Our changing world creates new opportunities and faces new challenges every day. Our Engineering school is leading the way with an innovative approach to education that is supported by world-renowned experts and is producing successful graduates across all disciplines of Engineering.

Check out some of the top reasons that make Waikato a great place to study Engineering:

**In 2017 $40,000** worth of Engineering Scholarships were given out.

**WORLD LEADING RESEARCHERS** in biomedical innovation, sustainable industry, agriculture, 3D imaging and titanium alloys.

Build a Formula SAE CAR with WESMO

**OVER 60 UNIVERSITY PARTNERS** around the world. Take part in an exchange and see the world while you study.

Specialized LARGE SCALE LAB complex dedicated to ENGINEERING teaching and research

**OVER 220 INTERNATIONAL FACULTY STUDENTS** from more than 50 countries.

EXCITING WORK PLACEMENT opportunities with our Co-operative Education Unit.
## CONTENTS

### UNDERGRADUATE STUDY
- Overview of Qualifications 14
- General Entry Requirements (Bachelors Degrees) 16
- Certificates and Diplomas 18

### PAPERS
- General Engineering Papers 35
- Chemical and Biological Engineering Papers 40
- Civil Engineering Papers 43
- Electronic Engineering Papers 46
- Environmental Engineering Papers 50
- Materials and Process Engineering Papers 52
- Mechanical Engineering Papers 54
- Software Engineering Papers 56

### GRADUATE STUDY
- Introduction 64
- Graduate and Postgraduate Qualifications 65
- Masters Qualifications 67
- Higher Research Degrees 72
- Extensions for Masters Theses 75
- Subject Areas within Engineering 76
- Academic Staff 77
The information contained in this handbook is correct at the time of printing (March 2018). However, it is subject to a continuous process of review and improvement. A new handbook is produced in August/September every year and students should use the latest handbook available. The University’s document of authority for information contained in this handbook is the 2018 University of Waikato Calendar.

Please note: This handbook contains information for new students starting in 2018 only. If you are a current student (before 2018), please consult with the Undergraduate or Postgraduate Advisor, or the Programme convenor.
Kia Ora and welcome to University of Waikato School of Engineering. I would like to congratulate you on choosing a qualification in engineering that can provide you with an interesting and very rewarding career. You have chosen to be taught by some of the world’s leading engineering practitioners and researchers who can open your eyes to the science and art of chemical engineering, mechanical engineering, mechatronics, environmental engineering, civil engineering, electronic engineering, product design and material science.

You will attend undergraduate labs where you will hone your skills, as well as have the opportunity to be involved in practical research projects. Some of our students in the past have worked on some impressive projects including: developing innovative robots for fruit picking, intelligent sensors for inflight detection, prosthetic limbs for amputees, bioreactors for waste processing and energy saving devices.

The opportunities for you are limitless if you are willing to work hard. With our programmes you will be equipped with the skills to learn independently and think critically, whilst having many options to get involved with some exciting projects.

Professor Mark Dyer
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UNIVERSITY TERMINOLOGY

100, 200, 300, 500 LEVELS
These refer to the different levels at which papers are taught and are usually associated with years of study. First year (100 level) papers are more general while fourth year (500 level) papers are more advanced.

BACHELORS DEGREE
This is a first degree. It is sometimes also called an undergraduate degree. It takes a minimum of three years of full-time study to complete. The BE(Hons) usually takes four years to complete.

CALENDAR
The University’s official record of rules and regulations, staff, papers, dates, etc. It is available online at calendar.waikato.ac.nz

COREQUISITES
Corequisites are papers that are complementary to each other. While the knowledge gained from one paper is not required to take the other, students are required to complete both papers.

COMPULSORY PAPER
These are papers that are required by a particular degree and must be completed to gain a degree.

DEGREE
A degree is a structured course of study in a particular area such as science or management. Each degree has a different structure with a set number of papers (or courses) at different levels. To complete a degree, a student must take the papers required for that degree.

EFTS
EFTS stands for Equivalent Full-time Student. This relates directly to points – 120 points equate to one EFTS. StudyLink uses this information when looking at your Student Loan and Student Allowance eligibility.

ELECTIVE
Students may have room in their degree to take papers outside of their major. These can be chosen from almost any subject at Waikato.

GRADUATE
A person who has been awarded a university degree.

GRADUATE QUALIFICATIONS
Students who have successfully completed an undergraduate qualification may be eligible to take a graduate qualification. Graduate qualifications include the Master of Engineering, Master of Engineering Practice, Master of Science, Master of Science (Research), Graduate diplomas and Postgraduate diplomas.
LECTURES, LABS AND TUTORIALS
Lectures start in the first week of term and are detailed in the University’s Catalogue of Paper Offerings and Timetable. Laboratory sessions normally start in the first or second week of teaching. Lab sessions for first-year students are normally assigned by the Faculty Office prior to the start of the first week of A Semester. You can select your tutorial times during the first week of teaching from a list of options included in the timetable and available at the first lecture.

MAJOR
This is the main subject in your degree. To major in a subject, you study it to a higher level, i.e. 300 or 500 level.

PAPER
A paper is a series of lectures, tutorials and assessment tasks that relate to a specific topic.

POINTS
Degree requirements are expressed in terms of points (e.g. a four-year degree generally requires 480 points). Points bear a direct relationship to workload: one point equates to approximately 10 hours’ total work; so a student might expect to spend about 150 hours on 15-point papers.

PREREQUISITES
Some papers build upon the knowledge gained in earlier papers. Because of this, it is necessary to take these earlier papers first. Papers that must be taken before you can progress to other papers are known as prerequisites for the later papers.

PROGRAMME
A set of compulsory papers that meet the requirements of a professional degree, e.g. BE(Hons).

RESTRICTION
A restriction against a paper means you cannot do that paper if you have done a paper with similar content, e.g. ENGEN112 is restricted against ENMP102.

ROOM NUMBERS
A numbering system applies to every building on campus. For example, FG.G.04: FG = ‘FG’ block, G = Floor level ‘ground’, 04 = Room number ‘04’.

UNDERGRADUATE
A person who is studying at university for a first degree is known as an undergraduate.
PAPER CODES EXPLAINED

Each paper code contains information regarding the subject, the level, the year, the semester, and teaching location.

ENGINEERING PAPER CODES

Descriptions of papers with the following subject codes are listed in this handbook.

OTHER UNIVERSITY PAPER CODES

This handbook refers to, but does not provide descriptions of papers with the following subject codes.

SEMESTER INDICATORS

LOCATION INDICATORS


<table>
<thead>
<tr>
<th>Subject</th>
<th>Level</th>
<th>Paper</th>
<th>Year</th>
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<td>ENGME</td>
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<tr>
<td>C</td>
<td>An atypical teaching period</td>
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<td>S</td>
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<td>Summer School 2: November – December</td>
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<tr>
<td>TGA</td>
<td>Papers taught in Tauranga</td>
</tr>
<tr>
<td>NET</td>
<td>Online course</td>
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HELP AND ADVICE

HOW DO I CHECK WHAT I AM ENROLLED IN?
You are responsible for your programme of study and choices at enrolment. You should keep copies of any information that the University sends you confirming your enrolment status and the papers you are enrolled in. You can access your current enrolment information through iWaikato at i.waikato.ac.nz
You can also visit the Faculty Office in FG.G.04.

