2020
Introduction to Engineering
He Kupu Arataki mō te Pūkaha

Engineering.

Bachelor of Engineering with Honours
Bachelor of Forestry Science
Bachelor of Product Design
Plan your degree

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Welcome to Engineering

E ngā pītau whakarei o tēnei waka, nāia te reo rāhiri e karanga atu ki a koutou.

Tauti mai ki Te Rāngai Pūkaha!

Tēnā koutou katoa.

UC’s Te Rāngai Pūkaha | College of Engineering started life as the first Engineering School in Aotearoa New Zealand. We are now internationally recognised for the excellence of our teaching and research, and the calibre of our graduates.

We offer innovative degree programmes tailored to careers in the real world, with study options in various different types of Engineering including our unique qualifications in Humanitarian Engineering, Forestry Science, Product Design, and Data Science.

In the last few years, we have invested $163 million in new state-of-the-art laboratories and teaching spaces, providing our students with enviable, world-class study and research spaces. UC also has close links with numerous local companies, which presents a unique opportunity for students to work alongside them as part of the reshaping of our new and vibrant city.

We look forward to welcoming you to Te Rāngai Pūkaha | College of Engineering and helping you along your journey to become one or more of many things – engineer, scientist, inventor, designer, builder, and great thinker.

Professor Jan Evans-Freeman
Pro-Vice-Chancellor | Amorangi
College of Engineering
Te Rāngai Pūkaha
Study Engineering at UC

At UC, Te Rāngai Pūkaha | College of Engineering makes a difference by looking for ways to make everyday life better for everyone. Technology is relevant to all parts of society and is changing fast to meet the future.

Deep industry engagement

Our connections are based on ‘real’ interactions that make engagement more meaningful for both industry and student (page 4).

Global reach and recognition

Te Rāngai Pūkaha | College of Engineering is internationally respected, its qualifications are portable, and its graduates are snapped up both in Aotearoa New Zealand and overseas (page 6).

Passionate practising experts

UC lecturers teach and do. All of our staff are research-active practising experts and work with industry, collaborating on projects, or acting as expert consultants (page 8).

State-of-the-art facilities

Over the last few years we’ve invested $163 million in new state-of-the-art laboratories, teaching spaces, and study areas (page 10).

* QS World University Rankings by Subject, 2019
Experience ‘on the job’
Our students are ready to start work the minute they graduate (page 12).

Problem-solving creativity
Our students learn to solve problems by designing and building something (page 14).

Collaboration and teamwork
Learn to work with and learn from others (page 16).

Hands-on learning
Our students learn by doing. We provide you with the opportunity to put your ideas into action – before work (page 18).

Mataio — IMPACT ENGINEER
Studying towards a Bachelor of Engineering with Honours in Civil Engineering
Deep industry engagement

Our connections are based on ‘real’ interactions that make engagement more meaningful for both industry and student.

Partnering with industry
All of our engineering students do a final year project, many of which are funded by industry, which can lead to jobs. Most project ideas come from industry partners looking for a solution to a problem, or to design a new product. Companies benefit from the creative problem solving of students and, in many cases, use the opportunity to identify top students for future job opportunities.

Many companies provide scholarships to students, which can lead to employment opportunities.

Networking opportunities
UC hosts clubs such as the Engineering Students Society (ENSOC), Women in Engineering (WIE), and the UC Computer Society (CompSoc). Clubs engage with industry members throughout the year by running careers fairs, networking events, interview preparatory sessions, and guest speaker evenings.

UC runs employer information sessions and careers fairs to connect students with industry, including an Engineering and Science Careers Fair and ICT Careers Fair.

Linking the energy industry to students
UC hosts the EPECentre (Electric Power Engineering Centre), a world-class power industry research incubator. They provide a link between academic research, industry, and students. With over 30 power industry partners, the EPECentre provides scholarships, careers fairs, field trips, and projects for students interested in the field of power engineering.

Many final year projects are SPONSORED BY INDUSTRY

‘My project is co-funded by industry, so there’s been a lot of engagement for me. We produce work and present it directly to industry leaders. As PhD students, we always want our research to be useful to the wider world.

During my undergrad, I did a three month placement with Mighty River Power, now Mercury Energy. I was in Rotorua assessing the risk of “arching” in equipment at their geothermal generation stations. Arcing is essentially like lightning with the equipment which, if it’s powerful enough, can actually vaporise someone. It was a really cool project because I got to acquire a whole new skillset. I gained a lot of confidence from that.’

Luke Schwartfeger (pictured right) Ngāti Raukawa
Studying towards a PhD in Electrical Engineering
Global reach and recognition

The College is internationally respected; its qualifications are portable, and its graduates are snapped up both in Aotearoa New Zealand and overseas.

Top rankings
UC is ranked in the top 250 in the world for Engineering and Technology.* We are ranked in the top 100 for Civil Engineering. We have an excellent reputation around the world for the quality of our teaching and calibre of our graduates, in all fields of study.

International experts
We host guest lecturers from around the world, giving students the opportunity to interact with world-leaders in their fields. UC’s unique Erskine programme brings up to 70 academics a year from around the world, from top universities. You will learn from experts in the field from the best universities across the UK, Europe, North America, and Asia, allowing you to gain a global perspective.

Accredited programmes
A UC Engineering degree is a professional degree. Our programmes are fully accredited by Engineering NZ, meaning they are benchmarked with other engineering programmes worldwide. A UC Engineering degree is therefore recognised internationally, a ticket to a career that can take you around the world.

Global student exchanges
We offer international exchange opportunities. Many of our Engineering and Forestry Science students go on a semester-long exchange to another university during their degree. You can study at some of the most prestigious universities around the world, diversify your degree, and make the most of global networking opportunities.

*Ranks are Top 250 in Engineering and Technology, QS World University Rankings by Subject, 2019.

Sarah Lyne (pictured right)
Bachelor of Engineering with Honours in Civil Engineering

‘An Engineering degree can take you pretty much anywhere in the world. There are so many job options, you don’t even necessarily have to become an engineer. The degree provides a really good grounding and teaches you skills you could apply in a range of fields.

I went to Purdue University in Indiana. It was great to be in different surroundings, although it took me a while to adjust to the -20°C temperatures! It was fun studying in an American university town. I met tons of people and got to go to spring break in Florida. If I could do it again I would. I just wish it was for longer!’
World experts who teach
Our lecturers are passionate about sharing their knowledge, and they are top experts in their field, meaning you will learn from the best in the field and at the cutting-edge of research. They are actively involved in research and publishing in their specialist areas. UC is leading the country for the proportion of researchers that teach.

Research meets industry
Te Rāngai Pūkaha | College of Engineering is home to several world-renowned research centres providing research and consultancy services. Industry comes to UC looking for solutions to problems. We host unique national research centres, where research meets industry, including the UC QuakeCentre, Te Hiranga Rū QuakeCore, the Electric Power Engineering Centre (EPECentre), and the Wireless Research Centre (WRC). We have one of only three Human Interface Technology Laboratories (HIT Lab NZ) Hangarau Tangata, Tangata Hangarau in the world.

Leaders in their field
UC is acknowledged as a leader in Computer Science education in Aotearoa New Zealand. It is the home of award-winning, internationally recognised research groups, including Computer Science Unplugged and the Intelligent Computer Tutoring Group.

Sta/uniFB00 in Computer Science have won national and international awards for their teaching and research in the field.

Passionate practising experts
UC lecturers teach and do. All of our staff are research-active practising experts and work with industry, collaborating on projects, or acting as expert consultants.

‘Our lecturers come from places all around the world and all have different stories. That’s great because you get exposed to lots of different perspectives and the quality of their knowledge is very good.

My computer programming lecturer runs the competitive programming group at UC, and is a super enthusiastic guy who has been involved in his field since forever. Another of my lecturers is doing active research into computer security. It’s very relevant stuff, and also very tricky! It’s great to learn from them because they know exactly what to teach and what’s most important for you to learn.’

Max Clarke (pictured right)
Bachelor of Science in Computer Science

State-of-the-art facilities

Over the last few years, we’ve invested $163 million in new state-of-the-art laboratories, teaching spaces, and study areas.

A student hub

Our new Engineering Core is a student-hub, complete with a café, chill out spaces, computer labs, and lecture theatres. The Engineering Core hosts regular events, for students and staff, and is frequently used by clubs for social, academic, and industry networking events.

Purpose-built facilities

UC has world-class engineering facilities including a futuristic augmented reality lab, the only high-voltage lab in Aotearoa, and a new Structural Engineering Lab (SEL). The SEL ensures our Civil Engineering students experience the most modern educational facilities in seismic testing available. The SEL allows students to be exposed to modern testing techniques that provide first-hand experience of seismic loadings on structures and soils in real-time and at a realistic scale as part of their degree.

Our specialist lab facilities include a structures lab, fluids lab, control and robotics lab, advanced manufacturing lab with 3D printers, a PC2 lab, and a wind tunnel lab. We also have a specialist Engineering and Physical Sciences library.

Innovative labs and equipment

We have rebuilt or completely refurbished every wing of the engineering precinct, including new teaching and research labs and equipment in all of our engineering departments. Students have access to some of the best facilities available. All of our departments and schools each have dedicated buildings, with modern teaching spaces and labs. Te Kura Hanga Otinga | School of Product Design is our newest school. It offers prototyping spaces, a virtual reality testing studio, high-end gaming computers, and a collaborative creative open space, encouraging students to share innovative ideas.

‘The Chemical and Process Engineering (CAPE) lab is where we do the experimental work for our degree. My experiments included using a brand new biofuel reactor, where I got to test the efficiency of different oils. I also did a refrigeration lab where we had to change a certain variable to try to improve on the design.

It’s more interesting when you can physically see how something works. It also improves your understanding. You can ask questions and work things out as you go. The experiments we do give relevance to what we learn in the lectures.’

Sima Bagheri (pictured right)
Bachelor of Engineering with Honours in Chemical and Process Engineering, with a minor in Bioprocess Engineering

$163 MILLION

investment in new labs
and facilities for all Engineering departments
Experience ‘on the job’

Our students are ready to start work the minute they graduate.

**Hit the ground running**
Students start developing workplace skills from the moment they begin their degree, making them more industry-ready by the time they graduate. We teach you the professional skills you need when you start work – skills like communication and report writing, handling issues such as ethics, sustainability, safety, and interacting with customers and clients.

**Real-world problem solving**
Our graduates acquire a versatile skillset and knowledge base by combining the applied side of learning of labs and projects, balanced with academic theory, hands-on design, and industry projects. They learn to solve problems in real-world projects and have the opportunity to work for companies while they are still students, gaining a competitive edge.

**Work placements**
Practical work placements are an integral part of the Bachelor of Engineering with Honours and Bachelor of Forestry Science degrees. As an Engineering or Forestry Science student, you will complete 90-100 days of practical work experience for an organisation.

Work is generally done over the summers and is paid. Students often work for 1–2 companies during their practical work placements, allowing them to gain broad experiences in industry while studying. Time in industry helps them to develop skills such as communication, teamwork, and leadership, and often leads to job opportunities upon graduating.

‘I’ve worked the last two summers for the same company out in Rangiora. The first summer I was mostly shadowing people and finding out how the company operates. The following summer, I had real projects, like harvest planning and calculating the carbon footprint for the shipping side of the business.

I went up to the head office in Auckland and worked for the export team. I got to meet the CEO and all the big shots which was cool! They gave me a lot of responsibility. I had my own ute to use and I was included in all the meetings. I really felt like part of the team.’

Sarah de Gouw (pictured right)
Bachelor of Forestry Science
Problem-solving creativity

Our students learn to solve problems by designing and building something.

Bringing ideas to life

We use real-world and simulated projects to teach you the creative problem-solving skills that employers are looking for. Our second year Civil and Natural Resources Engineering students complete a bridge design and building competition as part of their studies. Student groups must draw and design a bridge, while understanding material strength and estimating loads on structures before building and testing their bridge in a fun competition.

Humanitarian engineering

For students who want to apply their engineering skills to humanitarian causes to help solve global issues such as food and water shortages, power supply, or climate change, we offer a unique humanitarian engineering programme. The Diploma in Global Humanitarian Engineering can be taken in parallel to your Engineering degree, in any discipline. You can apply the knowledge and skills you learn as an engineer to humanitarian efforts, working on engineering issues, and projects in disadvantaged or developing communities, in Aotearoa or overseas.

Ingenuity to entrepreneurship

At UC, our students are encouraged to research more and push the boundaries of their thinking. We give them the business and entrepreneurial skills they will need to make their ideas happen. We allow students to think big – while at the same time giving them a solid grounding in science and technology so that their ideas can be realised.

Product Design students learn to combine creative design, science, engineering, and business studies to plan and develop items for use in homes, businesses, and industry.

‘The Diploma has forced me to look at things differently. You have to change from a concise, logical, factual way of looking at things, to developing convincing ideas and arguments. It has definitely helped exercise the creative side of my brain!

For example, in your final year project you’re given a problem and you have to come up with the solution for it yourself. Creativity is so important in engineering. You have to be able to try different things if you want to succeed and be useful.’

Madeline Furness (pictured right)
Bachelor of Engineering with Honours in Natural Resources Engineering
Diploma in Global Humanitarian Engineering
Studying towards a PhD in Civil Engineering
Working across disciplines

At UC, you have the opportunity to work across disciplines. We encourage creative problem solving and collaboration between disciplines, through teamwork, group projects, communication, and leadership skills development. Having the School of Mathematics and Statistics in our College gives students a more integrated understanding of their application to problem solving. Mathematics and statistics underpins much of engineering, and is at the forefront of breakthroughs in science, technology, and finance. Data Science is our newest subject on offer, combining mathematics, computing, technology innovation, and practical results.

