sedimentary geology and physical geography.

Our first year programmes provide opportunities for you to develop a broad understanding of the Earth’s systems, giving you a learning experience that goes beyond the classroom and the lab - out into the real world.

Our graduates gain the knowledge and skills to pursue a wide range of careers.

Earth Sciences graduates are spread across New Zealand and around the world, working in careers ranging from Earth resources’ exploration to environmental management and planning, and from scientific research to teaching.

Coastal marine science
Impressive field resources provide Waikato’s earth sciences students with excellent opportunities to combine field experience with state-of-the-art computer modelling techniques.

See page 5 for more information about the Coastal Marine Field Station.

Career options
- Coastal engineer
- Environmental consultant/scientist
- Earth scientist
- Engineering/exploration geologist
- Groundwater scientist
- Hazard manager
- Hydrologist
- Oceanographer
- Petroleum geologist
- Policy analyst
- Soil scientist
- Technician
- Volcanologist
- Water resource manager

Potential employers
- Crown research institutes
- Education providers
- Energy companies
- Environmental agencies
- Environmental consulting companies
- National government, local bodies, regional and district councils

HOLLY GODDARD
BSc, MSc(Research), Earth Sciences
Warwickshire College, England
Geothermal Monitoring Supervisor, MB Century, Taupo

Geothermal energy is said to be the power source of the future and Waikato graduate Holly Goddard is making the most of her opportunity to learn as much as she can about this rapidly expanding industry.

Holly works for MB Century, a company that completes geothermal investigation and development work throughout the North Island and around the world. She is currently a Geothermal Monitoring Supervisor, overseeing the day-to-day operations of the monitoring team as well as doing field work and client liaisons.

Holly says her masters enabled her to develop self-learning skills which have been invaluable in her job to help her think outside the box when problems or new challenges arise. During her masters study she won an Antarctica New Zealand Scholarship which funded a trip to Antarctica to work on her research. In addition, she travelled to Russia to present her research findings at a conference and worked on the search for the Pink and White Terraces in Rotorua.

“Your degree is what you make it. Take every chance and opportunity you are given and it could take you anywhere,” she says.
Kit Lawrence
BSc(Tech), Earth Sciences
St John’s College, Hamilton
Engineering Geologist, AECOM, Christchurch

Kit is working to determine the physical make-up of the ground and analysing the capacity of foundations in Christchurch. His efforts will ensure that existing structures are safe and new ones can be created.

Following the 2010/2011 earthquakes in Canterbury, buildings and land were damaged and a major rebuild is underway. Kit is loving the opportunity to help the people of Canterbury return to normal and prepare the city for the future, through a variety of challenging projects that involve geotechnical investigation and design.

Kit was offered the role at AECOM, a global architecture, design, engineering and construction services provider following an eight-month work placement at the company, organised by the Faculty of Science & Engineering.

Thanks to the global nature of AECOM, during his time there Kit has also spent six months living and working in Saudi Arabia conducting geotechnical testing for a large-scale infrastructure project.

Engineering geology
Technical abilities in the analysis of hill-slope stability, environmental monitoring, rock and soil strength, and engineering site assessment provide students with key skills that are highly sought-after in geotechnical engineering, consulting and environmental management.

Hydrology and freshwater resources
Water-resource management, whether for flood prevention and control, drinking water, economic development, or environmental protection, is a rapidly growing issue for New Zealand and the world. You will study groundwater, surface waters, and the atmosphere and climate, including greenhouse gas emissions.

Sedimentary geology
Sedimentary geology provides you with important skills in geological mapping, data acquisition and data interpretation that have application in the energy industry, and in groundwater management and geo-resource development.

Soil science
Managing our soils to ensure sustainable food production, environmental protection and the safe management of waste is critical to the future of New Zealand and the world. You will study the distribution of soils in the landscape and learn how soils’ chemical, physical and biological properties can be managed to contribute to more positive environmental health.

Volcanology
The Waikato region includes a diverse range of volcanoes and volcanic products such as lavas, ignimbrites and tephra. Study of these products is important to help us manage responses to potential volcanic hazards and to better understand the geo-resources and geological history of the Earth. As a volcanology student you will be able to take advantage of the natural laboratory on our doorstep in the central North Island.
Electronics is the science and technology concerned with the controlled flow of electrons and other carriers of electric charge.

Electronics covers a wide range of exciting modern developments ranging from microscopic electronic circuits and machines, mobile and computer communications, advances in medical diagnosis and treatment, to developments in the latest audio and video technologies.