CHECK YOUR TIMETABLE
Engineering papers normally involve attending lectures, tutorials and laboratory work. Timetable clashes can occur between papers from different subject areas, or between papers at different levels.
You are required to attend all lectures and you will not usually be permitted to take papers that have more than one lecture clash per semester. Lectures in the School of Engineering are recorded with Panopto to make it easier to accommodate students who may have a lecture clash.
There are often several streams for laboratories, so laboratory clashes can usually be resolved. If you have a laboratory clash, you should initially contact the convenor of the papers concerned.
You can check your timetable at timetable.waikato.ac.nz
If you want to change your papers before you pay your fees, then you can call the Faculty Reception on 0800 838 4625. The change can normally be made immediately and a new enrolment agreement sent within 24 hours.
If you need to make changes after you have paid your fees (i.e after you become officially enrolled), you can apply to do a “change of enrolment” on iWaikato at i.waikato.ac.nz

CHANGING PAPERS
Withdrawals must be made by the required date to obtain a fees refund. You can add or withdraw from an industry paper or any C Semester paper with a full fees refund at any time before those papers begin.
Withdrawals on medical or compassionate grounds may be made after these periods, and fees may be refunded on a pro-rata basis. Some conditions apply, and you should consult with the Faculty Registrar by calling 0800 838 4625 or by dropping into the Faculty Office.

HANDY TIPS
Here are some suggestions to help you get the most out of University life:
• Sign up for tutorials early, as places fill fast
• If you wish to see a particular lecturer, check on times that he or she is available to students
• Paper outlines and book lists can be obtained from the Catalogue of Papers online at papers.waikato.ac.nz
FREQUENTLY ASKED QUESTIONS

WHERE CAN I GET SUBJECT SPECIFIC ADVICE?
You can make an appointment with one of the First Year Mentors or contact the relevant convenor of your programme. Names of the subject convenors can be found in this handbook.

WHAT DO I DO IF I HAVE MISSED A LAB?
You should try to attend another lab stream that week, wherever possible. You will be expected to provide a reason why you missed a lab, so if your absence was due to illness, on your first day back on campus you should immediately see the paper coordinator to discuss your options and any work you have missed. You may be asked to provide a medical certificate.

HOW DO I GET AFTER HOURS ACCESS TO THE COMPUTER LABS?
You need to complete the required form at the School of Engineering office. The school administrator will be able to advise you further on the process.

HOW DO I CHANGE MY PAPERS AFTER I AM ENROLLED?
You need to complete and submit a Change of Enrolment application online through your iWaikato account. Click on Common Tasks > Change Enrolment and Re-Enrolment > Change of Enrolment, then follow the steps onscreen.

WHAT PAPERS SHOULD I TAKE NEXT YEAR?
The answer to this question depends on a lot of things - what programmes you are taking, which qualification you're enrolled in, how far through the qualification you are, amongst other things. The best thing to do is to make an appointment for personal enrolment advice with the Faculty Office staff by calling them on 0800 838 4625, calling in to FG.G.04 or by emailing science@waikato.ac.nz

WHERE DO I GET A LAB COAT IF I NEED ONE?
Lab coats can be purchased by paying the prescribed fee (currently $58.00) at the Fees Office in the Student Centre at the Library, and then taking your receipt to collect your lab coat from the Science Store, which is located on the Ground Floor of F block. Alternatively, you can purchase a second-hand lab coat for a reasonable price at ApparelMaster, 10 Main Street, off Sunshine Ave, Te Rapa.
HOW LONG DO I HAVE TO MAKE CHANGES TO MY PROGRAMME OF PAPERS?

The best thing to do is to try and finalise your papers before the semester starts, but we know that due to a variety of circumstances, this is not always possible.

If you do wish to change your papers, you have until the end of the first week of classes (for S or T semester papers) and until the end of the second week of classes (for A, B and Y Semester papers) to apply to change your papers. If you apply within these time frames, and if the changes are approved, you should be eligible for a full refund of fees for any papers dropped.

You will not be able to add any papers after these times, but you may still be able to withdraw from papers after this. However penalties will likely be incurred. If you are not sure where you stand, please contact the Faculty Office for advice as soon as you can - and the sooner the better.

Please refer to the Change of Enrolment regulations for the University’s official rules and deadlines surrounding enrolment changes.

WHERE CAN I FIND THE TIMETABLE FOR THE PAPERS THAT I AM TAKING/WANT TO TAKE?

The University’s Online Timetable (timetable.waikato.ac.nz) is available for everyone to be able to search for timetables associated with most papers offered. You will need to know the paper codes (the alphanumeric code that each paper is assigned; ie; ENGEN183-18B) for each of the papers you are interested in. Use the Create a Timetable function to create your own personal timetable.

You can search by lecture, lab, workshop, tutorial or a combination of all of these things, but it’s best to start with lectures, and work around these where possible for labs/tutorials/workshops etc. You can also use the other functions on the Timetable page to check what lab times are available and where and when lectures are held.

HOW DO I ENSURE RE-ENTRY INTO MY DEGREE IN THE FOLLOWING YEAR?

You should aim to get the best possible grades you can, but if you are struggling at all, then it is best to try and gain a clear pass with a C grade or in better in all your papers. The absolute minimum you need to be automatically eligible for re-entry is unrestricted passes (ie; C- grades or better) in papers worth at least half of the total points you are enrolled in for the year.
UNDERGRADUATE STUDY
OVERVIEW OF QUALIFICATIONS

BACHELOR OF ENGINEERING WITH HONOURS (BE(HONS))

The Bachelor of Engineering with Honours (BE(Hons)) focuses on how problems can be solved by using design and engineering processes.

Four-year degree with programmes in:
- Chemical and Biological Engineering
- Civil Engineering
- Electronic Engineering
- Environmental Engineering
- Materials and Process Engineering
- Mechanical Engineering
- Software Engineering (offered by The Faculty of Computing and Mathematical Sciences)

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</table>

KEY

- Compulsory
- Placement
- Stream
- Programme Elective
- Project Paper
BACHELOR OF ENGINEERING WITH HONOURS (BE(HONS))

IF YOU WANT TO LEAD THE WAY IN INNOVATION, IMPROVE INFRASTRUCTURE, BUILD SMARTER TECHNOLOGIES AND FIND ALTERNATIVE ENERGY SOLUTIONS, A WAIKATO BACHELOR OF ENGINEERING WITH HONOURS WILL HELP YOU ACHIEVE JUST THAT.

New Zealand needs more professional engineers working in the economy. Currently, fewer than 1,000 professional engineers graduate each year. Countries with similar populations to New Zealand have more than double that number of engineering graduates. Increasing the number of trained engineers and getting them working in New Zealand businesses is seen as essential for New Zealand’s growth in technology-related enterprises.

Close links with New Zealand industry ensures our graduates are work ready and can apply engineering skills and scientific knowledge to solve real world, industrial and society problems. Waikato’s BE(Hons) encourages creative thinking and problem solving in all students using design and engineering processes from year one.

If you are good at mathematics and physics and are a highly creative thinker and enjoy making things, the BE(Hons) will appeal to you. At every stage of the degree, you’ll be deeply involved in creating, designing and realising sophisticated engineering products. Studying engineering at Waikato offers you a future-proofed education with project-based learning that will put you at the top of your game for a career in engineering.

By the end of your degree you will have worked in teams, managed your own projects, worked with budgets and spent significant time working within the industry. Our BE(Hons) programmes are accredited by Engineering New Zealand (formerly known as the Institute of Professional Engineers New Zealand (IPENZ), meaning they are professionally recognised in a wide range of countries and regions around the world including Australia, Canada, the UK, Japan, Singapore and the USA.

DEGREE LENGTH
The BE(Hons) requires four years of full-time study or the equivalent in part-time study, plus six months work experience.

REQUIREMENTS
• 480 points from 100, 200, 300 and 500 level papers
• Complete the requirements of one of the specified engineering programmes, which includes 800 hours of work experience.
GENERAL ENTRY REQUIREMENTS (BACHELORS DEGREES)

There are several ways you can gain admission to study at The University of Waikato: University Entrance, Admission at Entrance Level or with credit from previous study, Discretionary Entrance and Special Admission. Some first-year papers may have specific prerequisites, so check the paper catalogue (papers.waikato.ac.nz) carefully. If you do not meet the prerequisites, contact recruitment@waikato.ac.nz as there may be other pathways you can take.