Bicultural competence and confidence

Te Rāngai Pūkaha | College of Engineering is committed to strengthening staff and students’ bicultural competence and confidence. For example, bicultural competence and confidence is being embedded across our Engineering, Forestry Science, and Product Design degrees. Negotiation and cross-cultural skills are taught in project management, and we engage kaiārahi as part of programmes.

Student mentoring and engagement

We offer all first year Engineering students access to a peer mentoring scheme, called ENGMe! Engineering students in their second and third year, who have “been there and done that”, offer advice, tips and tricks, and answer questions from new students. A schedule of events is also run during the first year, tailored to first-year Engineering students, with events covering TEDX-style talks from our Engineering programmes, a final year project showcase, and a look at what our innovative research centres do behind the scenes.

‘I like it when different areas combine because it means I’m not doing the same thing every day.

Everyone involved in a collaborative project has different passions, connections and personalities. It’s anything but boring. Even when I was getting my undergrad and doing coursework, there were a lot of opportunities for collaboration. You become more independent as you go into graduate studies, so to be able to develop those connections throughout my time at UC has been really nice.’

Rory Ellis (pictured right)  
PhD in Statistics

Collaboration and teamwork

Learn to work with and learn from others.
Final Year Projects
All of our engineering students do a final year project, many of which are sponsored by industry. By solving real-world problems, you gain work-ready skills and relevant experience. You build upon what you have learned during your degree, and complete your project as part of a team, alongside industry and academic mentors. Projects have spanned building technologies to withstand earthquake damage, electric vehicles, robotic machines to use in hazardous situations, rockets, and apps. Teams deliver concepts, prototypes, test data, and detailed reports at the end of their project.

Specialist labs and field stations
Students gain hands-on experience by applying what they learn in lectures to the laboratory environment. Labs are complemented by field trips which allow students to learn in a real and dynamic environment. For example, field trips to Waitaha Canterbury’s indigenous and exotic forests are an integral part of the Forestry Science degree. UC’s unique field stations around Waitaha Canterbury and Te Tai Poutini West Coast support teaching and research, allowing you valuable learning experiences outside of the classroom.

Hands-on learning
Our students learn by doing. We provide you with the opportunity to put your ideas to work – before work.

Student engineering design leading the world
UC Engineering students have competed in the international Formula SAE student competition for the last six years. The competition involves the design and build of their own cars, including the latest electronics and software, and racing them. The competition tests the depth of the students’ knowledge in engineering, business and management. UC Engineering students have also created the world’s first 3D-printed titanium internal combustion engine, as part of the international Shell Eco-marathon Asia, a global event that attracts over 100 university student teams around the Asia-Pacific region. UC teams have won Business, Design, and Innovation Awards for their cars at competitions over the years.

International Awards
UC Engineering students have won INTERNATIONAL AWARDS for the design of their race cars as part of the Formula SAE competition.

‘Our faculty advisor is very passionate and sets a high bar for us. What comes together is a really beautiful piece of machinery. In 2016, we built an electric vehicle. I got to design a carbon fibre shroud for the motor controllers. All the knowledge and experience gets passed down each year from student to student.

It’s the perfect real-life application of all the engineering skills you get taught. With UCM, you get ten times the learning that you do in a lecture theatre. It equips students to be industry ready too, because they’ve had that interaction with professionals and the experience of working on a large project.’

Willy Dunlop (pictured right)
Bachelor of Engineering with Honours in Mechanical Engineering
Part of UC Motorsport (UCM) & UC Formula SAE team
Bachelor of Engineering with Honours

Engineers design the future. They provide innovative solutions to meet the needs of our modern world.

From buildings and bridges, to apps and smart devices, to pharmaceuticals and renewable energy, engineering feats are everywhere.

The Bachelor of Engineering with Honours (BE(Hons)) is a four-year professional degree. The degree is accredited by Engineering New Zealand, allowing our graduates to work as professionally qualified engineers all over the world.

Entry requirements

For students entering the Intermediate Year (first year), physics and mathematics secondary school study is essential. Chemistry is also essential for some Engineering disciplines.

You should aim to have at least:

NCEA

• 14 credits in Level 3 maths or calculus including both differentiation and integration*

• 14 credits in Level 3 physics.

For students wishing to study Chemical and Process Engineering, Civil Engineering, Forest Engineering, Natural Resources Engineering, or Mechanical Engineering, you should also aim to have at least:

• 14 credits in Level 3 chemistry**.

18 credits are strongly recommended in all subjects.

International Baccalaureate (IB) Diploma

• minimum of 4 HL (or 6 SL) in each of maths and physics (HL is recommended)

• minimum of 4 HL (or 6 SL) in chemistry**.

Cambridge International Examination (CIE)

• maths and physics – D grade or better at A level or A in AS level

• chemistry – D grade or better at A level or A in AS level**.

* Including achievement standards 9578 - 'Apply differentiation methods in solving problems' and 9579 - 'Apply integration methods in solving problems'.

**The chemistry component is not required for the following Engineering disciplines: Computer; Electrical and Electronic; Mechatronics; Software Engineering.

Bachelor of Engineering with Honours – typical degree structure

Year 1 – Intermediate

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Year 2 – 1st Professional

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Year 3 – 2nd Professional

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Year 4 – 3rd Professional

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<th>Course</th>
<th>100 Level</th>
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Top achievers

Direct entry to the First Professional year is offered to students who have achieved excellent results in all relevant subjects.

Alternatively, a Modified Intermediate Year is offered to students who have taken the MATH 199 or relevant STAR Science courses, and/or have achieved excellent results in some subjects. You may be exempt from taking some of the required courses in the Intermediate Year and offered advanced/interest courses in their place.

Introductory pathway

If you did not achieve enough credits, you can take introductory courses in specific subjects to start with (eg, MATH 101, PHYS 111, and CHEM 114). You could then take the Intermediate Year courses in Semester 2 and over summer, or do an extra year of study.

Degree structure

The first year of the degree is called the Engineering Intermediate Year and comprises nine courses (120 points). You study five compulsory courses, and four further Intermediate Year courses which vary depending on which discipline you want to specialise in.

The Intermediate Year is followed by three Professional Years of study in one of the Engineering disciplines. Entry to the Professional Years is limited and based on your performance in the first year(s). All students must also complete 800 hours (approx. 100 days) of practical work placement.

BE(Hons) students are able to take the Diploma in Global Humanitarian Engineering at the same time (see page 23).

Disciplines

Chemical and Process Engineering*

Civil Engineering

Computer Engineering*

Electrical and Electronic Engineering*

Forest Engineering

Mechanical Engineering

Mechatronics Engineering

Natural Resources Engineering

Software Engineering

* Minors in Bioprocess Engineering and Energy Processing Technologies are offered.

** A minor in Communications and Network Engineering is offered.

A minor in Power Engineering is offered.

Career opportunities

Graduates have a wide range of employment opportunities, from private companies and consultancies through to government agencies. Many engineers progress into management.

www.canterbury.ac.nz/careers

More information

College of Engineering | Te Rāngai Pūkaha

T: +64 3 369 4271 or +64 3 369 4272

E: engdegreeadvice@canterbury.ac.nz

www.canterbury.ac.nz/engineering
**Bachelor of Forestry Science**

The Bachelor of Forestry Science (BForSc) is a professional degree offered by Te Kura Ngahere School of Forestry. It is an interdisciplinary degree that prepares graduates for managing forest resources by combining core science courses with management, commerce, and technology.

Small classes and field trips make for an engaging and rewarding learning experience at UC. Forestry Science graduates are highly sought after by employers and follow exciting and rewarding career paths.

**Recommended preparation**

The Bachelor of Forestry Science is open to all students who gain University Entrance. It is recommended that prospective students take NCEA Level 3 biology and maths, including statistics and probability – or the IB/Cambridge equivalent.

You may be able to fast-track your degree and gain direct entry to the second year if you have excellent Year 13 results or a New Zealand Certificate in Science with outstanding merit. It is possible to gain entry into the second or third year of study with a Bachelor of Science (BSc) or a New Zealand Diploma in Forestry with outstanding merit.

If you have not studied Year 13 statistics, or if you feel you have a weak background in these subjects, you should consider enrolling in a UC Headstart preparatory course over summer.

**Degree structure**

The BForSc requires a total of 480 points over four years. The first year provides a strong base in pure science, which is necessary for the professional study of Forestry Science.

First year courses cover a broad range of topics from trees, forests, and the environment to the commercial aspects of forestry and the importance of ecology, diversity, and conservation. First year electives can complement the degree or be of general interest to students.

In the second, third, and fourth years, you will then apply your knowledge to the forest situation, with elective options available in the third and fourth years.

It is possible to study the first year of the BForSc at other Aotearoa New Zealand universities. Students considering this option should consult the School of Forestry | Te Kura Ngahere for their course selection, which would include FORE 102 Forests and Societies or FORE 105 Forests of the World (available by distance).

[www.canterbury.ac.nz/regulations](http://www.canterbury.ac.nz/regulations)

**Bachelor of Forestry Science with Honours**

Students with a good grade average across 200 and 300-level courses may be invited to undertake honours as part of the fourth year of their degree. Honours involves the completion of a research course FORE 414 Dissertation.

**Double degrees**

You can combine the Forestry Science degree with the study of another degree, such as a Bachelor of Commerce (BCom) or Bachelor of Science (BSc) degree. Normally you can complete the two degrees in five years, but some degree combinations may take longer. It is also possible to complete a BCom degree with a strong Forestry emphasis. If you are considering a double degree you should consult Te Kura Ngahere | School of Forestry or Te Rōpū Takawaenga o UC | UC Liaison Office before enrolling.

There is also a Forest Engineering programme at UC, which students can study as a Bachelor of Engineering with Honours in four years.

**Further study**

UC offers a Graduate Diploma and Postgraduate Diploma in Forestry for graduates looking to update or retrain, and a master’s and PhD for those who wish to advance their Forestry Science studies and research.

**Career opportunities**

UC students benefit from New Zealand Institute of Forestry meetings, lectures on campus, and summer work opportunities. Some of the biggest companies in Aotearoa New Zealand hire UC graduates and many obtain work overseas.

Possible careers include forest management (plantation and native forests), conservation, harvesting, wood processing, planning, policy, forest science, timber appraisal, biosecurity, forest economics, sustainability, and land management.

[www.canterbury.ac.nz/careers](http://www.canterbury.ac.nz/careers)

**More information**

School of Forestry | Te Kura Ngahere  
T: +64 3 369 3500  
E: forestry@canterbury.ac.nz  
[www.canterbury.ac.nz/Engineering](http://www.canterbury.ac.nz/Engineering)  
[www.canterbury.ac.nz/schools/forestry](http://www.canterbury.ac.nz/schools/forestry)

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### Bachelor of Forestry Science – typical degree structure

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# Bachelor of Product Design

Product Design combines creative design, science, engineering, and business studies. Product designers plan and develop items for use in homes, businesses, and industry.

From creating a new lightweight kayak or a phone app, to formulating natural cosmetics or a virtual training world, studying product design will equip you for a wide range of occupations.

Graduates will be able to develop creative ideas based on their knowledge of related sciences and engineering disciplines, as well as gain the practical business skills needed to commercialise new products. This degree will prepare you for a modern career path in many areas of Aotearoa New Zealand’s innovative economy.

With a structure that is unique among design qualifications, this is the only university product design degree available in Te Waipounamu South Island.

## Entry requirements

Entry to the BProdDesign is open to all students with entry to the University. However, it is strongly recommended that you have at least 14 credits in NCEA Level 2 science and mathematics. Those intending to take the Chemical, Natural and Healthcare Product Formulation major should ideally have 14 credits in NCEA Level 3 chemistry (or the IB/CIE equivalent of these).

Credits in related subjects such as digital technologies, technology, or design and visual communication would be an advantage.

For more details on recommended preparation, including an outline for different qualification frameworks, go to [www.canterbury.ac.nz/engineering/product-design](http://www.canterbury.ac.nz/engineering/product-design)

## Degree structure

The BProdDesign is a three-year 360 points qualification with a combination of coursework and design projects:

- 135 points of Product Design courses
- 165 points of Science and Engineering courses
- 60 points of Business or Management courses.

The first year covers four compulsory courses in Engineering, Mathematics, Management, and Product Design. The remaining three 100-level courses vary depending on which major you choose to study.

### Majors

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<tr>
<th>Majors</th>
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<tbody>
<tr>
<td>Applied Immersive Game Design</td>
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<tr>
<td>Chemical, Natural and Healthcare Product Formulation</td>
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<tr>
<td>Industrial Product Design</td>
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</tbody>
</table>

Product design projects will involve independent work on open-ended projects, with a mix of individual and team-based activities, under close supervision by academics with experience in product design.

[www.canterbury.ac.nz/regulations](http://www.canterbury.ac.nz/regulations)

## Double and conjoint degrees

It is possible to combine the study of a BProdDesign with other degrees, such as a BSc or BCom. Conjont programmes leading to a BProdDesign/BCom or a BProdDesign/BSc can be completed in just four years.

Students considering a double or conjoint degree should seek advice from a Te Rāngai Pūkaha | College of Engineering Student Advisor.

## Further study

UC has a wide range of relevant options for postgraduate study, including qualifications in Engineering, Computer Science, Chemistry, Biochemistry, and Business and Marketing.

There is also a Doctor of Philosophy (PhD) in Product Design.

## Career opportunities

The scope of product design roles is widening from the traditional design of commercial products to include the design of user experiences, systems, and processes, as well as implementing virtual reality into existing applications.

Increasingly, many product designers work in multidisciplinary teams. Graduates may be employed in large manufacturing companies, design agencies, educational and training companies, engineering consultancies, and central and local government.

They may do design work for businesses in many industries such as medical, home appliances, packaging, computing, education, graphic design, cosmetics, or therapeutics and pharmaceutical companies.

Product designers can choose to start their own company.

More broadly, BProdDesign graduates will be prepared to work in a variety of roles for modern companies that not only require a technical background, but value innovation, customer focus, and business sense.