Studying electronics will give you valuable skills in electronic engineering and design. You will have the option to specialise in some of the most progressive areas in electronics today such as optoelectronics or mechatronics.

Optoelectronics deals with the conversion of electrical signals to light or vice-versa. Examples such as solar cells, fibre optics and lasers are integral components of everyday devices such as supermarket barcode scanners and long distance communication systems.

Mechatronics combines aspects of electronic software and mechanical engineering to produce devices such as printers, cars, aircraft, photocopiers and even washing machines. These are fast-growing areas in which you can develop a productive and satisfying career.

Electronics can also be studied as part of a Bachelor of Engineering (Honours) (BE(Hons)) under the programme of Electronic Engineering. The BE(Hons) is accredited by the Institution of Professional Engineers New Zealand (IPENZ).

**Career options**
- Design engineer
- Electronic engineer
- Electronic technician
- Information systems engineer
- Mechatronic designer
- Programmer

**Potential employers**
- Electrotechnology and electronics industries
- Health and biomedical industries
- Information technology and telecommunications sectors

**Enhanced surge protection technology**

A supercapacitor-based surge protector, the S-TVIQ, invented by University of Waikato Senior Lecturer Nihal Kularatna, has made it to commercialisation.

Mr Kularatna discovered that unlike existing surge absorption products that have a limited lifetime and degrade with every surge, supercapacitors can absorb countless power surges without any degradation. He went on to develop a supercapacitor-based circuit with the potential to offer longer lifetime components and superior surge protection than existing products.

"As electronic circuits become more sophisticated, consumer electronic products are becoming more sensitive to power issues such as high voltage surges and spikes," he says. "The S-TVIQ is like an electronic shock absorber and can be used for devices such as desktops computers, tablets, TVs and cash registers."

Mr Kularatna was born and brought up in Sri Lanka, which he says is a lightning-prone country. "I saw a lot of damage done to electrical and electronic equipment in home and work environments, so finding a way to protect this type of equipment from transient surges in power has been a lifelong interest of mine."
If you’re interested in identifying environmental challenges and finding innovative and sustainable solutions, environmental planning may be for you.

The study of environmental planning is based on the recognition that environmental problems and solutions involve social, economic and cultural dimensions as well as the natural and physical environment.

Environmental planning at Waikato is strongly interdisciplinary. You will be encouraged to see the links between human behaviour and environmental consequences through papers that combine social science and the natural sciences.

The programme will provide you with the knowledge and skills for careers in urban planning, environmental management, sustainability and many other fields.

Degree options
Environmental Planning can be taken as a major in a Bachelor of Science or Bachelor of Science (Technology) through the Faculty of Science & Engineering or as a Bachelor of Environmental Planning with an Environmental Science and Resource Planning pathway through the Faculty of Arts & Social Sciences.

Career options
• City planner
• Community development co-ordinator
• Conservation planner
• Environmental consultant
• Environmental educator
• Environmental planner
• Iwi planning co-ordinator
• Policy analyst
• Resource consent planner

Potential employers
• National government, local bodies, regional and district councils
• Natural resource users such as dairy and energy companies
• Planning consultancies
• Resource management consultancies
• Surveying and engineering companies

An excellent reputation, a location close to home and flexible science and engineering degrees meant the University of Waikato ticked all the boxes for current student Scott Richardson.

This flexibility came in handy when Scott decided to switch from his original choice of engineering to a science degree majoring in Environmental Planning.

“My supporting subjects are coastal oceanography and coastal geomorphology. I’m also looking forward to completing papers in marine biology and geographical information science.”

And while he has enjoyed learning about new and interesting topics in science, he has also relished the opportunity to explore the Waikato region.

“Field trips have given me the chance to put the skills I’ve learnt in lectures and laboratories into practice in the real world.”
Environmental Sciences

If we are to leave the world in a healthy functioning state for future generations, we need to understand how the environment works.

The pressure on our environment is increasing as the human population grows, and we recognise the need to manage our soil, water, ecological, marine, mineral, and energy resources in a sustainable manner.

Environmental Sciences is the interdisciplinary study of the environment and our role in its management. It draws on all the sciences, but particularly ecology and earth sciences. Environmental Sciences can provide scientific basis for understanding environmental problems, and finding solutions to them.

As an environmental scientist or technician, you’ll have the chance to become directly involved in effective environmental management.