If you gain University Entrance through NCEA, you are eligible to apply to enrol in the BE(Hons) as long as you also meet the specific Engineering requirements (see page 18).

**Numeracy**
Level 1 or higher: 10 credits from specified achievement standards available through a range of subjects **OR** from a package of three numeracy unit standards (26623, 26626, 26627 – all three required)

**Literacy**
Level 2 or higher: 5 reading credits **AND** 5 writing credits from the specified list. The credits can come from a range of subjects. For more information go to waikato.ac.nz/go/UEliteracy

**Level 3:**
14 credits in one approved subject
14 credits in a second approved subject
14 credits in a third approved subject

Achieve NCEA Level 3 Certificate (60 credits at Level 3 or above and 20 credits from Level 2 or above)

University Entrance from NCEA
GENERAL ENTRY REQUIREMENTS (BACHELORS DEGREES)

CIVIL ENGINEERING, ELECTRONIC ENGINEERING AND MECHANICAL ENGINEERING
You must gain University Entrance, including a minimum of 16 credits in NCEA at level 3 in Calculus (from standards 3.1, 3.2, 3.3, 3.5, 3.6, 3.7, or 3.15), and 14 credits in Physics at level 3.

CHEMICAL AND BIOLOGICAL ENGINEERING, ENVIRONMENTAL ENGINEERING, AND MATERIALS AND PROCESS ENGINEERING
You must gain University Entrance, including a minimum of 16 credits in NCEA at level 3 in Calculus (from standards 3.1, 3.2, 3.3, 3.5, 3.6, 3.7, or 3.15), and at least 16 credits in Chemistry and 14 credits in Physics at level 3.

SOFTWARE ENGINEERING
You must gain University Entrance, including a minimum of 16 credits in NCEA at level 3 in Calculus (from standards 3.1, 3.2, 3.3, 3.5, 3.6, 3.7, or 3.15) and at least 14 credits in NCEA at level 3 in two other approved subjects.

CAMBRIDGE INTERNATIONAL EXAMINATIONS (CIE) STANDARD RECOGNISED BY UNIVERSITIES NEW ZEALAND
PART A: A minimum of 120 points on the UCAS Tariff at A or AS level other than the General Paper, including at least three subjects (other than Thinking Skills) in which no grade is lower than D.
PART B: Literacy: An E grade or better in any one of AS English Language, Language and Literature in English, Literature in English. A D grade or better will satisfy one of the subject requirements of Part A; or as prescribed for University Entrance with NCEA.
NUMERACY: Either a D grade or better in IGCSE or GCSE mathematics, or any mathematics passed at AS level. A D grade or better will satisfy one of the subject requirements of Part A; or as prescribed for University Entrance with NCEA.

INTERNATIONAL BACCALAUREATE (IB) STANDARD RECOGNISED BY UNIVERSITIES NEW ZEALAND
Award of the full IB Diploma (24 points or higher).

UNIVERSITY ENTRANCE FROM BURSARY
Three C grades or higher in the New Zealand University Entrance Bursaries and Scholarships examinations (NZUEBS) plus Higher School Certificate (HSC).

ADMISSION AT ENTRANCE LEVEL OR WITH CREDIT FROM PREVIOUS STUDY
New Zealand citizens and permanent residents who have studied overseas at secondary school or at tertiary level (in New Zealand or overseas) should apply for Admission at Entrance level. We will assess your study to determine whether it is an acceptable equivalent to the New Zealand University Entrance qualification. Students who successfully complete the Certificate of University Preparation are eligible for admission at Entrance Level.

SPECIAL ADMISSION
STUDENTS AGED 20 AND OVER
If you left school without University Entrance and will be 20 years of age or over by the first day of the semester in which you are applying to enrol, you may be eligible for special admission.
# Certificates and Diplomas

**Who are Diplomas and Certificates Suitable For?**
- Students who want an introductory programme in one of our subjects.
- Students with no background in their chosen area of study, although a diploma is suitable for those with some background or relevant experience in an area of study.
- Students who want to work towards a degree programme part-time, or who would like to work through a degree programme in stages.

**Certificate**
A Certificate is equivalent to the first year of study of a bachelor’s degree. It’s a great way to gain an introductory qualification in a particular field. Candidates must complete 120 points at 100 level or above.

**Certificate (Science) Planner** 1 year 120 points

<table>
<thead>
<tr>
<th>100 level</th>
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<th>100 level</th>
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<th>100 level</th>
<th>100 level or above</th>
<th>100 level or above</th>
</tr>
</thead>
</table>

**Diplomas**
A diploma is equivalent to the second year of study of a bachelor’s degree. A diploma is a good way to gain an introductory qualification in a particular field, and is slightly more comprehensive than a certificate programme.

**Diploma (Science) Planner** 1 year 120 points

<table>
<thead>
<tr>
<th>200 level</th>
<th>200 level</th>
<th>200 level</th>
<th>200 level</th>
<th>200 level or above</th>
<th>100 level or above</th>
<th>100 level or above</th>
<th>100 level or above</th>
</tr>
</thead>
</table>

**Key**
- Compulsory
- Elective paper
CHEMICAL AND BIOLOGICAL ENGINEERING

CHEMICAL AND BIOLOGICAL ENGINEERING FOCUSES ON SOLUTIONS THAT ASSIST OUR SOCIETY TO SUSTAIN GOOD HEALTH, PROVIDE SUFFICIENT FOOD, SUPPLY CLEAN WATER AND PRODUCE SUSTAINABLE ENERGY AND MATERIALS.

Chemical and Biological Engineering uses process engineering, science, maths and economic principles to transform chemical and biological materials into high value products and services, in a safe and cost-effective way.

Chemical and biological engineers are ‘think big’ professionals who work in cooperation with others to bring about the large-scale benefits of advances in chemistry, biotechnology, environmental and materials to solve the world’s sustainability challenges.

As a chemical and biological engineer, you can play a vital role in the creation and production of new medicines, nutritious foods, novel materials, new energy systems, better waste treatment methods and a sustainable global future.

This programme has full Engineering New Zealand accreditation, meaning it is nationally and internationally recognised. It offers growing employment opportunities, with a high salary and excellent prospects of progress into management.

CAREER OPPORTUNITIES

- Chemical Engineer
- Biological Engineer
- Agricultural Engineer
- Process Engineer
- Biomedical Engineer
- Nuclear Engineer
- Sustainability Engineer

SALARY EXPECTATIONS*

Graduate engineers in the fields mentioned above usually earn $45 - $75K per year.
Senior engineers in the fields mentioned above usually earn $100 - $120K per year.
Consulting engineers and management usually earn > $120K per year.

*Sourced from www.careers.govt.nz
# Undergraduate Study Programme Elective Papers

<table>
<thead>
<tr>
<th>Year</th>
<th>Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 1</strong> - Choose 1 paper</td>
<td><strong>Year 2</strong> - Choose 1 paper</td>
</tr>
<tr>
<td>BIOMO101 B</td>
<td>Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEMY101 A</td>
<td>Structure and Spectroscopy</td>
</tr>
<tr>
<td>EARTH101 A</td>
<td>Introduction to Earth System Sciences</td>
</tr>
<tr>
<td>EARTH102 B</td>
<td>Discovering Planet Earth</td>
</tr>
<tr>
<td>ENGEN110 B</td>
<td>Engineering Mechanics</td>
</tr>
<tr>
<td>ENGEN111 A</td>
<td>Electricity and Electronics</td>
</tr>
<tr>
<td>PHYS101 B</td>
<td>Physics for Engineers and Scientists</td>
</tr>
<tr>
<td><strong>Year 3</strong> - Choose 1 paper</td>
<td></td>
</tr>
<tr>
<td>BIOMOXXX A/B</td>
<td>Any BIOMO level 200/300 paper</td>
</tr>
<tr>
<td>CHEMYXXX A/B</td>
<td>Any Chemistry level 200/300 paper</td>
</tr>
<tr>
<td>EARTHXXX A/B</td>
<td>Any Earth Science level 200/300 paper</td>
</tr>
<tr>
<td>ENGEV341 B</td>
<td>Environmental Engineering 2</td>
</tr>
<tr>
<td>ENGM311 B</td>
<td>Materials 2</td>
</tr>
<tr>
<td>ENGEN390 A/B</td>
<td>Special Topic in Engineering 1</td>
</tr>
</tbody>
</table>