[www.canterbury.ac.nz/careers](http://www.canterbury.ac.nz/careers)

## More information

School of Product Design | Te Kura Hanga Otinga
T: +64 3 369 4271 or +64 3 369 4272
E: productdesign@canterbury.ac.nz
[www.canterbury.ac.nz/engineering/product-design](http://www.canterbury.ac.nz/engineering/product-design)

## Bachelor of Product Design – typical degree structure

### Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>PROD 101</td>
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<tr>
<td>PROD 100 or 160 Level 100</td>
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<tr>
<td>EMTH 100 Level 100</td>
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<td>MGMT 100</td>
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### Year 2

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<th>Course Code</th>
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<tr>
<td>PROD 200 Level 200</td>
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<td>PROD 200 Level 200</td>
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<tr>
<td>MKTG 100 Level 200</td>
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<td>ACCT 102 Level 200</td>
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### Year 3

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<th>Course Code</th>
<th>Description</th>
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<tr>
<td>PROD 300 Level 300</td>
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</table>

Note:

1. Select courses from the Bachelor of Science or Bachelor of Engineering with Honours degrees, depending on chosen major.
2. If students have not completed MKTG 100 then at least 15 points of MKTG 200 or 300-level courses.
3. Select 15 points above 200-level from the Bachelor of Engineering with Honours or Bachelor of Science degree schedules.

For major requirements please go to the University Regulations [www.canterbury.ac.nz/regulations](http://www.canterbury.ac.nz/regulations).
Diploma in Global Humanitarian Engineering

This diploma will allow you to apply your knowledge in engineering humanitarian service, broaden your skills, and widen your perceptions of engineering.

The Diploma in Global Humanitarian Engineering can only be completed in parallel with a Bachelor of Engineering with Honours degree, in any engineering discipline. It is an additional qualification that can be completed in the same time it takes to complete a four-year BE(Hons) degree.

Enrolment in the Diploma in Global Humanitarian Engineering is open to Engineering students in their professional years, from any discipline. To enter, you must have successfully completed the Intermediate Year and your application will need to be approved by the College of Engineering Dean (Academic).

As part of this diploma, you must complete a minimum total of 120 points, including:
• 45 points of which can be cross-credited from a BE(Hons) degree
• 45 points made up of courses from a list of humanities and social sciences courses
• a 30 point capstone course in humanitarian engineering, which includes either a professional report or practical component.

www.canterbury.ac.nz/regulations

More information
College of Engineering | Te Rāngai Pūkaha
T: +64 3 369 4271 or +64 3 369 4272
E: engdegreeadvice@canterbury.ac.nz
www.canterbury.ac.nz/engineering

Bachelor of Science

A Bachelor of Science (BSc) will extend your knowledge in multiple interest areas, satisfying many questions you may have about the world and encouraging you to investigate even further.

The following subjects are offered through Te Rāngai Pūkaha | College of Engineering as part of the BSc degree:
• Computer Science
• Data Science
• Financial Engineering
• Mathematics
• Statistics.

For more details on these subjects, see page 24. The 2020 Introduction to Science has more details on the Bachelor of Science.

www.canterbury.ac.nz
Subjects

35 Applied Immersive Game Design
26 Chemical and Process Engineering
35 Chemical, Natural and Healthcare Product Formulation
27 Civil Engineering
28 Computer Engineering
36 Computer Science
37 Data Science

39 Electrical and Electronic Engineering
25 Engineering
38 Financial Engineering
30 Forest Engineering
33 Forestry Science
36 Industrial Product Design
38 Mathematics
30 Mechanical Engineering

31 Mechatronics Engineering
32 Natural Resources Engineering
34 Product Design
36 Science
32 Software Engineering
40 Statistics

* The Diversity Agenda has a goal of 20% more female engineers by 2021
Engineering
BE(Hons), DiplGlobalHumanEng

Engineering is a challenging and exciting field that uses physical science and mathematics to solve complex problems. Engineers must enjoy design work, thinking creatively and analytically, working as part of a team, and communicating their ideas to others.

If you are interested in developing new, innovative technology to improve the quality of our lives and provide solutions to meet the needs of our modern world, then Engineering is for you.

Engineers understand the underlying mechanisms of how things work, ensuring that almost everything that underpins our society functions effectively, safely, and efficiently. They are responsible for designing, analysing, and improving basic infrastructure; water resource management; telecommunications systems; and the generation and distribution of electricity. Engineers improve the operation of processing plants and factories, and design new medical technology, digital systems, and electronics.

Why study Engineering at UC?
As a UC Engineering student you will have access to some of the best engineering staff and resources in Aotearoa New Zealand and the world.

- UC is ranked in the top 100 universities in the world for Civil and Structural Engineering; and in the top 250 for Electrical and Electronic Engineering and for Chemical Engineering (QS World University Rankings by Subject, 2019).
- UC’s Mechanical Engineering and Chemical and Process Engineering are the top departments for research in Aotearoa (Tertiary Education Commission 2012 PBRF Assessment).
- UC Engineering students have access to state-of-the-art labs and facilities in all engineering departments, after a $163 million investment in infrastructure, including the Engineering Core space for students.
- UC has world-class engineering facilities including a futuristic augmented reality lab, and the only high-voltage lab in Aotearoa.
- UC Engineering has connections with a number of international universities, and Engineering students can do a semester abroad as part of a UC Exchange programme, adding an international flavour to your studies.
- We have specially-designed computer laboratories and software as well as a specialist Te Puna Pōkaha me te Fūtalao Engineering and Physical Science Library.
- There are numerous scholarships available to Engineering students throughout your study, many of which are industry-funded and include summer employment opportunities.
- We host clubs such as ENSOC, Women in Engineering, and Engineers Without Borders NZ, which provide tutoring, mentoring, industry networking, community engagement opportunities, and many social activities throughout the year.
- Our programmes are accredited by Engineering New Zealand. An Engineering degree from UC is internationally recognised, allowing graduates to work overseas upon gaining their degree.
- All first year Engineering students have access to peer mentoring opportunities and a schedule of engineering events.

Recommended background
Entry into the Intermediate Year is open to any student with the relevant background. See the Bachelor of Engineering with Honours degree information on page 20 or go to the Engineering website for full details on entry requirements.

100-level courses
The first year of the BE(Hons), the Engineering Intermediate Year, consists of five compulsory courses essential for all Engineering disciplines (see below) plus four further courses specific to the Engineering discipline(s) you are considering studying in the professional years (years 2–4).

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course title</th>
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<tbody>
<tr>
<td>ENGR 100</td>
<td>Academic Writing Assessment (0 points, no cost)</td>
</tr>
<tr>
<td>ENGR 101</td>
<td>Foundations of Engineering</td>
</tr>
<tr>
<td>EMTH 118</td>
<td>Engineering Mathematics IA</td>
</tr>
<tr>
<td>EMTH 119</td>
<td>Engineering Mathematics IB</td>
</tr>
<tr>
<td>PHYS 101</td>
<td>Engineering Physics A: Mechanics, Waves, Electromagnetism and Thermal Physics</td>
</tr>
</tbody>
</table>

Other Intermediate Year courses
Students will also be required to choose their remaining four courses from Chemistry, Computer Science, Physics, or other approved subjects to complete the nine courses (120 points) required in their first year. The particular combination of courses required depends on the Engineering discipline you intend to study in the following three professional years.

If you are undecided on which discipline you wish to pursue, it is possible to keep your options open for more than one discipline (and is encouraged given the popularity of some professional programmes). For guidance as to how to structure your Intermediate Year, use our interactive course planner at www.canterbury.ac.nz/engineering/qualifications-and-courses/engineering/engineering-intermediate-year

‘As you go through your first year you’ll learn a lot about what’s involved in each specialisation and the different opportunities they can lead to. By the end of this first year you’ll be well informed to decide what path you want to follow next. Getting to study aspects of Mechanical, Electrical, and Computer Engineering is really valuable as it helps to think about technical problems from a wider perspective.

I saw a Mechatronics degree as a great way to learn a very broad set of skills, which when applied take a different perspective to problems in medicine. It is exciting to work on the forefront of a project with the potential to make a life changing impact.’

Zane Ormsby
Bachelor of Engineering with Honours in Mechatronics Engineering
Development Engineer, Tiro Medical
Entry into the professional years of the Engineering programme is limited, however most students who pass their Intermediate Year courses gain entry to their first or second choice of Engineering discipline. If you are not successful in gaining a place, or if you decide not to continue with Engineering, you can normally credit passes to the Bachelor of Science and other UC degrees. It is worth checking the website or contacting a Student Advisor to make sure you plan your first year to keep your options open.

www.canterbury.ac.nz/engineering/qualifications-and-courses/engineering/engineering-intermediate-year

200-level and beyond

The Professional Years

Once you have completed the Engineering Intermediate Year, you can apply for entry into the First Professional Year of one of the nine Engineering disciplines:

- Chemical and Process Engineering
- Civil Engineering
- Computer Engineering
- Electrical and Electronic Engineering
- Forest Engineering
- Mechanical Engineering
- Mechatronics Engineering
- Natural Resources Engineering
- Software Engineering.

Minor subjects

You can also take a minor in:

- Bioprocess Engineering, or Energy Processing Technologies, under Chemical and Process Engineering
- Communications and Network Engineering, under Computer Engineering
- Power Engineering, under Electrical and Electronic Engineering.

A Diploma in Global Humanitarian Engineering can be studied alongside any of the engineering disciplines giving you an extra qualification and a point of difference without adding any time to your studies.


Some limits on entry into the professional years of each discipline apply, with selection based on your grade point average achieved during the Engineering Intermediate Year.

The professional years will focus your learning on knowledge and skills that are relevant to your chosen Engineering discipline through a combination of lectures, laboratory work, and field classes.

In the second and third professional years, you will have the option of choosing courses which concentrate on a particular field (or fields) within your chosen Engineering discipline.

Practical work

Before graduating with the BE(Hons), you must complete 800 hours (approx. 100 days) of practical work in the engineering industry. This includes a compulsory zero fees work placement course ENGR 200 Engineering Work Experience during the First Professional Year, and further practical work normally carried out during the summer breaks of the professional years.

You are also required to carry out a workshop training course or a site safety course during the First Professional Year. These courses will vary depending on Engineering discipline, and aim to prepare you in the use of common tools and equipment that you are likely to need for your practical work in industry. You must also hold a University-approved first aid certificate while enrolled in the BE(Hons).

Career opportunities

Throughout their degree, students take part in practical work experience, on-campus events, careers fairs, and industry talks, giving them multiple opportunities to make industry contacts.

Engineering students work on final year projects as part of their degree, many sponsored by industry, which increases professional capability and encourage leadership, teamwork, and innovation.

Our graduates find work on projects of social, economic, and environmental significance to society. Many UC engineers progress into management or consultancy.

www.canterbury.ac.nz/careers/students/subjects

Contact

College of Engineering | Te Rāngai Pūkaha
T: +64 3 369 4271 or +64 3 369 4272
E: engdegreeadvice@canterbury.ac.nz
www.canterbury.ac.nz/engineering

Chemical and Process Engineering

BE(Hons)

Engineers revolutionise the world. With a Chemical and Process Engineering degree, you will do so by tackling some of society’s greatest challenges:

- supplying clean, safe drinking water
- creating sustainable energy opportunities
- improving society’s health and well-being
- providing a sustainable food supply.

Chemical and process engineers transform raw materials into processed, marketable products by chemical, physical, or biological means. They take science experiments performed in the laboratory and operate them on a commercial scale, taking into account economics, safety, and sustainability. Others are involved in the research and development of new products and processes, such as those in nanotechnology, biotechnology, or advanced materials.

It is the only traditional Engineering discipline that explicitly builds on Physics, Chemistry, and Biological Sciences, along with the mathematical rigour required of all engineers.

The BE(Hons) in Chemical and Process Engineering offered by UC is fully accredited by the Institution of Chemical Engineers (IChemE) as well as Engineering New Zealand.

Minor in Bioprocess Engineering

If you are interested in biology as well as engineering, the Bioprocess Engineering minor is worth considering as there is a rapidly increasing demand for Engineering graduates with an appreciation and knowledge of biological sciences. Bioprocess Engineering is about using biology for sustainable and more effective processes and for the design of better products, such as medicines and vaccines, beverages, vitamins, dairy products, detergents, foods, and clean water. This minor will help you to create an interesting and diverse career path in evolving industries.

Minor in Energy Processing Technologies

The world’s demand for energy is increasing and an understanding of energy processing technologies is essential to meeting that rising demand. The Energy Processing Technologies minor will give you insight into renewable and existing energy sources (such as hydrogen, solar, wind, natural gas, and oil), and how these resources are used to produce things like power, fertilisers, and fuels. You’ll also learn about electricity generation and storage while gaining an understanding of environmental issues, sustainable engineering, and energy stewardship.
200-level and beyond

The First Professional Year consists of compulsory courses in modelling, engineering chemistry, principles of biology, chemical process technology, thermodynamics, and fluid mechanics.

In the Second and Third Professional Years, courses include topics such as process systems and process engineering, thermodynamics, chemical reaction engineering, heat transfer, and separations. Final-year students can include courses in more specialist topics, including renewable energy technologies, management, bioprocess engineering, industrial pollution control, and advanced modelling and simulation to suit their specific interests. Students must also complete a group design project and an individual research project in their final year.

Career opportunities

Chemical and process engineers work in areas such as renewable energy, biofuels, environmental control, fermentation, waste treatment, food industry, biotechnology, and pharmaceuticals.

The petrochemical industry continues to grow and employs chemical engineers at oil refineries and a number of gas processing plants. Managing these and other precious resources provides excellent career opportunities for our graduates in the manufacture of aluminium, steel, and fertilisers.

Alternative career paths for our graduates include operational and asset management, finance, research, consulting, and marketing. Some of our graduates ultimately take company leadership positions.