Specialisations

• **Environmental Microbiology**: You will learn about the important role micro-organisms play in underpinning environmental processes, from recycling nutrients to bioremediation of contaminated sites.

• **Environmental Modelling**: Learn to use computer models to understand and predict changes in a range of environments such as estuaries, lakes, rivers, coastlines, climate, and the ocean.

• **Land and Freshwater Environments**: Discover the importance of the sustainable management of soil and water resources for human survival, biodiversity and wider ecological values.

• **Marine Sciences**: Explore marine organisms and the sustainable management of marine environments, including processes such as the effects of coastal erosion and sedimentation.

Career options

• Agricultural adviser
• Biosecurity officer
• Coastal resource manager
• Consent planner
• Environmental analyst
• Environmental scientist
• Hydrologist
• Oceanographer
• Water resource manager

Potential employers

• Crown research institutes
• Education providers
• Energy companies
• Environmental consultancies
• National government, local bodies, regional and district councils
• Non-governmental organisations

SARAH BOWLER
BSc, Environmental Sciences
Rangitikei College

When Sarah visited Waikato University as a school student she fell in love with the serene campus and was impressed by the approachable staff. Now she is in her final semester of a BSc and the university has lived up to her high expectations.

“At Waikato Uni I don’t just get swallowed up by the crowds of people. I get the chance to be an individual and stand out and that comes from being on a first-name basis with lecturers and tutors.

The relatively smaller class sizes and the close student-teacher relationships have been so valuable for me in my studies so far.”

In addition to study Sarah is working part-time at DairyNZ, an organisation dedicated to dairy industry success through ongoing sustainability, profitability and innovation.
Materials and Processing

Efficiently converting New Zealand’s raw materials and commodity goods into products is important to the national economy. To do this, we need to understand the properties of materials as diverse as food, wood, metals, plastics and fuel.

Materials and processing skills are used in industrial and other activities where materials are undergoing chemical, biochemical or physical changes.

Process science involves knowing how to prepare raw materials, how to make reactions occur, and how to separate and purify the products.

It also involves understanding how to limit and treat wastes, minimise energy use, and consider sustainable processes. Ultimately, value is added to raw materials to manufacture useful products that can be as varied as dietary formulae, foods, ceramics that can withstand high temperatures, new metal alloys, pharmaceuticals, laminated boards, functional proteins, and composites.

Materials and Processing can also be studied as part of a Bachelor of Engineering (Honours) (BE(Hons)). The BE(Hons) is accredited by the Institution of Professional Engineers New Zealand (IPENZ).

Career options
- Energy efficiency engineer
- Environmental engineer
- Materials engineer (plastics, composites, metallurgy)
- Process design engineer
- Products/process development engineer

Potential employers
- Crown research institutes
- Environmental industries
- Food and dairy industries
- Iron and steel manufacturing
- Oil and gas industries
- Petrochemical and plastics industry
- Pulp, paper and wood industries

Biodegradable plastic from animal protein waste

University of Waikato researchers have invented a novel manufacturing process to turn low-value animal protein into high-value biodegradable plastic. In New Zealand, bloodmeal is produced as a co-product from the meat industry and is available in large quantities, typically used as animal feed or fertiliser.

The new product, called Novatein™, uses bloodmeal and standard plastic processing equipment to produce bioplastic with a wide range of applications including seedling trays, plant pots, pegs, and vine clips.

Its unusual ingredient – bloodmeal – offers a cost competitive, sustainable alternative to petroleum-based plastic resins. Its bloodmeal colour can also be modified, giving it a translucent, honey-coloured appearance.

“For me, the most gratifying thing is being able to use low-value sustainable materials to create a high-value product that breaks down without polluting the environment,” says University of Waikato chemical and biological engineer Dr Johan Verbeek.
Because of the vital role of mathematics and statistics in many disciplines, we provide papers not just for Mathematics majors, but for all students who need mathematical skills.

**Mathematics**

A strong mathematical background is a valued trait in today’s workforce. Besides the knowledge and understanding of mathematics itself, you will have valuable analytical and problem-solving skills.

Mathematics is a subject of vital importance which underpins the study of biology, chemistry, computer science, earth sciences, cryptography, economics, engineering, finance, modelling (including environmental modelling), operations research, physics, and statistics.

Within a Mathematics major you can specialise in Economics or Finance. You could also consider the flexible double major options in Mathematics and Computer Science or Mathematics and Statistics.