## Contacts for Chemical and Biological Engineering

### Undergraduate Study Advisor
Dr Rob Torrens  
Room: LSL.G.32 Phone: 07 838 4684  
Email: rob.torrens@waikato.ac.nz

### Convenor
Associate Professor Johan Verbeek  
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Email: johan.verbeek@waikato.ac.nz
CIVIL ENGINEERING

CIVIL ENGINEERING AT WAIKATO WILL EQUIP YOU WITH THE PRACTICAL AND THEORETICAL SKILLS TO HELP CREATE, IMPROVE AND PROTECT OUR BUILT AND NATURAL ENVIRONMENTS. NEW ZEALAND FACES INCREASING CIVIL ENGINEERING AND INFRASTRUCTURE CHALLENGES.

Civil engineers play a key role in shaping our societies future, having the knowledge and skills to address those challenges in urban and rural infrastructure. This includes construction, earthquake proofing, energy recovery, water and waste management, power generation, road networks, transport management, agriculture and forestry development.

Civil engineering at Waikato is multi-dimensional, having a strong technical focus but also an emphasis on the development of team working skills, knowledge of ethics and an awareness of the social and environmental impacts of their work.

Great civil engineers are so much more than just their technical skills. That’s why our civil engineering degree program aims to produce highly skilled engineers who are problem solvers, ready for life, ready for work, and ready for the world. To do this, we offer a range of papers from engineering mechanics to social science to help our students become well-rounded engineers with hands on experience of building solutions in the lab and gaining industrial experience.

CAREER OPPORTUNITIES

- Civil Engineer
- Structural Engineer
- Geotechnical Engineer
- Transport Engineer
- Coastal and Marine Engineer
- Water Resource Engineer
- Construction Engineer and Manager
- Water Resource Engineer
- Government and Urban Planning Engineer
- Compliance Officer
- Project Management
- Consultancy

SALARY EXPECTATIONS*

Graduate engineers in the above mentioned fields usually earn $45 - $75K per year.
Senior engineers in the above mentioned fields usually earn $100 - $120K per year.
Consulting engineers and management usually earn > $120K per year.

*Sourced from www.careers.govt.nz
### PROGRAMME ELECTIVE PAPERS

**YEAR 1 - Choose 1 paper**

<table>
<thead>
<tr>
<th>Year 1 Courses</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEMY1XX A/B</td>
<td>Any Chemistry 100 level paper</td>
</tr>
<tr>
<td>EARTH102 B</td>
<td>Discovering Planet Earth</td>
</tr>
<tr>
<td>ENGEN111 A</td>
<td>Electricity and Electronics</td>
</tr>
</tbody>
</table>

**YEAR 4 - Choose 2 papers**

<table>
<thead>
<tr>
<th>Year 4 Courses</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGCV512 A</td>
<td>Advanced Structural Design</td>
</tr>
<tr>
<td>ENGCV513 B</td>
<td>Earthquake Engineering and Design</td>
</tr>
<tr>
<td>ENGCV531 B</td>
<td>Advanced Geotechnical Engineering</td>
</tr>
<tr>
<td>ENGEV541 A</td>
<td>Water and Waste Water Engineering</td>
</tr>
<tr>
<td>ENGEV542 A</td>
<td>Waste Minimisation Engineering</td>
</tr>
<tr>
<td>ENGEN590 A/B/C/Y</td>
<td>Special Topics in Engineering</td>
</tr>
</tbody>
</table>

### CONTACTS FOR CIVIL ENGINEERING

**UNDERGRADUATE STUDY ADVISOR**

Dr Rob Torrens  
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**CONVENOR**

Professor Ilanko Sinniah  
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ELECTRONIC ENGINEERING

ELECTRONIC ENGINEERING FOCUSES ON THE DESIGN, DEVELOPMENT, MANUFACTURE AND APPLICATION OF ELECTRONIC DEVICES, CIRCUITS AND SYSTEMS. THE WORK OF ELECTRONIC ENGINEERS IS ESSENTIAL TO OUR SOCIAL, BUSINESS AND INDUSTRIAL LIVES. NEW ZEALAND’S HIGH TECH SECTOR, WHICH INCLUDES ELECTRONICS, IS ONE OF THE FASTEST-GROWING SECTORS IN THE COUNTRY.

Electronic engineers design, build and maintain many of the latest technologies that society relies on. Students in this programme learn how to analyse, design and build electronic circuits; program embedded microcontrollers; and build devices to sense and control factory machines, fluid flows, vehicles and other applications.

There is a global shortage of electronic engineers, and the New Zealand Government has set a priority to expand the high tech manufacturing sector. When you graduate you will be in demand by employers looking for capable graduates with the practical experience and robust engineering and design skills you will gain at Waikato.

This programme has full Engineering New Zealand accreditation, meaning it is nationally and internationally recognised. This offers great and growing employment opportunities, with a high salary and excellent prospects of progress into management.

CAREER OPPORTUNITIES

- Electronic Engineer
- Mechatronic Engineer
- Product Design Engineer
- Network Engineer
- Control and Instrumentation Engineer
- Broadcast Engineer
- IT Consultant
- Manufacturing Manager
- Product Designer
- Programmer
- Project Manager
- Systems Analyst

SALARY EXPECTATIONS*

Graduate engineers in the above mentioned fields usually earn $50 - $60K per year.
Senior engineers in the above mentioned fields usually earn $80 - $120K per year.
Business engineering management usually earn > $120K per year.

*Sourced from www.careers.govt.nz
**PROGRAMME ELECTIVE PAPERS**

### YEAR 1 - Choose 1 paper

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGEN170</td>
<td>Concepts of Biology</td>
</tr>
<tr>
<td>ENGEN180</td>
<td>Molecular and Cellular Biology</td>
</tr>
<tr>
<td>ENGEN183</td>
<td>Any Chemistry level 100 paper</td>
</tr>
<tr>
<td>ENGEN184</td>
<td>Object-Oriented Programming</td>
</tr>
<tr>
<td>ENGEN103</td>
<td>Economics and Society</td>
</tr>
<tr>
<td>ENGEN112</td>
<td>Physics for Engineers and Scientists</td>
</tr>
<tr>
<td>ENGEN111</td>
<td>Research and Development Project</td>
</tr>
</tbody>
</table>

### YEAR 3 - Choose 2 of:

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGEN334 A</td>
<td>Transmission Lines and Antennas</td>
</tr>
<tr>
<td>ENGEN335 B</td>
<td>Integrated Circuits</td>
</tr>
<tr>
<td>ENGEN353 A</td>
<td>Electrical and Mechanical Machines</td>
</tr>
<tr>
<td>ENGEN357 B</td>
<td>Mechatronics</td>
</tr>
</tbody>
</table>

**Choose 2 of:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGEN311 A</td>
<td>Optoelectronics</td>
</tr>
<tr>
<td>ENGEN336 A</td>
<td>Power Electronics</td>
</tr>
<tr>
<td>ENGEN323 B</td>
<td>Sensors and Measurement</td>
</tr>
</tbody>
</table>