Graduates are eligible for membership of both IChemE and Engineering New Zealand after a period of experience as a practising engineer.

‘The engineering industry is huge, varied, and a fantastic platform to work in. I have always had a fascination with infrastructure, and how it plays such an important role in our day to day lives. Sports fields and public amenities can change the way you feel about a place.

I hope to lead teams of engineers to design and build infrastructure that the community can really benefit from. Christchurch is such a vibrant city, and I love watching it grow. I want to help drive the city forward, and get projects off the ground.’

Jessie Winder
Bachelor of Engineering with Honours in Civil Engineering
Graduate Civil Engineer, WSP Opus NZ

Contact

Department of Chemical and Process Engineering
T: +64 3 369 3784
www.canterbury.ac.nz/engineering/schools/cape

Civil Engineering

BE(Hons)

Civil engineers design, construct, project manage, and commission a wide range of facilities and infrastructure such as buildings, bridges, towers, dams, roads and railways, pipe networks, and treatment plants. These facilities provide people with a reliable, safe, sustainable, and modern environment to live in.

Electric power depends on civil engineers for the design and construction of dams, canals, and transmission towers. Many towns and cities are protected against flooding or the effects of fire and earthquakes by infrastructure designed and constructed by civil engineers.

Civil engineers have responsibility for managing people, equipment, resources, time, and money. Communication skills are vital, as all professional engineers need to effectively disseminate complex information to people of diverse backgrounds by providing detailed engineering reports, presentations, and taking part in public hearings and inquiries.

This is a broad field, and students may take courses to focus on a more specific area of civil engineering during their professional years of study to suit their interests.

UC is ranked in the top 100 universities in the world in Civil and Structural Engineering (QS World University Rankings by Subject, 2019).

200-level and beyond

The First and Second Professional Years consist of compulsory courses that provide a wide, basic knowledge for the civil engineering professional. These include fluid mechanics, geotechnical engineering, surveying, materials, management, soil mechanics, structural design, transportation, and water quality. An external field camp also forms part of the First Professional Year’s programme.

In the Third Professional Year, students choose their courses to either specialise in a specific area of interest or generalise their courses. Courses can include traffic planning, structures, water engineering, geotechnical engineering, fire engineering, and engineering in developing communities. A compulsory research project is required for all students.

Laboratory, tutorial, design, office, and field classes complement the theory presented in lectures and demonstrate its relevance to practical applications. As well as individual assignments, students also regularly work in teams on projects. Written and oral presentations are key components of many courses. Lecturers place a heavy emphasis on the importance of good communication skills.

www.canterbury.ac.nz/regulations
Career opportunities

There are excellent career opportunities for civil engineers, with a strong demand for graduates in Aotearoa New Zealand and around the world in a diverse range of fields.

Most new graduates are employed by consultants (who design and manage), contractors (who build and maintain), or central, regional, and local government (who develop and manage the infrastructure of countries, cities, and communities).

Many civil engineers become experts in a specialised area of civil engineering such as structural, water, geotechnical, transportation, fire, or environmental fields.

Some UC civil engineering graduates go on to run their own companies, enter into partnerships, or become researchers for government agencies or business.

www.canterbury.ac.nz/careers/students/subjects

Minor in Communications and Network Engineering

If you have an interest in the internet, and specifically in the “internet of things”, the design and implementation of computer networks, and in a wide range of communications, the minor in Communications and Network Engineering would be a good choice to complement your Computer Engineering degree.

Aotearoa New Zealand has a larger number of internet providers, communication and networking equipment manufacturers, and infrastructure providers, spanning both major exporters and smaller companies. A number of these companies are based in Ōtautahi Christchurch. Currently, there is a shortage of computer engineers to fulfil the roles in this area and a need to increase the number of graduates with these skills. Employment opportunities for graduates in this field are extensive, especially in the overseas marketplace.

200-level and beyond

The First and Second Professional Years consist of courses that provide a wide, basic knowledge for the computer engineering professional. These include embedded computing, systems and control, digital electronics, electronics and devices, circuits and signals, networking, operating systems, computer science, and mathematics.

In the Third Professional Year, students take courses in embedded systems, computer architecture, and embedded software engineering. You can select specialised subjects, which can include topics on machine learning, computer vision, communication and network engineering, and signal processing, as well as complete a research project.

Most courses consist mainly of lectures, with laboratory work included to complement the theory and show practical application. Some formal laboratory periods are replaced by independent and group projects.

www.canterbury.ac.nz/regulations/academic-regulations

Career opportunities

With approximately 50% of the ICT industry in Aotearoa New Zealand located in the Waitaha Canterbury region, Ōtautahi Christchurch is the ideal location for such a programme, offering abundant opportunities for work experience and excellent employment opportunities for graduates.

There are plenty of exciting job opportunities locally, nationally, and internationally for computer engineers, as they are in high demand. Many find employment with companies that create devices with embedded systems such as

‘Given the skills you’re required to have, the Computer Engineering major gave me a wide range of skills which I can apply to the real-life IT industry. As part of my study I had the chance to work as a security intern at local company Dynamic Controls, and my project was about testing Bluetooth security systems, finding the vulnerabilities and fixing them.

Learning both hardware and software will give you a better overview of the digital world, so that you can use this knowledge in the industrial field that requires many hardware and practical skills.’

Grace Lee
Bachelor of Engineering with Honours in Computer Engineering
Cyber Security Analyst, Cyber Research
New Zealand, Auckland
Electrical and Electronic Engineering

BE(Hons)

Electrical and Electronic Engineers harness one of the fundamental forces of the universe, electromagnetism, for the benefit of the world. Electrical and Electronic Engineers create systems to provide efficient and sustainable power for homes and industry, the physical parts that transfer information between computers, and also the smart miniature devices we now have throughout the modern world.

Electrical and Electronic Engineering involves being creative with the generation, storage, and use of electricity; the design and programming of smart systems, such as robots and mobile devices; as well as the design and use of integrated circuits, sensors, and actuators. This discipline also involves the transmission and transformation of information using computers and communication networks, and the design of new electronic and computer products.

There is a significant overlap with both the Computer Engineering and Mechatronics Engineering degrees, especially relating to smart devices and programming, but Electrical and Electronic Engineers have a stronger focus on making things happen in the physical world compared to Computer Engineers, and a stronger focus on electrical power, digital data, and micro-devices than Mechatronics Engineers.

Electrical and Electronic Engineers have played a major role in the development of many technological advances, from personal computing and smart phones to autonomous vehicles and renewable electrical power. Digital television, unmanned aerial vehicles, robotics, medical imaging, and space exploration have all been possible in large part because of electrical engineering innovation.

UC is ranked in the top 250 universities in the world in Electrical and Electronic Engineering (QS World University Rankings by Subject, 2019).

Minor in Power Engineering

Efficient and sustainable power generation and transmission is highly important in the modern world, and studying the Power Engineering minor will allow you to investigate power distribution and usage through electrical devices. Systems such as generators, transformers, and motors are widely used within different industries, and therefore need graduates with the expertise to create, maintain, and improve these.

Graduates will find employment in areas such as power generation companies, consultancies, transmission companies, contractors, energy retailers, equipment suppliers, and distribution companies. You may also find the knowledge gained through this minor useful in transport industries that deal with the design of electrical railways, aircraft, and electric motors.

200-level and beyond

A significant amount of flexibility in course structure is available in the Third Professional Year (the last year of the degree). Course topics include embedded computer systems (smart systems), digital electronics, robotics, signal processing, communications engineering, control systems, power electronics, nanotechnology, electronic devices, electric power engineering, and renewable energy system design.

All Third Professional students take courses in mechanical system design, industrial management, and the Honours Research and Development Project. The project gives students the opportunity to apply their education and learn professional practice in industry-sponsored projects. These are conducted within the department under the joint supervision of staff members and an industry sponsor. Most projects are sourced from Aotearoa New Zealand industry; however, some come from large, well-known international firms.

Final year design project

During the Third Professional Year, each student undertakes a major design project. These group projects are offered by multiple industry sponsors who have a real need for engineering solutions in their businesses. These projects give students the opportunity to work on real engineering problems for an actual company.

UC’s programme provides a solid grounding in the theoretical fundamentals of electrical engineering, as well as valuable practical experience building and testing real systems through projects such as solar cell fabrication, solar-powered cars, electric go-karts, and robot hardware and software.

Career opportunities

UC Electrical and Electronic Engineering graduates are well prepared to join the technological revolution, with a wide range of career options. Some examples of these are as a consulting engineer, electronic design engineer; biomedical engineer, an entrepreneur, or as a teacher/educator in industry, school, or university.

Now, and in the future, electrical and electronic engineers have the opportunity to develop innovative systems such as:

- new ways of generating power from renewable energy sources eg, wind, hydro, and solar
- faster, cheaper, and more reliable ways of sending information through communication networks
- more precise non-invasive medical devices, instruments, and scanners
- new nano-scale devices and materials
- more efficient ways of using electric power and intelligent systems, such as autonomous cars or search-and-rescue robots
- better ways of gathering information through sensor networks to help businesses make accurate decisions
- new ways of controlling the administration of medicines or the motion of rockets.

Contact

Department of Electrical and Computer Engineering
Computer Engineering Coordinator
T: +64 3 369 3366 or +64 3 369 4419
www.canterbury.ac.nz/engineering/schools/ece

www.canterbury.ac.nz/careers/students/subjects
Forest Engineering
BE(Hons)

Forest engineering is a hybrid of engineering, forestry, and management. It requires people who can combine skills to solve engineering problems in the natural environment, with a focus on balancing economic, societal, and environmental requirements.

Forest engineers construct and evaluate the operational systems that make the forest industry ‘work’. This can include:
- designing and building new roads
- developing or modifying forestry equipment
- planning harvest operations
- optimising transport logistics
- integrating new technologies
- supervising employees and contractors
- ensuring safety standards are maintained.

Forest engineers work with public and governmental agencies. They look after the environment, and may steer projects through the resource consent process. Forest Engineering graduates know the forest environment and forest products and processes, and they provide the essential link between the forest and the real product.

Studying Forest Engineering includes courses and expertise taught through Te Kura Ngahere School of Forestry and the Department of Civil and Natural Resources Engineering. There is a real focus on ‘hands-on’ engineering practices, with many field trips to expose students to real-world engineering problems and opportunities. The Forest Engineering programme at UC is the only one of its kind in Australasia.

200-level and beyond
The First Professional Year emphasises basic engineering subjects including forest engineering, forest economics, materials, mechanics, and forest measurement.

In the Second Professional Year, this knowledge of engineering principles is consolidated and students are introduced to the principles of forest management, design, geotechnical engineering, infrastructure management, geospatial technologies in forestry, and wood science.

At this stage, there is an opportunity to go on exchange by studying at either the University of British Columbia in Vancouver, Canada, or the Virginia Polytechnic Institute and State University in Blacksburg, Virginia, USA. Through formal exchange programmes, students spend 8–12 months in either Vancouver or Blacksburg, and no tuition fees beyond the usual UC fees are due.

The Third Professional Year includes courses in harvest planning, transportation and road design, and forest engineering research. We also allow students to choose a number of electives from both Forestry and Engineering subjects, including advanced geotechnical or economics courses, or to discover new areas of study, such as international marketing.

Career opportunities
Forest engineers have a wide skillset that provides work opportunities both at home and abroad. Graduates can take up employment in the forest industry, but because of the multidisciplinary nature of forest engineering, job opportunities are also available in areas including general engineering consultancy, local and regional councils, government agencies, forest management, and research.

Careers in these organisations are challenging, creative, stimulating, and offer great scope for advancement.

www.canterbury.ac.nz/education/schools/forestry

Contact
School of Forestry | Te Kura Ngahere
T: +64 3 369 3500
www.canterbury.ac.nz/engineering

Mechanical Engineering
BE(Hons)

Mechanical engineers design and develop everything that is moving or has moving parts – from airplanes to wind turbines to dishwashers, as well as everything from macroscopic (large) down to nanoscopic (very small). Mechanical engineers are systematic thinkers with a sense of social responsibility that leads them to constantly seek better ways of doing things.

Many mechanical engineers specialise in areas such as materials, dynamics and controls, product design, manufacturing, energy and thermodynamics, and mechanics. Others cross over into other disciplines, working on everything from artificial organs in bioengineering to enhancing the field of nanotechnology.

The mechanical engineer may design a component, a machine, a system, or a process, and analyse their design using the principles of work, power, and energy to ensure the product functions safely, efficiently, reliably, and can be manufactured economically. Central to a mechanical engineer’s role is the design and the use of information technology.

200-level and beyond
The First and Second Professional Years consist of compulsory courses dealing with the fundamentals of engineering science and design, and include courses on dynamics, mechanics, thermodynamics, fluid mechanics, materials, controls, and manufacturing. Most courses in Mechanical Engineering consist of lectures supplemented by tutorials and laboratory classes.

Having developed a core skillset in engineering science and design, the Third Professional Year has more flexibility with a variety of elective subjects available to specialise the degree. Students select options in areas which are of particular interest to them. These include energy engineering, biomedical and bioengineering, computer-aided product development, robotics, aerodynamics, advanced materials, and acoustics, among others.

Research and Development Projects
Additional to elective courses, Third Professional students take courses in mechanical system design, industrial management, and the Honours Research and Development Project.