**Statistics**

Statistics is the science of collecting and interpreting data. Almost every facet of modern life relies on some application of statistics.

Statistical analysis is used to make informed decisions in areas such as agriculture, industry, law, medicine, psychology, insurance and commerce. Without statistics we would have to resort to hunches or guesses.

You may major in Statistics or can take Statistics papers to complement and strengthen your study programme. Within a Statistics major you can specialise in Databases or Economics. You should also consider the flexible double major options in Statistics and Computer Science or Statistics and Mathematics.

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**Career options**

- Actuarial trainee
- Data analyst
- Financial analyst
- Industrial statistics
- Market research analyst
- Mathematical modeller
- Medical statistician
- Secondary school teacher

**Potential employers**

- Crown research institutes
- Government organisations (eg reserve bank, treasury, Ministry of Economic Development, Crown Research Institutes)
- Hospitals and health boards
- Private sector (eg power companies, banks, insurance companies)
- Regional and district councils
- Secondary schools

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**CLAIRE FORSYTHE**

MSc, Statistics

Te Awamutu College

Business Analyst, Waikato District Health Board

Sparked by a passion for numbers, a career in the health industry was just what the doctor ordered for graduate Claire Forsythe.

As a Business Analyst for the Waikato District Health Board (DHB), Claire extracts, investigates, interprets and models patient and other DHB data. This includes creating reports, providing information for capacity planning projects and developing advanced planning models.

She helps support decision-making processes with the information she provides to management groups throughout the DHB.

"Learning about such a complicated and interesting area such as health has been both a challenge and an awesome learning experience," says Claire.
From analysing the reasons for anger to considering the best way to train dogs, the study of psychology allows insight into countless intriguing facets of cognitive function.

Widely regarded as the centre of Applied Psychology in New Zealand, the School of Psychology at Waikato offers numerous undergraduate and postgraduate study options for those keen to pursue a journey through this remarkable discipline.

Psychology opens the door to a broad range of career opportunities across many different fields.

With the introduction of new information technologies and changes to our work and employment patterns, applied psychology is helping us understand how these changes affect the way people live their lives and interact with the people and world around them.

If you are curious, creative, and energetic, it is an exciting time to be pursuing a career in psychology.

Major areas of study in psychology include:
- Animal behaviour
- Applied cognitive science
- Behaviour analysis
- Behavioural neuroscience
- Clinical psychology
- Cognitive psychology
- Community, kaupapa Māori and applied social psychology
- Health and mental health services
- Organisational psychology
- Vision science

Psychology can be studied as a major of a Bachelor of Science through the Faculty of Science & Engineering, or as a major of a Bachelor of Arts or Bachelor of Social Sciences through the Faculty of Arts & Social Sciences.

Career options
- Behaviour analyst
- Clinical animal behaviour
- Clinical or community psychologist
- Community programme co-ordinator
- Human resource adviser
- Private practitioner
- Research scientist

Potential employers
- Community agencies
- Government departments and agencies
- Health providers
- Private organisations or businesses
- Secondary schools and universities

Saving lives on NZ’s roads

Researchers from the University of Waikato’s Applied Cognitive Psychology/ Traffic and Road Safety (TARS) research group are providing insights into the psychology of drivers on New Zealand roads.

The team researches driver behaviour as a means to understanding attention, memory, decision-making, vision and other aspects of skilled human performance. Their research projects have provided sound, fact-based support to policy makers and contributed to lowering the annual road toll.

State-of-the-art research facilities, including New Zealand’s most advanced driving simulation laboratory, have allowed the group to conduct research into the effects of alcohol on driving, distractions produced by cell phones, perceptions of risk, driver fatigue, the design of overtaking lanes, and many other topics. TARS research has led to changes that have saved the lives of New Zealand drivers.
The big challenges facing the world today require research that transcends disciplinary boundaries.

That requires flexibility in the ways we seek to understand the world and the ways we prepare for the future.

Waikato’s scientists work together across disciplines, creating a cohesive unit and providing our students with unique opportunities. Whatever science discipline appeals to you, we have the experts who will provide you with the skills you’ll need in the future.

Waikato PhD graduate Megan Grainger is working hard to unlock the antibacterial properties of honey, a scientific project that will help the beekeeping industry and will provide new markets around the world.

Visit sci.waikato.ac.nz to find out more.

Megan Grainger
Bachelor of Science, Master of Science (Research), PhD
Fraser High School