### YEAR 4 - Choose 1 paper

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGEN580 A</td>
<td>Mechatronics Projects</td>
</tr>
<tr>
<td>ENGEN517 A</td>
<td>Optical Instrumentation</td>
</tr>
<tr>
<td>ENGEN532 B</td>
<td>Image Processing and Machine Vision</td>
</tr>
<tr>
<td>ENGEN531 B</td>
<td>Advanced Signal Processing</td>
</tr>
<tr>
<td>ENGEN518 A</td>
<td>Robotics</td>
</tr>
<tr>
<td>ENGEN590 Y/A/B</td>
<td>Special Topics in Engineering</td>
</tr>
<tr>
<td>ENGEN3XX A/B</td>
<td>Electronic Engineering 300 Level paper</td>
</tr>
<tr>
<td>ENGEN3XX A/B</td>
<td>Mechanical Engineering 300 Level paper</td>
</tr>
</tbody>
</table>

**CONTACTS FOR ELECTRONIC ENGINEERING**

**UNDERGRADUATE STUDY ADVISOR**
Dr Rob Torrens  
Room: LSL.G.32 Phone: 07 838 4684  
Email: rob.torrens@waikato.ac.nz

**CONVENOR**
Professor Jonathan Scott  
Room: C.1.10 Phone: 07 837 4909  
Email: jonathan.scott@waikato.ac.nz
ENVIRONMENTAL ENGINEERING

ENVIRONMENTAL ENGINEERING IS CONCERNED WITH THE APPLICATION OF SCIENTIFIC AND ENGINEERING PRINCIPLES TO THE PROTECTION AND IMPROVEMENT OF THE ENVIRONMENTAL QUALITY OF THE WORLD IN WHICH WE LIVE.

Environmental engineers make a major contribution to mitigating environmental harm. As the world’s demand for materials, food and energy grows it is environmental engineers who ensure that practices are developed to meet this demand, and contribute to protecting and enhancing our natural and man-made environments.

Environmental engineers evaluate and assess options, design equipment and systems, and develop regulations and controls to solve issues of water quality and supply, waste reduction and disposal, soil and air quality management, and noise.

During your degree you will learn how to identify, monitor and contribute to solving a variety of problems associated with the environment, the use and allocation of resources, and sustainability.

Environmental engineering graduates learn to understand the environment using input from a wide range of disciplines. The Environmental Engineering programme at Waikato combines the fundamentals of engineering, science, mathematics, and computing with the study of water resources, water quality, earth and ocean environments, environmental planning, modelling and sustainability, process energy and management.

CAREER OPPORTUNITIES

- Environmental Engineer
- Water and Sanitary Engineer
- Public/Environmental Health Engineer
- Infrastructure Engineer
- Sustainability Engineer
- Restoration Engineer
- Project Management
- Consultancy

SALARY EXPECTATIONS*

Graduate engineers in the above mentioned fields usually earn $50 - $60K per year.
Senior engineers in the above mentioned fields usually earn $80 - $120K per year.
Consulting engineers and management usually earn > $120K per year.

*Sourced from www.careers.govt.nz
### UNDERGRADUATE STUDY PROGRAMME ELECTIVE PAPERS

**YEAR 1 - Choose 1 of:**
- CHEMY101 A  Structure and Spectroscopy
- CHEMY102 B  Chemical Reactivity

**Choose 1 of:**
- BIOEB101 A  Concepts of Biology
- BIOEB102 B  Intro to Ecology and Biodiversity
- EARTH101 A  Intro to Earth Systems Sciences
- EARTH102 B  Discovering Planet Earth

**YEAR 3 - Choose 2 papers**
- BIOEB2XX A/B  Any BIOEB 200 level paper
- BIOMO203 A  Microbiology
- CHEMY2XX A/B  Any Chemistry 200 level paper
- EARTH2XX A/B  Any Earth Science 200 level paper
- ENGX2XX A/B  Any Engineering 300 level paper (not including ENGLI3XX)
- ENVPL301  Planning for Sustainability
- ENGEN390 A/B  Special Topics in Engineering

### CONTACTS FOR ENVIRONMENTAL ENGINEERING

**UNDERGRADUATE STUDY ADVISOR**
- Dr Rob Torrens
  - Room: LSL.G.32
  - Phone: 07 838 4684
  - Email: rob.torrens@waikato.ac.nz

**CONVENOR**
- Dr Graeme Glasgow
  - Room: CD.3.02
  - Phone: 07 837 5269
  - Email: graeme.glasgow@waikato.ac.nz
MATERIALS AND PROCESS ENGINEERING

MATERIALS AND PROCESSING FOCUSES ON THE PROCESSES AND ACTIVITIES OF CONVERTING RAW MATERIALS INTO VALUABLE PRODUCTS NEEDED BY MANUFACTURERS AND THE END CONSUMER.

By studying Materials and Process Engineering at the University of Waikato, you will learn how to add value to raw materials used to manufacture a number of useful products, while minimising waste. These products can be as varied as dietary formula, foods, ceramics that can withstand high temperatures, new metal alloys, pharmaceuticals, laminated boards, functional proteins, and composites.

Materials engineers make critical decisions in selecting and developing the best materials for a particular product, while process engineers make critical decisions in the processes and utilities required to manufacture the product.

This programme has full Engineering New Zealand accreditation, meaning it is nationally and internationally recognised. This offers great and growing employment opportunities, with a high salary and excellent prospects of progress into management.

CAREER OPPORTUNITIES

- Materials Engineer
- Process Engineer
- Sustainability Engineer
- Energy Systems Engineer
- Material and Polymer Processing
- Products/Process Development Engineer
- Project Management
- Consultancy

SALARY EXPECTATIONS*

Graduate engineers in the above mentioned fields usually earn $50 - $60K per year.
Senior engineers in the above mentioned fields usually earn $70 - $120K per year.
Consulting engineers and management usually earn > $120K per year.

*Sourced from www.careers.govt.nz
PROGRAMME ELECTIVE PAPERS

YEAR 3 - Choose 1 paper
CHEMY201 B  Organic Chemistry
CHEMY202 B  Physical Chemistry
ENGB321 B  Thermal Engineering
ENGB322 B  Chemical and Biological Operations
ENGB323 A  Reaction Engineering
ENGEV341 B  Environmental Engineering 2
ENGM3280 B  Design and Manufacturing 1
ENGEN390 Y  Special Topics in Engineering

YEAR 4 - Choose 2 papers
ENGB521 A  Advanced Process Control
ENGB523 B  Advanced Energy Engineering
ENGEV541 A  Advanced Water and Waste Water Engineering
ENGEV542 A  Waste Minimisation Engineering
ENMG580 A  Product Innovation and Development
ENGEN590 Y  Special Topics in Engineering
ENGM513 B  Materials Performance in Service
ENXX3XX/5XX  Any Engineering 300 or 500 level paper (not including ENGLI3XX)

CONTACTS FOR MATERIALS AND PROCESS ENGINEERING

UNDERGRADUATE STUDY ADVISOR
Dr Rob Torrens
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Email: rob.torrens@waikato.ac.nz

CONVENER
Professor Michael Walmsley
Room: E.2.08 Phone: 07 837 4701
Email: michael.walmsley@waikato.ac.nz
MECHANICAL ENGINEERING

MECHANICAL ENGINEERING IS A DIVERSE AND INNOVATIVE FIELD WHICH USES MECHANICS AND ENERGY PRINCIPLES TO DESIGN, RESEARCH, DEVELOP AND MANUFACTURE TOOLS, ENGINES, MOTORS AND OTHER DEVICES.

Mechanical engineers design the tools and processes necessary to create all manmade products, and are often involved from idea and conception right through to seeing the finished product ready for its commercial application. Our undergraduate programme combines a broad-based education in the engineering sciences with a strong grounding in quantitative, problem-solving, design, and communications skills. It develops the relevant engineering fundamentals, provides experience in their application, and introduces the important methods and techniques of engineering practice.

Mechanical Engineering at Waikato uses project based learning, where students learn how to design, build and test mechanical, mechatronic machinery and energy systems in response to real-world problems to meet a design specification. They learn the use of computer aided engineering software for designing and analysing components, machinery and systems.

This programme has full Engineering New Zealand accreditation, meaning it is nationally and internationally recognised. This offers great and growing employment opportunities, with a high salary and excellent prospects of progress into management.