This unique industry project gives students the opportunity to apply their education and learn professional practice in industry-sponsored projects. These are conducted within the department under the joint supervision of staff members and an industry sponsor. Most projects are sourced from Aotearoa New Zealand industry; however, some come from large, well-known international firms. This experience gives our students an employability advantage.

www.canterbury.ac.nz/careers/students/subjects

Career opportunities
Mechanical Engineering graduates are well equipped to meet the challenges of a rapidly changing world by applying their creativity, scientific principles, and engineering skills to find solutions to technical problems. Mechanical engineers may work in areas such as:
- product design – design and analysis of tools, toys, sporting equipment, domestic appliances, computer-aided design, finite element analysis, environmental lifecycle of products
- power generation – wind and water turbines, internal combustion engines, fuels, alternative energy sources
- transport vehicles – cars, ships, aircraft, trains, unmanned vehicles
- medical technology – medical devices for operating theatres, implants, insulin control
- building services – heating, ventilation, air conditioning, energy use analysis, water treatment plant

www.canterbury.ac.nz/education/schools/forestry
Matthew Furkert  
Studying towards Bachelor of Engineering with Honours in Mechanical Engineering

‘I have found that there is always help available for academic work and that staff are willing to give advice for extracurricular projects such as rocket design. As the leader of the UC Rocketry Association club, I organised events ranging from launch days to industry speeches and build-your-own-rocket challenges for over 70 members.

I am attaining a better understanding of how machines in the world work and how to make them better. After graduating from Canterbury, I want to start up an aeronautical business which allows everyday people to send small objects and experiments into space.‘

Mechatronics Engineering

BEng(Hons)

Mechatronics is the field behind the “Smart Products and Systems” that increasingly dominate many aspects of our lives. It sits at the intersection of mechanical, electrical, and computer engineering, and combines sensors, software, and motors to create innovative and amazing new devices.

These mechatronic systems can be found manipulating the smallest bits of matter, in spacecraft, as well as throughout your home and town. From smart phones and TVs, to smart energy grids to smart cars and smart medical care and devices. They are everywhere you look, making life better, greener, healthier, more productive, and more interesting.

During the coming decades, we will see an explosion of these automated systems further aiding our lives. Robots are widely used to automate manufacturing processes for productivity benefits, quality consistency, and reduction/elimination of physically hard and/or hazardous labour. Mobile machines, such as Unmanned Aerial Vehicle (UAV), Autonomous Underwater Vehicle (AUV), and Autonomous Ground Vehicle (AGV), are deployed to operate in such environments.

The vast discipline of Mechatronics Engineering does not stop at the visible world. Micro and nano electro-mechanical systems (MEMS/NEMS) are an ever increasing branch of mechatronics research and technology for applications such as atom-scale microscopy and spectroscopy, micro and nano fabrication, big data storage, sensor technology, medical drug delivery, and many more.

200-level and beyond

The First, Second, and Third Professional Years consist of compulsory and elective courses from Mechanical Engineering, and Electrical and Electronic Engineering, as well as dedicated Mechatronics Engineering courses.

The First Professional Year introduces the topics of mechatronics design, computer systems, electronics and devices, dynamics and vibrations, machine elements, and engineering mathematics.

The Second Professional Year focuses on mechatronics system design, control engineering, embedded systems, computational mechanical analysis, and power electronics.

The Third Professional Year allows students to take courses that suit their specific interest, and includes courses on electronics, aerodynamics, robotics, and computer vision. All students also take a course on modern control theory and complete a design and research project, which typically are real-life engineering projects offered by industry partners. This unique project approach gives our students an employability advantage at graduation.

At UC, special emphasis is placed on project-based learning that integrates mechanical, electronic, and computer engineering skills in each professional year.

Career opportunities

Graduates with a Mechatronics Engineering degree can take up careers in a wide spectrum of industries, including the robotics, aerospace, chemical, gaming, internet/cloud/software, defence, automotive, and manufacturing industries. Mechatronics graduates also work in businesses that require extensive computer infrastructure and algorithms, such as banking and commerce.

Within these industries, Mechatronics Engineering graduates could be design engineers, software engineers, project planners, product designers, or project managers.

Contact

Department of Mechanical Engineering  
T: +64 3 369 2166  
www.canterbury.ac.nz/engineering /schools/mechatronics
Natural Resources Engineering
BE(Hons)

Natural resources and environmental engineers improve or maintain the sustainability of natural resources through creative design and wise application of technology. Natural resources engineering takes into consideration both the impact of humans on natural systems and the impact of natural systems on humans.

Natural resources and environmental engineering is the application of the physical (and social) sciences, using a system-based approach to design technology for the sustainable development, management, and conservation of our natural resources. These resources include land, soils, water, the atmosphere, renewable energy, and biological resources (such as plants and animals). Wastes are also considered resources, and can be recycled in a variety of ways, and end products utilised.

UC is the only university in Aotearoa New Zealand that offers this programme.

200-level and beyond

The First Professional Year of the Natural Resources Engineering programme is the same as the Civil Engineering degree programme. Courses include fluid mechanics, surveying, materials, solid mechanics, soil mechanics, and environmental engineering. A field camp also forms part of the First Professional Year of the programme.

The Second Professional Year includes courses offered through Civil Engineering on infrastructure management, fluid mechanics, environmental engineering, geotechnical engineering and design, and introduces specific Natural Resources Engineering courses. These topics consist of ecological engineering, and integrated catchment analysis and design.

During the Third Professional Year, students have more flexibility. All final year students must complete a natural resource engineering research project, and a selection of courses which can focus on water resource engineering, ecological engineering, bio-resources engineering, engineering in developing communities, hydrology, waste and wastewater management, and energy.

Communication skills are nurtured throughout, as all professional engineers need to be able to provide detailed engineering reports and effectively take part in presentations, public hearings, and inquiries.

www.canterbury.ac.nz/regulations/academic-regulations

Career opportunities

With their holistic approach to engineering in relation to natural resources, specialist engineers in this field are well-placed to make a positive contribution to the development of sustainable lifestyles, something of vital importance to the future of humankind.

Natural resources engineers are scarce in the professional workplace and there are plenty of exciting jobs, including research and academic opportunities in Aotearoa New Zealand and all around the world.

Recent graduates have found positions with professional engineering consultancies, local and regional councils, primary industry companies, central government departments, and Crown Research Institutes.

www.canterbury.ac.nz/careers/students/subjects

Software Engineering
BE(Hons)

Our society relies in many ways on software or software-based systems, for example in transportation, entertainment, telecommunications, government, business, health, and avionics.

Very often software systems have a high degree of complexity, often consisting of millions of lines of code produced by large teams of engineers or programmers. We critically depend on their timely and cost-effective completion, and on their reliable and efficient operation. To meet all these targets, a disciplined and well-founded approach to the design, creation, and operation of software (or software-based systems) under real-world constraints (economic, ethical, technical, legal) is needed.

The Software Engineering programme at UC provides a unique blend of foundational courses in Computer Science and Engineering, and practical work through a series of projects.

200-level and beyond

In all three professional years, students take foundational and advanced courses in core Computer Science and Software Engineering topics, such as databases, operating systems, human-computer interaction, web-based systems, and software design and testing. Courses use a mixture of lectures, lab work, and practical projects.

An important feature of studying Software Engineering at UC is the projects, one for each professional year. The projects enable students to work in teams and use the latest software technologies to develop and implement creative solutions to complex problems.

• The project in the First Professional Year focuses on teamwork and gaining experience with contemporary software engineering tools for testing, or configuration and build management.

• The Second Professional Year project is a whole-year project with a focus on teamwork and interaction with customers and other stakeholders.

• The final-year project in the Third Professional Year is a capstone project in which students apply all of their software engineering skills.

www.canterbury.ac.nz/regulations/academic-regulations

Career opportunities

There is a strong demand for Software Engineering graduates; Aotearoa New Zealand employers have commented that they often have to look overseas to find sufficiently qualified candidates who combine technical expertise with good communication skills and teamwork ability.

Software engineering is a widely applicable discipline and graduates are not only needed in software production companies, but also in many companies whose products involve significant amounts of software.

www.canterbury.ac.nz/careers/students/subjects

Contact
Department of Civil and Natural Resources Engineering
T: +64 3 369 3113
www.canterbury.ac.nz/engineering/schools/cne

Contact
Department of Computer Science and Software Engineering
T: +64 3 369 2777
www.canterbury.ac.nz/engineering/schools/csse
Forestry Science

BForSc

The Bachelor of Forestry Science (BForSc) is a professional degree offered by Te Kura Ngahere School of Forestry. It is an interdisciplinary degree that prepares our graduates for managing forest resources by combining the study of core science courses with management, commerce, and technologies.

Forestry Science graduates are highly sought after by employers and follow exciting and rewarding career paths. As a graduate, you can choose a career in commercial forestry, conservation and restoration ecology, research, or policy and planning in Aotearoa New Zealand or overseas.

If you care about the management of natural resources and are interested in being part of a huge worldwide industry, of particular national relevance to Aotearoa, then forestry could be for you.

Why study Forestry at UC?

• UC is the only Aotearoa New Zealand university to offer a professional degree in Forestry.

• UC is located near plantations and native forests, which are used for both teaching and research, and students are able to visit other forestry organisations throughout the country.

• The School has exchange programmes with the University of British Columbia in Canada and Virginia Polytechnic Institute and State University in the USA, which allow students to complete one or two semesters of their BForSc studies at those universities while paying UC fees.

• The BForSc equips you with a broad understanding of natural resource management issues. During the course of your studies you can specialise in a range of areas including forest engineering, wood science, forest management, forest science, forest marketing and finance, commerce, and conservation management.

• Small class sizes make the BForSc a friendly and social programme, and the Forestry Students’ Society (FORSOC) organises social functions throughout the year.

• UC Forestry students may be eligible for forestry industry scholarships. For more information, contact Te Kura Ngahere | School of Forestry.

• You may also enrol for both Forestry and Commerce, or Forestry and Science degrees, at the same time (double degree), or complete a Commerce degree with a strong Forestry emphasis.

Research and fieldwork

Te Kura Ngahere | School of Forestry has excellent teaching and research facilities, and opportunities to work in the field are maximised. UC’s field stations located near Arthur’s Pass and at Kawatiri Westport are used for Forestry teaching and research.

Staff are actively engaged in research on forest management, conservation and restoration ecology, biology, silviculture, biosecurity, geospatial applications, tree and forest modelling, tree breeding, economics, harvesting and transport, timber processing, and marketing.

Te Kura Ngahere | School of Forestry is part of Te Rāngai Pūkaha | College of Engineering, and has strong links with Te Rāngai Umanga me te Ture | College of Business and Law, and Te Rāngai Pūtaiao | College of Science, which ensures that students receive a broad education and graduate with a wide range of career options.

Recommended background

The Bachelor of Forestry Science is open to all students who gain entry to the University. It is recommended that prospective students take NCEA Level 3 biology and maths, including statistics and probability – or the IB/Cambridge equivalent.

You may be able to fast-track your degree and gain direct entry to the second year, if you have excellent Year 13 results or a New Zealand Certificate in Science with outstanding merit.

It is possible to gain exemption for parts of the Forestry examinations with a Bachelor of Science (BSc) or a New Zealand Diploma in Forestry with outstanding merit.

If you have not studied Year 13 statistics, or if you feel you have a weak background in this subject, you should consider enrolling in a UC Headstart preparatory course over summer.

100-level courses

The following are the compulsory courses for the first year of the Forestry Science degree:

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course title</th>
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</thead>
<tbody>
<tr>
<td>FORE 111</td>
<td>Trees, Forests and the Environment</td>
</tr>
<tr>
<td>FORE 131</td>
<td>Trees in the Landscape</td>
</tr>
<tr>
<td>FORE 141</td>
<td>Forest Growth and Measurements</td>
</tr>
<tr>
<td>FORE 151</td>
<td>Commercial Aspects of Forestry</td>
</tr>
<tr>
<td>BIOL 112</td>
<td>Ecology, Evolution and Conservation</td>
</tr>
<tr>
<td>STAT 101</td>
<td>Statistics 1</td>
</tr>
</tbody>
</table>

Students must also take another 30 points of 100-level courses from any degree at UC in their first year.

‘The outdoors soon became a passion of mine and, with the promising career opportunities that the Forestry degree posed, it was obvious that forestry was a suitable career option.

I enjoy its ability to cover a range of topics giving students a broad understanding of what “Forestry” is all about, and the opportunity to get outside and see real life operations as well as providing summer work opportunities.’

Reihana Fisher
Ngāti Porou
Studying towards a Bachelor of Forestry Science
Possible careers include forest management employed by the time they finish their degree. Workforce, the majority of our graduates are hired UC graduates and many students obtain summer work opportunities. Some of the biggest companies in Aotearoa New Zealand. Students are able to make employer contacts through New Zealand Institute of Forestry meetings and lectures on campus. These contacts can also provide summer work opportunities. Some of the biggest companies in Aotearoa hire UC graduates and many students obtain work overseas. Of those choosing to enter the workforce, the majority of our graduates are employed by the time they finish their degree. Possible careers include forest management or consultancy (plantation and native forests), conservation, harvesting, wood processing, planning, policy, forest science, timber appraisal, biosecurity, forest economics, sustainability, and land management.

The degree is very well supported by employers in Aotearoa New Zealand. Students are able to make employer contacts through New Zealand Institute of Forestry meetings and lectures on campus. These contacts can also provide summer work opportunities.

In the second year, the main focus is on Forestry courses with some supporting Science subjects. In the third year, more applied Forestry courses are introduced. One further subject is taken from an option schedule available to both third and fourth-year students.

In the fourth year, students are required to take three compulsory courses and three further courses from the option schedule, which can include a course from another UC degree. Students who attain a good grade point average during the second and third years will be invited to consider undertaking honours in the final year of the degree. Those who choose to do so must complete a dissertation, which is a piece of original research on a Forestry topic usually chosen by the student.

200-level and beyond

In the second year, the main focus is on Forestry courses with some supporting Science subjects. In the third year, more applied Forestry courses are introduced. One further subject is taken from an option schedule available to both third and fourth-year students.