CAREER OPPORTUNITIES
- Mechanical Engineer
- Automation Engineer
- Medical Engineer
- Test Engineer
- Quality Engineer
- Agricultural Engineer
- Robotics Engineer
- Aeronautical Engineer
- Project Manager
- Safety Engineer
- Computer Aided Engineering Specialist

SALARY EXPECTATIONS*
Graduate engineers in the above mentioned fields usually earn $50K - $60K per year.
Senior engineers usually earn between $70K - $120K per year.
Business engineering management usually earn > $120K per year.

*Sourced from www.careers.govt.nz
PROGRAMME ELECTIVE PAPERS

YEAR 2 - Choose 1 paper
Manufacturing and Energy Stream
ENGC2224 B  Heat and Mass Transfer

Mechatronics Stream
COMPX203 B  Computer Systems

YEAR 3 - Choose 2 papers from List A or 2 papers from list B
List A - Manufacturing and Energy Stream
ENGC223 B  Fluid Mechanics (Compulsory)
ENGC321 B  Thermal Engineering
ENGM311 B  Materials 2

List B - Mechatronics Stream
ENGM323 B  Thermofluids
ENGM357 B  Mechatronics

YEAR 4 - Choose 3 papers
ENGC521 A  Advanced Process Control
ENGC523 B  Advanced Energy Engineering
ENGM540 A  Finite Element Analysis
ENGM557 B  Robotics
ENGM511 A  Advanced Materials Engineering
ENGM513 B  Materials Performance in Service
ENGC590 A/B/C/Y  Special Topics in Engineering
ENXX3XX/5XX  Any Engineering 300 or 500 level paper (not including ENGLI3XX)

CONTACTS FOR MECHANICAL ENGINEERING

UNDERGRADUATE STUDY ADVISOR
Dr Rob Torrens  Room: LSL.G.32  Phone: 07 838 4684
Email: rob.torrens@waikato.ac.nz

CONVENOR
Professor Mike Duke  Room: CD.1.02  Phone: 07 837 4522
Email: mike.duke@waikato.ac.nz
SOFTWARE ENGINEERING

SOFTWARE ENGINEERS SPECIFY, DESIGN AND BUILD THE SOFTWARE THAT SOCIETY RELIES ON.

When you study software engineering, you’ll be learning about how to use a scientific and disciplined approach to designing and developing complex software systems. You’ll also learn how to operate and maintain such systems. From ATM machines to smart phones to cars – many aspects of modern society are driven by software which we expect to operate correctly and be reliable and flexible at all times.

During your studies at Waikato, you’ll develop an understanding of reliable processes and formal methods for software engineering. You’ll learn how to use systematic techniques to test software systems. You’ll develop the skills you need to be able to prove that safety-critical systems operate correctly under all possible operating conditions.

Strong emphasis is also put on the vitally important interface between critical complex systems and the people who use them or are affected by them. Once you graduate you will be well suited for all areas of employment that require development of high quality software that is safety or mission-critical.

This programme has full Engineering New Zealand (ENZ) accreditation, meaning it is nationally and internationally recognised. This offers great and growing employment opportunities, with a high salary and excellent prospects of progress into management.

CAREER OPPORTUNITIES

- Network Engineer
- Product Development Engineer
- Software Architect
- Software Consultant
- Software Developer
- Systems Engineer
- Test Engineer
- Safety Engineer
- Computer aided engineering specialist

SALARY EXPECTATIONS*

Software developers with some experience usually earn $58K - $80K per year.
Senior developers with several years’ experience usually earn between $80K - $110K per year.
Consulting engineers and management usually earn > $120K per year.

*Sourced from www.careers.govt.nz
## Programme Elective Papers

### Year 1 - Choose 1 paper

- APHYS111 A Applied Physics
- CHEMY100 A Chemistry in Context
- CHEMY101 A Structure and Spectroscopy
- CHEMY102 B Chemical Reactivity
- ENGEN110 B Engineering Mechanics
- ENGEN111 A Electricity and Electronics
- ENGEN112 B Materials Science and Engineering
- PHYS100 A Exploring Physics
- PHYS101 B Physics for Engineers and Scientists

### Year 4 - Choose 2 papers

- COMPX524
- COMPX526 B Engineering Interactive Systems
- COMPX539 A Usability Engineering
- COMPX548 A Developing Mobile Applications
- COMPX552 A Model Checking
- COMPX554 B Specification Languages and Models

## Contacts for Software Engineering

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PAPERS
GENERAL ENGINEERING PAPERS

100 LEVEL PAPERS

ENGEN103-18A/B (HAM)
ENGINEERING COMPUTING
This paper introduces computer programming in languages such as C# and Python. It provides the basis for the programming skills required in more advanced papers within the School of Engineering.

Restricted paper(s): COMP103, ENGG182, COMPX101
Assessment: Internal assessment/examination ratio 1:2 / 2:1

ENGEN110-18B (HAM)
ENGINEERING MECHANICS
This paper covers aspects of engineering mechanics.

Prerequisite paper(s): 14 NCEA level 3 Physics credits and 14 NCEA level 3 Calculus credits or a B in CAFS011 or FOUND011.
Restricted paper(s): ENGG110
Assessment: Internal assessment/examination ratio: 1:1

ENGEN111-18A/T (HAM)
ELECTRICITY AND ELECTRONICS
Students are introduced to underlying concepts in electricity such as current, voltage and power, and apply these concepts in a laboratory by making circuits and measuring them with common laboratory instruments.

Prerequisite paper(s): 14 NCEA level 3 Physics credits.
Restricted paper(s): ENEL111
Assessment: Internal assessment/examination ratio: 1:0

ENGEN112-18B (HAM)
MATERIALS SCIENCE AND ENGINEERING
Introduction to engineering materials (metals, ceramics, polymers, composites, semiconductors and biomaterials) and their atomic structure and mechanical properties. Includes; elastic and plastic deformation, fracture mechanisms, failure in service, iron-carbon phase diagram, redox reactions in corrosion, production of polymers, cement and concrete.

Restricted paper(s): ENMP102
Assessment: Internal assessment/examination ratio: 1:1

ENGEN170-18B (HAM)
ENGINEERING AND SOCIETY
Introduction to the role of engineering in society in particular understanding of Treaty of Waitangi, history of science, engineering and technology, philosophy and ethics and public participation, participatory design, sustainability.

Assessment: Internal assessment/examination ratio 1:1
ENGEN180-18A (HAM)
FOUNDATIONS OF ENGINEERING
Introduction to the engineering design process and computer aided design, fundamental principles of engineering analysis, open ended problem solving, engineering economics and the skills of a successful engineer. Includes a design-build-test experience.

Restricted paper(s): ENGG180, ENGG302
Assessment: Internal assessment/examination ratio 1:1

ENGEN183-18A/B (HAM)
LINEAR ALGEBRA AND STATS FOR ENGINEERS
A study of introductory statistics and the fundamental techniques of algebra including Gaussian elimination, vector and matrix algebra, complex numbers, eigenvalues and eigenvectors, as well as basic statistical notions and tools, with engineering applications.

Prerequisite paper(s): Any one of MATHS165, MATHS166, MATH165, MATH166, at least a B- grade in CAFS004 or FOUND007, or 16 credits at Level 3 in NCEA Calculus; or equivalent.

Restricted paper(s): ENGG183, MATH102, MATHS102
Assessment: Internal assessment/examination ratio 1:1

ENGEN18A/B/S (HAM)
CALCULUS FOR ENGINEERS
A study of the fundamental techniques of calculus, including differentiation and integration for functions of one real variable, with engineering applications.

Prerequisite paper(s): At least a B- grade in MATHS165, MATH165, MATHS166, MATH166, CAFS004 or FOUND007; or a pass in MATHS102, MATH102, ENGEN183 or ENGG183; or 16 credits of NCEA Level 3 Calculus including at least 11 credits from AS91577, AS91578 and AS91579; or equivalent.

Restricted paper(s): ENGG184, MATH101, MATHS101
Assessment: Internal assessment/examination ratio 1:1

APHYS111-18A (HAM)
PHYSICS IN CONTEXT
This is an introductory paper in physics for students who have not studied physics or mathematics at NCEA level 2 or 3. It is intended to support a major in other science subjects. Emphasis is placed on describing everyday physics concepts using correct terminology. Examples of physics in action are drawn from many science areas. Topics include Newton’s laws of motion, electricity & magnetism, the structure of matter and the universe, waves and heat. This paper provides a route into the applied physics minor.

Restricted paper(s): PHYS100
Assessment: Internal assessment/examination ratio 1:1
PHYSC100-18A (HAM)
GENERAL PHYSICS
This paper provides an introduction to the core ideas in physics. Topics covered include kinematics, mechanics, fluids, electric and magnetic forces and fields, electric circuits, optics, modern physics and relativity, taught in a problem solving context.

Prerequisite paper(s): 14 credits at Level 2 in NCEA Mathematics or Physics, or a minimum of 8 credits at Level 3 in NCEA across Mathematics and/or Physics.
Restricted paper(s): PHYS100, APHYS111
Assessment: Internal assessment/examination ratio 1:1

PHYSC101-18B (HAM)
PHYSICS FOR ENGINEERS AND SCIENTISTS
This is a lecture and laboratory course covering fundamental physics concepts relevant to engineers and scientists. Topics covered include vectors, kinematics, force, work, energy, collisions, rotation, equilibrium, oscillations, waves, sound, electricity, magnetism, and light.

Prerequisite paper(s): (14 credits at Level 3 in NCEA Physics or PHYS100 or PHYSC100) and (14 credits at Level 3 in NCEA Calculus or one of MATH165, MATHS165, MATH101, MATHS101, MATH102 or MATHS102).
Restricted paper(s): PHYS103
Assessment: Internal assessment/examination ratio 1:2

200 LEVEL PAPERS

ENGEN201-18B (HAM)
ENGINEERING MATHEMATICS 2
Calculus of Several Variables and its Applications. Vector calculus (Green’s, Gauss’ and Stokes’ theorems). Taylor’s Theorem in n dimensions. Introduction to partial differential equations. Fourier series.

Prerequisite paper(s): ENGEN183 or ENGG183 and ENGEN184 or ENGG184
Restricted paper(s): MATH251, MATH255, MATHS201, MATHS203
Assessment: Internal assessment/examination ratio: 1:1

ENGEN270-18A (HAM)
ENGINEERING PROFESSIONAL PRACTICE 1
Preparation for success in the engineering workplace including CV preparation, interview techniques, job seeking skills, online profile, workplace and engineering business cultures and norms, ethics, communication and management structures.

Restricted paper(s): ENGG279, ENMP282
Assessment: Internal assessment/examination ratio: 1:0

ENGEN271-18T/S/C (HAM)
ENGINEERING INDUSTRY PLACEMENT 1
First work placement involving 400 hours of work experience at an approved engineering organisation relevant to your studies. Typically undertaken during the summer semesters at the end of second year.
Corequisites: ENGEN270
Assessment: Internal assessment/examination ratio: 1:0
300 LEVEL PAPERS

ENGEN301 (HAM)  
ENGINEERING MATHS 3  
This paper description will be outlined in the 2019 handbook.

ENGEN371 (HAM)  
ENGINEERING INDUSTRY PLACEMENT 2  
Second work placement involving 400 hours of work experience at an approved engineering organisation relevant to your studies. Typically undertaken during the summer semesters at the end of third year.  
Prerequisite paper(s): ENGEN270, ENGEN271  
Assessment: Internal assessment/examination ratio: 1:0

ENGEN390 (HAM) & (TGA)  
SPECIAL TOPIC IN ENGINEERING 1  
An independent theoretical literature or experimental investigation of an engineering topic supervised by a member of staff.  
Prerequisite paper(s): Students should have completed 90 points of programme specific level 200 papers.  
Assessment: Internal assessment/examination ratio: 1:0

500 LEVEL PAPERS

ENGEN508 (HAM)  
MASTER'S CAPSTONE PROJECT  
This paper requires students to carry out a theoretical or empirical investigation in a relevant subject/engineering discipline and write a report on the findings of the investigation.  
Prerequisite paper(s): The student should have completed a 4-year bachelors degree in a relevant subject/engineering discipline, and the first 120 points of the MEngPrac programme.  
Assessment: Internal assessment/examination ratio: 1:0

ENGEN570 (HAM)  
ENGINEERING PROFESSIONAL PRACTICE 2  
Role engineers in industry, business and society, contract law and legal responsibility, Treaty of Waitangi considerations, intellectual property, teamwork and leadership skills, responsibilities of a professional, ethics with industrial case studies.  
Prerequisite paper(s): ENGEN270  
Assessment: Internal assessment/examination ratio: 1:0
ENGEN590 (HAM) & (TGA)
SPECIAL TOPIC IN ENGINEERING 2
An independent theoretical literature or experimental investigation of an engineering topic supervised by a member of staff.
Prerequisite paper(s): Students should have completed 90 points of programme specific level 300 papers.
Assessment: Internal assessment/examination ratio: 1:0

ENGEN591 (HAM)
HONOURS RESEARCH PROJECT
Final year honours research project carried out on a topic assigned and supervised by a member of staff.
Prerequisite paper(s): Students should have completed 120 points of programme specific level 300 papers.
Assessment: Internal assessment/examination ratio: 1:0

ENGEN592 (HAM)
HONOURS RESEARCH AND DEVELOPMENT PROJECT
This is the final year Honours, research and design "capstone" project.
Prerequisite paper(s): Students should have completed 120 points of programme specific level 300 papers.
Assessment: Internal assessment/examination ratio: 1:0
CHEMICAL AND BIOLOGICAL ENGINEERING PAPERS

200 LEVEL PAPERS

ENGCB223-18B (HAM)
FLUID MECHANICS
This paper covers the basic principles of fluid mechanics, including viscosity, hydrostatics, stability of floating bodies, energy and continuity equations, force and momentum analysis, dimensional analysis, flow in pipes and ducts, flow over external bodies and turbo machinery flow.
Prerequisite paper(s): ENGEN180 or ENGG180
Restricted paper(s): ENGCV223, ENMP223
Assessment: Internal assessment/examination ratio: 1:1

ENGCB224-18B (HAM)
HEAT AND MASS TRANSFER
This paper covers the fundamentals of heat and mass transfer analysis, including conduction, heat convection, radiation, molecular diffusion and mass convection. Finned surfaces and heat exchangers are also covered.
Prerequisite paper(s): (ENGEN180 or ENGG180) and (ENGEN184 or ENGG184)
Restricted paper(s): ENMP223, ENMP323
Assessment: Internal assessment/examination ratio: 1:1

ENGCB280-18B (HAM)
PROCESS ENGINEERING DESIGN 1
This paper covers mass balances around reactors and separation processes used by engineers in process design, CAD tools for process flow diagrams, pipe and instrumentation diagrams, and simple batch and continuous process modelling using software tools.
Prerequisite paper(s): ENGEN180 or ENGG180
Restricted paper(s): ENGG282, ENMP221
Assessment: Internal assessment/examination ratio: 7:3

300 LEVEL PAPERS

ENGCB321 (HAM)
THERMAL ENGINEERING
Application of engineering thermodynamics to steady and unsteady industrial processes, including, steam boiler systems, advanced power and refrigeration cycles, cooling towers and plant utility systems.
Prerequisite paper(s): ENGME221 or ENMP221
Assessment: Internal assessment/examination ratio: 1:1
ENGCB322 (HAM)
CHEMICAL AND BIOLOGICAL OPERATIONS
This paper covers the principles and application of enzymes, concepts of fermentation technology, principles of bioreactor operation, bioprocess variables and their measurement, key product separation techniques, and bioprocess economics.