In the fourth year, students are required to take three compulsory courses and three further courses from the option schedule, which can include a course from another UC degree. Students who attain a good grade point average during the second and third years will be invited to consider undertaking honours in the final year of the degree. Those who choose to do so must complete a dissertation, which is a piece of original research on a Forestry topic usually chosen by the student.

www.canterbury.ac.nz/courses

Career opportunities

The degree is very well supported by employers in Aotearoa New Zealand. Students are able to make employer contacts through New Zealand Institute of Forestry meetings and lectures on campus. These contacts can also provide summer work opportunities.

Some of the biggest companies in Aotearoa hire UC graduates and many students obtain work overseas. Of those choosing to enter the workforce, the majority of our graduates are employed by the time they finish their degree. Possible careers include forest management or consultancy (plantation and native forests), conservation, harvesting, wood processing, planning, policy, forest science, timber appraisal, biosecurity, forest economics, sustainability, and land management.

www.canterbury.ac.nz/careers/students/subjects

Contact

School of Forestry | Te Kura Ngahere
Tel: +64 3 369 3500
E: forestry@canterbury.ac.nz
www.canterbury.ac.nz/engineering/schools/forestry

The first year is best taken at UC, although it may be taken at any Aotearoa New Zealand university. Students considering studying the first year of the Bachelor of Forestry Science at another Aotearoa university should consult Te Kura Ngahere | School of Forestry for their course selection, which would include the distance courses FORE 102 Forests and Societies or FORE 105 Forests of the World.

- UC's Chemical and Process Engineering,
- UC is ranked in the top 250 universities in the world for Business and Management Studies (QS World Rankings by Subject, 2019).
- UC's Product Design degree offers majors in:
  - Applied Immersive Game Design
  - Chemical, Natural and Healthcare Product Formulation
  - Industrial Product Design.

Graduates will be able to develop creative ideas based on their knowledge of related sciences and engineering disciplines, as well as gain the practical business skills needed to commercialise new product ideas. This degree will prepare you for a modern career path in many areas of Aotearoa New Zealand’s innovative economy.

Why study Product Design at UC?

- The Bachelor of Product Design (BProdDesign) is a three-year professional degree – the only university degree of its kind in Te Waipounamu South Island.
- Conjoint programmes leading to a BProdDesign/BCom, or a BProdDesign/BSc, can be completed in just four years.
- Product Design is an interdisciplinary mix of creative design with courses from science, business, and engineering.
- Students will have access to state-of-the-art facilities such as laboratory, computer, and testing facilities.
- UC is ranked in the top 250 universities in the world for Business and Management Studies (QS World Rankings by Subject, 2019).
- UC’s Chemical and Process Engineering, Mechanical Engineering, and Marketing departments are the top-ranked for research in Aotearoa New Zealand (Tertiary Education Commission 2012 PBRF assessment).

Recommended background

Entry to the BProdDesign is open to all students with entry to the University. However, it is strongly recommended that you have at least 14 credits in NCEA Level 2 science and mathematics, while those intending to take the Chemical, Natural and Healthcare Product Formulation major should ideally have 14 credits in NCEA Level 3 chemistry (or the IB/CIE equivalent of these).

‘Industrial Product Design has offered me a range of opportunities; it’s a unique combination of design, engineering, and marketing. Studying this has given me an open mind, particularly when deciding what I will do a master’s degree in.

In our lab experiments, we disassemble daily use appliances to understand how the materials make the appliance work. We also test the strength of 3D printed materials, this is a very good learning experience at the start of the course. The interactive learning method has really increased my curiosity for the course.’

Gursamrath Oberoi
Studying towards a Bachelor of Product Design in Industrial Product Design
Credits in related subjects such as digital technologies, technology, or design and visual communication would be an advantage.

For more details on recommended preparation, including an outline for different qualification frameworks, go to www.canterbury.ac.nz/engineering/product-design

100-level courses
Product Design has three compulsory 100-level courses:

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course title</th>
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</thead>
<tbody>
<tr>
<td>PROD 110</td>
<td>Product Design Principles</td>
</tr>
<tr>
<td>or ENGR 101</td>
<td>Foundations of Engineering</td>
</tr>
<tr>
<td>MGMT 100</td>
<td>Fundamentals of Management</td>
</tr>
<tr>
<td>PROD 101</td>
<td>Product Design 1</td>
</tr>
</tbody>
</table>

Students must also take one 100-level MATH or EMTH course.

The majors also require additional compulsory PROD courses and courses from related subjects.

www.canterbury.ac.nz/engineering/product-design

200-level and beyond
Product Design at 200 and 300-level allows you to develop deeper understanding of the principles of product design, as well as more detailed understanding of the principles of game design, industrial design, or chemical and healthcare product design, depending upon your chosen major.

www.canterbury.ac.nz/courses

Career opportunities
The scope of product design roles is widening from the traditional design of commercial products to include the design of user experiences, systems, and processes, as well as implementing virtual reality into existing applications.

Increasingly, many industrial and product designers work in multidisciplinary teams. Graduates may be employed in large manufacturing companies, design agencies, educational and training companies, game developers, engineering consultancies, or central and local government. They may also design work for businesses in many industries such as medical, home appliances, packaging, computing, graphic design, education, cosmetics, or therapeutics and pharmaceutical companies.

More broadly BProdDesign graduates will be prepared to work in a variety of roles for modern companies that not only require a technical background, but value innovation, customer focus, and business sense.

Product designers may choose to start their own company.

www.canterbury.ac.nz/careers/students/subjects

Contact
School of Product Design
Te Kura Hanga Otinga
T: +64 3 369 4271 or +64 3 369 4272
E: productdesign@canterbury.ac.nz
www.canterbury.ac.nz/engineering/product-design

Applied Immersive Game Design
BProdDesign
This subject covers both virtual and augmented reality, where software and hardware are evolving at a massive pace. Students will acquire knowledge and skills in creative and technical design, and business expertise within the gaming industry. Students will also have opportunities to design and develop games that meet end-user needs for entertainment, education, rehabilitation, and industrial applications.

By studying Applied immersive Game Design, you will understand idea generation, game structure, and interface design, and gain practical experience in prototyping for a range of platforms, animation software, and game engines, with an emphasis on virtual, augmented, and mixed reality.

Career opportunities
The electronic entertainment and technology sector is one of the biggest earners worldwide, with the gaming industry in particular growing at an exponential rate. Game development companies are continuously looking for well-qualified graduates with advanced technical skills and experience.

Aotearoa New Zealand houses more start-up developers per capita than any other country in the world, which benefit from graduates with ‘all-round’ skills, from technical aspects through to marketing and customer support.

Many companies look for graduates with broad skills and a user-centred approach to game and software design, for example in the areas of entertainment, industrial, retail, tourism, education, behavioural intervention, robotics, and medical and rehabilitation.

Chemical, Natural and Healthcare Product Formulation
BProdDesign
Chemical, biological, pharmaceutical, food, nutraceutical, and personal care products need to be crafted in a sustainable way, using active ingredients that enable their practical use. For example, to create a moisturising skin lotion that would be an attractive product for the consumer, it would need to contain moisturising properties and other elements to create suitable viscosity, skin feel, and fragrance, and contain antimicrobial agents to enhance shelf life.

This subject combined with others such as Biochemistry will help you learn to develop natural products. It will allow you to explore innovative ways to better formulate these products, and to analyse existing products and suggest improvements. You will understand the design lifecycle – from idea generation to commercialisation.

Career opportunities
Graduates will develop key skills needed to design personal care and household products and commercialise their ideas. Skills include understanding of the total product design process, practical experience in product formulation prototyping, methods of analysis, commercial production, testing, and process economics.

A degree in Product Design will prepare you for an exciting career path in many areas of Aotearoa New Zealand’s innovative economies. Graduates with this scientific background could pursue opportunities that lead to a career in the food, healthcare, and pharmaceutical industries.

Possible jobs are formulation scientist, quality manager, chemist, laboratory technician, product/marketing manager, marketing analyst, portfolio analyst, business development manager, entrepreneur, and CEO.

Graduates will be able to develop creative ideas based on their knowledge of related sciences and engineering disciplines, as well as gain the practical business skills needed to commercialise new product ideas. Some qualified product designers have chosen to start their own businesses for new product lines that they developed during their studies.
Science

A BSc will extend your knowledge in multiple interest areas, satisfying many questions you may have about the world and encouraging you to investigate even further.

Computer Science

BSc, CertCom, CertSc

When people think of Computer Science they often just think of programming, but there are many more aspects to the field, including interaction design, communications and networks, software design, computer security, information systems, big data, machine learning, graphics, operating systems, educational systems, artificial intelligence, and embedded systems (processors that are embedded in everything from mobile phones to cars). All of these areas are experiencing rapid growth both in Aotearoa New Zealand and internationally, and there is a strong demand for Computer Science graduates.

Computer Science is about helping people do their work efficiently and effectively by analysing needs and constructing appropriate solutions. It goes way beyond programming, as it is about knowing how to design systems that are fast, usable, reliable, secure, scalable, and make a positive impact on society and our environment.

Computer Science students learn techniques to tackle these challenges for applications as diverse as monitoring the condition of patients in hospitals to designing educational games for smartphones.

Why study Computer Science at UC?

• UC is located in Waitaha Canterbury – the ‘Silicon Plains’ of Aotearoa New Zealand, where there are dozens of large, hi-tech companies employing UC graduates. Further afield, our graduates are in demand overseas and many come up with an idea for a product while studying, going on to become business owners and employers themselves.

• UC is acknowledged as a leader in Computer Science education in Aotearoa. It is the home of the award-winning Computer Science Unplugged project, and the internationally recognised Intelligent Computer Tutoring group. Several members of staff have awards for their work as computer science educators.

• We have a vibrant student community that encourages meeting up with like-minded students through clubs, including CompSoc and Women in Technology clubs. There is a good interface with industry, including an annual careers fair where students meet a host of employers.

Industrial Product Design

BProdDesign

Products such as mobile phones, mobility-assist devices, automatic espresso coffee machines, microwave ovens, or bicycles all have elements in both design and usability. This major will teach students how to design products which will solve a problem, as well as create interest for consumers.

You will also develop skills in product design methods such as sketching and computer-aided design, fluid flow, power and energy, and materials selection that is both ergonomic, functional, and appealing. Students will gain a practical understanding of the product design lifecycle – from idea generation to prototyping and commercialisation.

Industrial designers need to be imaginative with good artistic skills, innovative, able to work well under pressure, and be good communicators who can accept criticism. You will also be persuasive at selling your ideas to clients.

Career opportunities

Graduates will be able to develop creative product ideas based on their knowledge of related sciences and engineering disciplines, as well as practical business skills to commercialise these ideas.

Combining engineering and science with creative arts and business will help you shape a career with unlimited possibilities, as industrial designers work across many different industries. Opportunities exist in design departments for large manufacturing companies, design or engineering consultancies, architectural practices, or the possibility to be self-employed with your own company.

Other example areas include furniture, electronics, packaging, medical appliances, consumer goods, vehicle design, ergonomics, and recreational and sports equipment.

‘Computer science is challenging but I like that we learn how to tackle different problems. I get to learn new skills like programming in different languages.

Learning is important to me and I have always admired the field of technology. It is always growing and provides a lot of career opportunities. I am amazed at how people in this area continue to solve problems and invent new technology.

With my degree, I wish to go into a career that relates to human-computer interaction or artificial intelligence.’

Kelly Esther Chan Ling Ing

Studying towards a Bachelor of Science in Computer Science and Psychology
Recommended background

It is possible to enrol in our courses with only a general computing background, but it is a significant advantage to have completed the NCEA achievement standards in programming and computer science (or IB/Cambridge equivalent).

A strong background in Year 13 calculus or statistics is recommended. A mathematical background is important for students who intend to advance beyond first year.

Advanced students

If you have very good results in NCEA programming and computer science (or IB/Cambridge equivalent), you can apply to join an advanced class. Students with outstanding achievement in NCEA (or IB/Cambridge) and who have completed the Computer Science STAR programme can be considered for direct entry into second-year Computer Science courses, with a view to completing an honours degree in three years.

100-level courses

<table>
<thead>
<tr>
<th>Course code</th>
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<tbody>
<tr>
<td>COSC 101</td>
<td>Working in a Digital World</td>
</tr>
<tr>
<td>COSC 121</td>
<td>Introduction to Computer Programming</td>
</tr>
<tr>
<td>COSC 122</td>
<td>Introduction to Computer Science</td>
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</tbody>
</table>

Students majoring in Computer Science are required to take COSC 121, COSC 122, MATH 102, and MATH 120. COSC 101 is also strongly recommended for those who have not studied computer science previously.

It is possible to design a first year of study that enables you to either continue in your second year in Computer Science or go into Software Engineering, Information Systems, Data Science, Electrical and Electronic Engineering, or Computer Engineering. To keep your options open for this, talk with a Te Rāngai Pūkaha College of Engineering Student Advisor.

200-level and beyond

A variety of courses in Computer Science are available after the first year. These cover topics essential for building innovative systems, such as algorithms, software engineering, data communications and networking, database systems, artificial intelligence, data and network security, microprocessor systems, computer graphics, wireless security, and computer vision.

As part of the Bachelor of Science, students can also choose courses from other Science subjects and non-Science subjects.

Data Science

BSc, CertSc

Organisations are increasingly making use of large volumes of digital data, from personal medical histories, to socio-economic statistics, to internet trends. Data scientists are one of the newest professions to come from this demand for effective storage, maintenance, and use of ‘big data’. Graduates with modern, technical knowledge of computing systems and statistical methods are needed to process information in a range of industries.

Data Science combines mathematics, statistics, computing, technology innovation, and practical results. You will study at the forefront of modern practices and issues in the digital world, including ethics and security of data, strategy development, and statistical programming.

Career opportunities

With such a wide range of industry applications and career opportunities, Data Science has been identified as one of the most essential and employable skills of the 21st century.

Why study Data Science at UC?

- Aotearoa New Zealand is ranked as the #1 country globally for starting a business (World Bank Group Doing Business 2019 Report), and Otatuhai Christchurch is home to a number of computing technology and innovation industries, with many start-up companies searching for skilled graduates from UC.
- A number of research centres at UC utilise data science, including the Toi Hangarau Geospatial Research Institute, Hangarau Tangata, Tangata Hangarau | HIT Lab NZ, Wireless Research Centre, Te Kāhui Roro Reo NZ Institute of Language, Brain and Behaviour, and Te Pokapū Aromi ā-Mathihiko | UC Arts Digital Lab.

Recommended background

Year 13 studies in maths, statistics, or computing will give you a good background for your first-year courses, however these are not essential to major in Data Science.

100-level courses

The first-year, 100-level courses required to complete a Bachelor of Science majoring in Data Science are:

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COSC 121</td>
<td>Introduction to Computer Programming</td>
</tr>
<tr>
<td>COSC 122</td>
<td>Introduction to Computer Science</td>
</tr>
<tr>
<td>MATH 102</td>
<td>Mathematics 1A</td>
</tr>
<tr>
<td>MATH 120</td>
<td>Discrete Mathematics</td>
</tr>
<tr>
<td>STAT 101</td>
<td>Statistics 1</td>
</tr>
</tbody>
</table>

200-level and beyond

Beyond first year, Data Science courses will further expand on data ethics, algorithms, database systems, statistical analysis and computer modelling, and data wrangling and data mining.

Career opportunities

Graduates of Data Science will find their knowledge is in high demand, as there is a global shortage of expertise to support the steady growth in data collection and digitisation.

Graduates will find employment in business and technology sectors as data scientists, data advisors, data/analytics consultants, and insight analysts.
Data Science graduates will also have a background in project implementation, research, critical analysis, problem solving, and communication skills in discussing and explaining data findings, all of which are useful skills in a number of careers.

www.canterbury.ac.nz/careers/students/subjects

Contact
School of Mathematics and Statistics
T: +64 3 369 2233
E: enquiries@math.canterbury.ac.nz
www.canterbury.ac.nz/engineering/schools/mathematics-statistics

Financial Engineering
BSc, CertSc

Want to understand the complexity of capital markets? How to manage different types of risks? Interested in achieving a challenging technical degree with flexible career opportunities?

Financial Engineering is a cross-disciplinary field combining financial and economic theory with the mathematical and computational tools needed to design and develop financial products, portfolios, markets, and regulations. Financial engineers manage financial risk, identify market opportunities, design and value financial or actuarial products, and optimise investment strategies.

Similar to other professional degrees at UC, the first-year of the Bachelor of Science in Financial Engineering provides a breadth and depth of technical skills and knowledge across the key disciplines of finance and economics, mathematics and statistics, and computer science and software engineering.

This broad foundation is then built upon over the next two years, where you will undertake further core courses across these disciplines and can choose specialisations within Financial Engineering.

Why study Financial Engineering at UC?
• This is the only programme directly targeted towards this career in Aotearoa New Zealand and echoes trends abroad in the UK, USA, and Europe. This subject was created in response to employer demand and international growth in Financial Engineering and related fields, like the wider actuarial and business analytics industries.

• The Bachelor of Science (BSc) major offers students a cross-disciplinary pathway across commerce, science, and engineering subjects, and utilises expertise from all these areas of strength at UC.

• This programme can be completed full or part-time and can be entered in either February or July of each year.

Recommended background
Previous study of mathematics (calculus and/or statistics) is recommended at Year 13 level.

For those who have not studied to that level, UC offers Headstart courses in January/February for students who have not studied mathematics or statistics for some time or who lack confidence in their skills.

100-level courses
The first-year, 100-level courses required to complete a Bachelor of Science majoring in Financial Engineering are:

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COSC 121</td>
<td>Introduction to Computer Programming</td>
</tr>
<tr>
<td>COSC 122</td>
<td>Introduction to Computer Science</td>
</tr>
<tr>
<td>ECON 104</td>
<td>Introduction to Microeconomics (a STAR course for secondary school students)</td>
</tr>
<tr>
<td>or ECON 199</td>
<td>(a STAR course for secondary school students)</td>
</tr>
<tr>
<td>MATH 102</td>
<td>Mathematics 1A (a STAR course for secondary school students)</td>
</tr>
<tr>
<td>or MATH 199</td>
<td>(a STAR course for secondary school students)</td>
</tr>
<tr>
<td>MATH 103</td>
<td>Mathematics 1B</td>
</tr>
<tr>
<td>STAT 101</td>
<td>Statistics 1</td>
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<tr>
<td>Plus 30 points from 100-level Science or any other UC courses.</td>
<td></td>
</tr>
</tbody>
</table>

It is also recommended to consider studying FINC 101 Personal Finance, ACCT 102 Accounting and Financial Information, INFO 125 Introduction to Programming with Databases, or MATH 120 Discrete Mathematics depending on your specialisation interests.

200-level and beyond
The broad foundation of the first year is then built upon over the next two years, where you will undertake further core courses across the disciplines and can choose specialisations within Financial Engineering.

Students who wish to major in Financial Engineering are required to take a number of core courses at 200 and 300-level. For the list of required courses, see the Regulations for the BSc at www.canterbury.ac.nz/regulations www.canterbury.ac.nz/courses

Career opportunities
UC Financial Engineering graduates will be ready for the international workplace in the finance industry and related fields mentioned above. They will also be well prepared for further study in this field in order to attain positions at higher technical levels.

Employers range from private industries, such as banking, investment, capital industries, security, data analysis, risk management and insurance, to the public sector (eg, Te Pūtea Matua | Reserve Bank, Kaitohutohu Kaupapa Rawa | Treasury, or regulatory bodies).

Graduates with the cross-disciplinary knowledge and highly technical skills provided by this degree will also have openings to a breadth of career opportunities, such as investment brokers, actuaries, statisticians, and data scientists.

Past graduates of the contributing departments from related paths of study have been employed by Macquarie Capital, Deloitte, BNY-Mellon, First NZ Capital, Te Pūtea Matua | Reserve Bank, Vero Insurance, Wynyard Security Group, and many government agencies like Kaitohutohu Kaupapa Rawa | Treasury, Tatauranga Aotearoa | Stats NZ, and Hīkina Whakatutuki | Ministry of Business, Innovation and Employment.

www.canterbury.ac.nz/careers/students/subjects

Contact
School of Mathematics and Statistics
T: +64 3 369 2233
E: enquiries@math.canterbury.ac.nz
www.canterbury.ac.nz/engineering/schools/mathematics-statistics

Mathematics
BA, BCom (minor only), BSc, CertArts, CertSc

Our modern society is underpinned by many mathematical results and insights. Mathematics is a living subject with new ideas, techniques, and theorems constantly being created, tested, and explored.

Mathematicians are at the forefront of breakthroughs in science, technology, and finance. Did you know:

• Money is kept secure when using internet banking protocols based on mathematical cryptography and prime numbers.

• Medical images such as MRI are reconstructed using mathematical tools that were first developed in the early 1800s.

• The mathematics of wavelet transformations helps us to understand seismic activity, which may one day assist us with the prediction of earthquakes.

www.canterbury.ac.nz/engineering
Mathematicians can find solutions to equations that govern the universe to help us understand physical phenomena, without the need for expensive experiments.

Mathematical modelling can help with the protection of our native flora and fauna. Mathematical thought is one of the greatest human achievements, and has been around for over 4,000 years. In all these millennia, mathematicians have been one step ahead and are already preparing for the technological advances of the coming generation.

Why study Mathematics at UC?

- UC is known internationally for its involvement in Mathematics and Statistics education and research. Several members of staff have awards for their work in this area. Our research expertise underpins our undergraduate teaching.
- Every year the School of Mathematics and Statistics welcomes visiting scholars on the Erskine Fellowship Programme. Students benefit greatly from their teaching and the alternative perspectives they offer.
- The School is active in supporting and promoting undergraduate research through summer projects and honours dissertations, with some of our recent budding scholars heading to Oxford, Harvard, and Yale for postgraduate work.
- UC also has a thriving culture that encourages meeting up with like-minded students through clubs.

Recommended background

Entry into MATH 101 is open to all students with entry to the University.

Entry into MATH 102 requires 14 credits at NCEA level 3 maths. The School of Mathematics and Statistics offers a choice of courses designed to cater for students with a range of backgrounds and interests. Detailed entry recommendations are available at www.canterbury.ac.nz/engineering/schools/mathematics-statistics

Students who have performed very well in NCEA Level 3 statistics and/or calculus (or IB/Cambridge equivalent) may be eligible for direct entry into a 200-level Mathematics course. UC also offers Headstart summer preparatory courses in January/February for students who have not studied mathematics or statistics for some time, or who lack confidence in their skills (see www.canterbury.ac.nz/get-started/transition/headstart).

100-level courses

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 101</td>
<td>Methods of Mathematics</td>
</tr>
<tr>
<td>MATH 102</td>
<td>Mathematics 1A</td>
</tr>
<tr>
<td>MATH 103</td>
<td>Mathematics 1B</td>
</tr>
<tr>
<td>MATH 120</td>
<td>Discrete Mathematics</td>
</tr>
</tbody>
</table>

The core of the 100-level programme consists of linear algebra and calculus, found in MATH 102 and MATH 103. MATH 102 is a prerequisite for MATH 103. Together, these courses will allow you into almost any 200-level Mathematics course and are necessary for those wishing to major in Mathematics.

MATH 102 is also required or recommended for people intending to major in any of several subjects, including Economics, Statistics, Data Science, Financial Engineering, and Physics. Anyone planning to study Engineering will require the Engineering Mathematics courses EMTH 118 and EMTH 119.

MATH 120 is an introductory course in discrete mathematics, a subject that underpins many areas of modern-day science including cryptography, coding theory, and computational biology. MATH 120 is required for people intending to major in Data Science and Computer Science.

200-level and beyond

UC offers a wide variety of courses at 200 and 300-level. These include courses in discrete mathematics, linear algebra, calculus, differential equations, mathematical modelling, and statistics. If you are majoring in Mathematics, you need 45 points from selected MATH 200-level courses and at least 60 points from MATH 302–394. If you are unsure which courses best suit your needs, contact a Student Advisor.

It is good to include other subjects at 200-level. Popular choices include Chemistry, Computer Science, Economics, Management, Physics, and Statistics.

www.canterbury.ac.nz/courses

Career opportunities

Perhaps the most important quality that a Mathematics graduate develops is the ability to reason logically and in depth. Mathematics is a creative, collaborative pursuit. The habits of thought developed by studying Mathematics are of permanent value.

Mathematics graduates are highly employable, working in computing, finance, commerce, insurance, scientific institutions (such as Crown Research Institutes), law, teaching, and many other fields.

*

Students who have not passed a substantial amount of Year 13 mathematics, or its equivalent, are strongly advised to enrol in MATH 101 before advancing to MATH 102.

www.canterbury.ac.nz
Employment opportunities are particularly good for people who combine qualifications in Mathematics with qualifications in other disciplines such as the Physical Sciences, Statistics, Computer Science, Engineering, Management, and Economics.
www.canterbury.ac.nz/careers/students/subjects

Statistics
BA, BCom (as a minor), BSc, CertArts, CertSc

We are increasingly becoming a data-driven society with advances in technology and the accumulation of massive data in many fields. Statistics is the profession associated with making meaningful sense of data. Statistics is a rapidly advancing science with many avenues open for study and work. These range from statistical theory to its application in biology, medicine, the social sciences, engineering, physics, and economics. In fact, there are few disciplines that do not use statistics in some form.

Modern statisticians are being asked to develop new tools and techniques to deal with problems in areas from business management to biology. New insights are also being developed in the more traditional areas of physical science and engineering. All this activity leads to new applications of statistics, as well as new theoretical work on the structure of the statistics involved.

Statistics can be used to answer some very important scientific, social, and commercial questions. The challenge in statistics is to use appropriate logic, apply the correct methodology, and interpret the results accurately.

Some projects involving statisticians include:
• measuring the rate that cystic fibrosis develops in lung tissue
• describing the spatial distribution of wood fibre lengths in trees
• monitoring endangered animals to detect critical rates of decline
• measuring the impact of government policy on education
• estimating the working life of mechanical equipment before it requires repair
• measuring the extent to which participation in group-therapy anger-management sessions reduces the chance of re-offending.

A large number of students benefit from taking an introductory course in Statistics because it is used in so many subjects, including Engineering, Physics, Computer Science, Data Science, Financial Engineering, Biological Sciences, Psychology, Forestry Science, Geography, Speech and Language Pathology, and Management.

Why study Statistics at UC?
• Every year the School of Mathematics and Statistics welcomes visiting scholars on the Erskine Fellowship Programme. Students benefit greatly from their teaching and the alternative perspectives they offer.
• The School is active in supporting and promoting undergraduate research through summer projects and honours dissertations, with some of our recent budding scholars heading to Oxford, Harvard, and Yale for postgraduate work.
• Here at UC, we have a thriving culture that encourages meeting up with like-minded students through clubs.
• UC has been recognised internationally for our teaching of Statistics to first-year students.

Recommended background
Entry into the 100-level Statistics course is open to all students with entry to the University. Logical thinking, a flair for numbers, curiosity, and the ability to live with uncertainty are the qualities that combine to make a good statistician. In school, it is important to do as well as possible in Year 13, particularly in statistics and/or calculus.

Students who have performed very well in Year 13 statistics and/or calculus may be eligible for direct entry into a 200-level Statistics course.

100-level courses

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course title</th>
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<tbody>
<tr>
<td>STAT 101</td>
<td>Statistics 1</td>
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</tbody>
</table>

The introductory Statistics course STAT 101 is designed to provide students with a solid background in statistics, critical thinking, and in the use of computers. Students use computers to graph and analyse data. Even if you are not majoring in Statistics, learning how to use Excel spreadsheets will still be a very useful part of your education at UC. This course is taught using a novel approach, with fewer classroom-style lectures and more computer-based learning through online tutorials. There is a strong emphasis on using computers to work with data. Student feedback on this approach to learning has been very positive.

If you are planning to major in Statistics, it is recommended that you take STAT 101 and MATH 103 (depending on which degree you wish to obtain – see the regulations for the Bachelor of Arts and the Bachelor of Science).

200-level and beyond
Five 200-level courses are offered, covering a range of topics from data analysis through to inference and probability. If you are majoring in Statistics, you need three courses from STAT 201–294 and four courses from STAT 310–394. MATH 103 or MATH 199 is also required. (Note that MATH 199 is a STAR course only available to secondary school students.)

If you are unsure which courses best suit your needs, contact a Student Advisor. It is good to include other subjects at 200-level. Popular choices include Mathematics, Management, Economics, Physics, Chemistry, and Computer Science.
www.canterbury.ac.nz/courses

Career opportunities
Statistics is an integral part of many industries, management and scientific research programmes. Statistics demands the ability to use analytical techniques, statistical methods, and information technology for the manipulation and interpretation of information. There is a growing demand for statisticians and biometricians (people who conduct research and advise on experimental design, data collection, and data analysis in biology).

Many of our graduates are employed by Tatauranga Aotearoa | Stats NZ as statisticians, and in other organisations as research officers, analysts, and statistical programmers. Crown Research Institutes also employ a large number of statisticians, particularly biometricians. Other graduates are employed in the financial sector and by insurance companies, and industrial and commercial companies. Many large companies employ statisticians to deal with the increasing demand for the collection and interpretation of data.

Many other jobs, while not requiring people with a degree in Statistics, need employees with a working knowledge of statistics, in particular competence in using statistical software packages.
www.canterbury.ac.nz/careers/students/subjects

Contact
School of Mathematics and Statistics
T: +64 3 369 2233
E: enquiries@math.canterbury.ac.nz
www.canterbury.ac.nz/engineering/schools/mathematics-statistics

www.canterbury.ac.nz/careers/students/subjects
Postgraduate studies

The College offers taught or coursework-based qualifications as well as research-based qualifications. Postgraduate studies in Engineering, Forestry, and Product Design include postgraduate certificates, diplomas, master’s, and doctoral degrees.

These qualifications can be completed in a range of subject areas as shown in the table to the right. We also offer specialist postgraduate qualifications in Fire Engineering, Human Interface Technology, Transportation Engineering, and Engineering Management.

At any one time, the College hosts up to a dozen visiting academics from top international universities as part of the University’s unique Erskine programme, providing opportunities for our students and staff to interact with world leaders in their respective fields.

Engineering, Forestry, and Product Design academics also travel overseas as part of the Erskine scheme. This allows them to increase their knowledge of teaching methods used by other institutions and bring new experiences back to UC to benefit our students.

Considerable resources are available to postgraduate students. These include well-equipped workshops, laboratories, and computer facilities, and a specialist Engineering and Physical Sciences Library which houses over 100,000 volumes and holds over 1,000 current serial subscriptions.

Postgraduate students also benefit from the College’s close interaction with industry. Such relationships help to attract financial support for research as well as providing opportunities to establish professional networks. A number of university and industry scholarships are also available for postgraduate students. Many research centres are housed in Te Rāngai Pūkaha College of Engineering and there are strong relationships with other research centres at UC and in Aotearoa New Zealand – some of which are showcased on page 42.

More information
www.canterbury.ac.nz/engineering/qualifications-and-courses/postgraduate-information

Subject areas

<table>
<thead>
<tr>
<th>Subject</th>
<th>PG Cert or Dip</th>
<th>Master’s</th>
<th>PhD</th>
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<tbody>
<tr>
<td>Applied Data Science</td>
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<tr>
<td>Architectural Engineering</td>
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<td>Bioengineering</td>
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<tr>
<td>Chemical and Process Engineering</td>
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<td>Civil Engineering</td>
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<tr>
<td>Computational and Applied Mathematical Sciences</td>
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<td>Computer Science</td>
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<tr>
<td>Construction Management</td>
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<tr>
<td>Data Science</td>
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<tr>
<td>Earthquake Engineering</td>
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<tr>
<td>Electrical and Electronic Engineering</td>
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<td>Engineering</td>
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<tr>
<td>Engineering Management</td>
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<td>Financial Engineering</td>
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<td>Fire Engineering</td>
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<tr>
<td>Forest Engineering</td>
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<tr>
<td>Forestry Science</td>
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<tr>
<td>Human Interface Technology</td>
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<tr>
<td>Mathematics</td>
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<tr>
<td>Mechanical Engineering</td>
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<tr>
<td>Product Design</td>
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<tr>
<td>Renewable Energy</td>
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<tr>
<td>Software Engineering</td>
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<tr>
<td>Statistics</td>
<td></td>
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<tr>
<td>Transportation Engineering</td>
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</tbody>
</table>

More information
www.canterbury.ac.nz/engineering/qualifications-and-courses/postgraduate-information
Research centres

Biomolecular Interaction Centre (BIC)
The Biomolecular Interaction Centre (BIC) is a multidisciplinary centre dedicated to the study of molecular interactions critical to biological function. Understanding biomolecular interactions is central to a range of fundamental sciences, new treatments for disease, and a wide range of highly functional products.
www.canterbury.ac.nz/bic

Centre for Bioengineering
The Centre for Bioengineering represents a group of internationally recognised researchers across numerous biomedical applications. The centre has prompted numerous clinical practice changes and scientific discoveries.
www.canterbury.ac.nz/engineering/schools/mechanical/bioengineering

Electric Power Engineering Centre (EPECentre)
The Electric Power Engineering Centre is Aotearoa New Zealand’s Centre of Research Excellence for electric power engineering. Its core areas of operation are education, research and industry interaction, and aims to create and foster power engineering innovation.
www.canterbury.ac.nz/epecentre

Human Interface Technology Laboratory (HIT Lab NZ)
Hangarau Tangata, Tangata Hangarau | Human Interface Technology Laboratory New Zealand (HIT Lab NZ) is a world-leading, human-computer interface research centre hosted at UC. HIT Lab NZ is focused on providing people with technological support for experiencing various realities to enhance work and daily life.
www.hitlabnz.org

Spatial Engineering Research Centre (SERC)
SERC addresses the engineering problems of modern day navigation and remote sensing geo-referenced data collection. Investigation into the links between positioning and data collection is the fundamental baseline for many geospatial sciences.
www.canterbury.ac.nz/serc

QuakeCoRE
Te Hiranga Rū | QuakeCoRE is a Centre of Research Excellence for earthquake resilience, hosted at UC. Informed by internationally-leading research excellence, the CoRE supports the development of an earthquake-resilient Aotearoa New Zealand, where our communities can recover rapidly after major earthquakes through mitigation and pre-disaster preparation.
www.quakecore.nz

Quake Centre
Funded by industry to deliver solutions to industry identified needs, Te Pokapū Rū | Quake Centre, hosted at UC, is a dynamic partnership between the engineering industry and UC. It has developed strong collaborations with Te Whare Wānanga o Tāmaki Makaurau | University of Auckland and other partners, to provide world-class knowledge, research, and solutions to seismic issues.
www.quakecentre.co.nz

Wireless Research Centre (WRC)
The Wireless Research Centre (WRC) joins together leading academic researchers, technology and communication based companies, students, and government to undertake groundbreaking research in the field of wireless communication.
www.canterbury.ac.nz/wrc

Wood Technology Research Centre
The Wood Technology Research Centre was established as a means of information exchange among staff engaged in wood-related research and to facilitate research programmes and technology transfer to end users.
www.canterbury.ac.nz/engineering/schools/forestry/research/woodtech
UC’s Te Rāngai Pūkaha College of Engineering offers many scholarships for prospective first-year students.

A few of the scholarships available specifically for Engineering, Forestry Science, and Product Design students are shown in the table. For a full list of UC scholarships (including general scholarships for all prospective students) see www.canterbury.ac.nz/scholarships

Many scholarships close on 15 August 2019 and are available for both Aotearoa New Zealand and international students. It is a good idea to apply for all the scholarships you are eligible for, as you may be able to hold more than one scholarship at a time.

**Key dates and events**

UC hosts many events for prospective students and their parents.

- Hui Tairanga ki Ōtautahi Christchurch Information Evening – 5 June
- Information evenings in other regions around Aotearoa New Zealand – throughout May and June
- UC Open Day | Rā Tōmene – 11 July
- Scholarships application deadline – 15 August
- College of Engineering Final Year Projects Day – 16 October
- Enrolment in courses for 2020 – 2 October – students can start an application to enrol at any time.

www.canterbury.ac.nz/events

**Some scholarships for first-year students**

<table>
<thead>
<tr>
<th>Scholarship name</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC Engineering Top Scholars Award</td>
<td>$10,000 ($5,000 per annum) x 10 awards</td>
</tr>
<tr>
<td>UC Engineering High Achievers Award</td>
<td>$3,000 ($1,500 per annum) x 30 awards</td>
</tr>
<tr>
<td>UC Product Design Scholarship</td>
<td>$10,000 ($5,000 per annum) x 10 awards</td>
</tr>
<tr>
<td>UC Electric Power Engineering Centre Scholarship (for students intending to study Electrical and Electronic Engineering)</td>
<td>Up to $15,000 x 8 awards, for up to 4 years</td>
</tr>
<tr>
<td>UC Engineering Māori Scholarship</td>
<td>$1,000–5,000 x 3 awards, for 1 year</td>
</tr>
<tr>
<td>UC Engineering Pasifika Scholarship</td>
<td>$1,000–5,000 x 3 awards, for 1 year</td>
</tr>
</tbody>
</table>
| UC College of Engineering International Scholarship (for international students) | $15,000 x 35 awards, for 1 year  
Note: Applications close on 15 August 2019, 31 October 2019, and 1 March 2020. |
| UC School of Forestry High Achievers Award | $2,000 x 5 awards, for 1 year |
| UC Computer Science High Achievers Award | $2,000 x 5 awards, for 1 year |
| UC Mathematics and Statistics High Achievers Award | $2,000 x 5 awards, for 1 year |
| UC College of Engineering Mathematics and Statistics STAR Scholarship | $5,000 per annum x 3 awards, for up to 3 years |
| AIMS Scholarship | $5,000 x unlimited awards, for 1 year |

www.canterbury.ac.nz/engineering/scholarships-and-funding
Frequently asked questions

What subjects do I need to study at Year 13 to study Engineering?
NCEA Level 3 mathematics or calculus (must include achievement standards 91578 and 91579) and physics are required. NCEA Level 3 chemistry is required for most disciplines, and highly recommended for anyone considering an Engineering degree. Depending on your results from school, you may need to also enrol in summer school or pursue a two-year intermediate track.

Is chemistry at NCEA Level 3 required for Engineering?
NCEA Level 3 chemistry is required for students who wish to pursue Civil, Natural Resources, Chemical and Process, Mechanical, and Forest Engineering disciplines.
However, if you do not have a background in chemistry, you may still be able to study these disciplines by taking an introductory chemistry course (CHEM 114*) first, before taking the first year Chemistry course (CHEM 111).
For more detailed information on the chemistry requirement for NCEA, CIE, and IB see www.canterbury.ac.nz/engineering/qualifications-and-courses/engineering-intermediate-year

Do I need to gain credits at Excellence or Merit in my required mathematics and physics NCEA subjects (or equivalent at CIE or IB)?
Students require a minimum of 14 credits, at any endorsement level, in each of NCEA Level 3 mathematics or calculus (with required standards), NCEA Level 3 physics and NCEA Level 3 chemistry (for disciplines that require chemistry). We recommend you have 18 credits in each subject area to enhance chances of success.
www.canterbury.ac.nz/engineering/qualifications-and-courses/engineering-intermediate-year

Are there other ways into an Engineering degree?
If you have previously studied at another Aotearoa New Zealand university or polytechnic, there may be different entry levels based on your academic history and relevant work experience.
www.canterbury.ac.nz/engineering/qualifications-and-courses/engineering-intermediate-year

How many Engineering disciplines are there?
There are nine Engineering disciplines within UC’s Bachelor of Engineering with Honours degree – Chemical and Process, Civil, Computer, Electrical and Electronic, Forest, Mechanical, Mechatronics, Natural Resources, and Software Engineering.
Students tailor their first-year courses to keep options open for more than one discipline which they then choose at the end of the Engineering Intermediate Year. Applications for the First Professional Year close on 1 December (at the end of your first year).
www.canterbury.ac.nz/engineering/qualifications-and-courses/engineering-intermediate-year

Can I get Direct Entry into the First Professional Year of Engineering (Year 2)?
If you have an excellent academic record at school, especially in mathematics and physics (and chemistry if required), you may be able to get Direct Entry to the First Professional Year at the College of Engineering Dean (Academic)’s discretion. Students with STAR courses (from UC or another university) will also be considered. A Modified Intermediate Year option, which involves taking alternative or advanced courses in place of standard Engineering Intermediate courses, can also be offered to top students.
www.canterbury.ac.nz/engineering/qualifications-and-courses/engineering-intermediate-year

Can I switch to another degree?
Our Engineering Intermediate Year courses are designed so students can either pursue the professional years of an Engineering degree or transfer to another degree, such as a Product Design or Science degree. A student who wishes to switch to Science after one year in Engineering can use their points, from passed courses, towards a Bachelor of Science without losing credits.

* It is assumed students have some chemistry background. Students should seek advice regarding this pathway into chemistry.
2020 Introduction to...

This is one of seven introduction publications available for prospective students considering which area to study. Download one or all at www.canterbury.ac.nz/publications

2020 Undergraduate Prospectus

For an overview of life and study at UC, including details on accommodation, admissions, Internationalisation, and study options, download our 2020 Undergraduate Prospectus at www.canterbury.ac.nz/publications