Prerequisite paper(s): ENGCB221 or ENGCB224
Restricted paper(s): ENMP322
Assessment: Internal assessment/examination ratio: 1:1

ENGCB323 (HAM)
REACTION ENGINEERING
This paper is an introduction to the quantitative treatment of chemical and biological reactions and reactor engineering, including homogeneous and heterogeneous reacting systems.

Prerequisite paper(s): ENGCB280 or ENGCB322
Assessment: Internal assessment/examination ratio: 1:1

ENGCB324 (HAM)
MASS TRANSFER OPERATIONS
This paper covers the application of heat and mass transfer and thermodynamics to chemical and physical separation process.

Prerequisite paper(s): ENGME221 and ENGCB224
Restricted paper(s): ENMP323
Assessment: Internal assessment/examination ratio: 1:1

ENGCB380 (HAM)
PROCESS ENGINEERING DESIGN 2
Conceptual and detailed design, costing and economic assessment of chemical, biological and materials process plants, including software and numerical simulation, separation trains, heat exchanger and pump sizing, and reactor kinetics.

Prerequisite paper(s): ENGCB280
Restricted paper(s): ENMP321
Assessment: Internal assessment/examination ratio: 1:1

500 LEVEL PAPERS

ENGCB521 (HAM)
ADVANCED PROCESS CONTROL
This paper covers the fundamentals of process control, and introduces advanced process control strategies.

Prerequisite paper(s): ENGCB321
Assessment: Internal assessment/examination ratio: 1:1
ENGCB522 (HAM)
ADVANCED BIOLOGICAL ENGINEERING
This paper will cover advanced aspects of biological engineering used in producing biologically derived products and one of New Zealand’s major primary processing sectors.
Prerequisite paper(s): One of ENGCB380, ENGCB324, ENGCB322
Assessment: Internal assessment/examination ratio: 2:1

ENGCB523 (HAM)
ADVANCED ENERGY ENGINEERING
Analysis of chemical processing plants and renewable, cogen and smart energy systems through pinch analysis and total site process integration.
Prerequisite paper(s): ENGCB280
Assessment: Internal assessment/examination ratio: 1:1

ENGCB580 (HAM)
PROCESS ENGINEERING DESIGN PROJECT
Engineering design principles applied to a complex chemical and or biological challenge. Detailed considerations in the project to include using design standards, materials selection, life cycle costs, environmental impact, health and safety and risk assessment.
Prerequisite paper(s): ENGCB380 or ENGCB324 or ENGCB322
Assessment: Internal assessment/examination ratio: 1:1
CIVIL ENGINEERING PAPERS

200 LEVEL PAPERS

ENGCV212-18A (HAM)
STRUCTURAL ENGINEERING 1
Analysis of statically determinant structural systems under axial, bending and torsional loads, including beam deflections, buckling of struts, shear in joints, couplings, trusses and frames; plus introduction to design of simple structural elements.
Prerequisite paper(s): (ENGEN110 or ENGG110) and (ENGEN184 or ENGG184 or MATHS101 or MATH101) and (ENGEN112 or ENMP102)
Restricted paper(s): ENGMP213
Assessment: Internal assessment/examination ratio: 1:1

ENGCV223-18B (HAM)
WATER ENGINEERING 1
Basic principles of fluid statics and dynamics, including fluid viscosity, Bernoulli and mechanical energy equation, dimensional analysis, flow in pipes and channels and introduction to hydrology and fluvial processes.
Prerequisite paper(s): (ENGEN110 or ENGG110) and (ENGEN184 or ENGG184 or MATHS101 or MATH101)
Restricted paper(s): ENGCB223, ENMP223, ENGME323
Assessment: Internal assessment/examination ratio: 1:1

ENGCV231-18A (HAM)
GEOTECHNICAL ENGINEERING 1
Basic principles and concepts governing the behaviour of soils and rocks, including phase relationships, permeability and seepage, soil strength, compressibility, slope stability analysis, consolidation and settlement.
Prerequisite paper(s): ENGEN112 or ENMP102
Assessment: Internal assessment/examination ratio: 1:1

ENGCV241-18B (HAM)
HIGHWAYS AND TRANSPORTATION
Introduces the basic theories and design techniques used in highway and pavement engineering, and traffic engineering and transportation planning.
Prerequisite paper(s): ENGEN180
Assessment: Internal assessment/examination ratio: 1:1
ENGCV251-18A (HAM)

CONSTRUCTION 1
Engineering properties, performance and constraints of common construction materials including timber, steel, concrete polymers and composites. Materials selection and application to construction methods.

Prerequisite paper(s): ENMP102 or ENGEN112
Restricted paper(s): ENMP211, ENGMP211
Assessment: Internal assessment/examination ratio: 1:1

ENGCV280-18B (HAM)

CIVIL DESIGN CHALLENGE 1
Civil design principles are applied to an open-ended design challenge. Design standards and calculations for simple civil structures are introduced, along with engineering drawings, and construction and testing of simple structures.

Prerequisite paper(s): ENGG180 or ENGEN180
Assessment: Internal assessment/examination ratio: 7:3

300 LEVEL PAPERS

ENGCV312 (HAM)

STRUCTURAL ENGINEERING 2
Analysis of statically indeterminate structures, application of moment-area method, computer analysis of structures, design of structures in steel, wood, reinforced concrete and pre-stressed concrete.

Prerequisite paper(s): ENGCV212
Restricted paper(s): ENGMP313
Assessment: Internal assessment/examination ratio: 1:1

ENGCV323 (HAM)

WATER ENGINEERING 2
Application of fluid mechanics principles to water engineering applications such as design of pipe system networks, pump characteristics and selection, open channel flow, hydraulic jump, measurement, analysis and modelling of surface hydrological processes.

Prerequisite paper(s): ENGCV223
Restricted paper(s): ENGCV223, ENGME323
Assessment: Internal assessment/examination ratio: 1:1

ENGCV351 (HAM)

CONSTRUCTION 2
Construction processes and building technology including surveying, site preparation, earthworks, foundations, Building Information Modelling (BIM), risk assessment, site health and safety, construction project management, demolition and site remediation.

Prerequisite paper(s): ENGCV251
Assessment: Internal assessment/examination ratio: 1:1
ENGCV380 (HAM)
CIVIL DESIGN CHALLENGE 2
Engineering design principles applied to an advanced open-ended civil design challenge. Design standards, project finance, environmental consideration, health and safety and risk assessment.
Prerequisite paper(s): ENGCV280
Assessment: Internal assessment/examination ratio: 1:1

500 LEVEL PAPERS

ENGCV513 (HAM)
EARTHQUAKE ENGINEERING AND DESIGN
Design of civil structures to withstand natural hazards and seismic events, including materials selection, geology and geotechnical considerations, types of foundations and single and multi-level structures.
Prerequisite paper(s): ENGCV312
Assessment: Internal assessment/examination ratio: 1:1

ENGCV531 (HAM)
ADVANCED GEOTECH ENGINEERING
Principles of critical state soil mechanics and soil plasticity applied to soil-structure interactions under seismic loading and the practical aspects of geotechnical earthquake engineering.
Prerequisite paper(s): ENGCV331
Assessment: Internal assessment/examination ratio: 1:1

ENGCV541 (HAM)
ADVANCED HIGHWAYS AND TRANSPORTATION
Theories and design techniques used in highway and pavement engineering; traffic engineering and transportation planning.
Prerequisite paper(s): ENGCV231
Assessment: Internal assessment/examination ratio: 1:1

ENGCV580 (HAM)
CIVIL DESIGN CHALLENGE 3
Engineering design principles applied to a complex civil design challenge. Detailed considerations in the project to include using design standards, materials selection, life cycle costs, environmental impact, health and safety and risk assessment.
Prerequisite paper(s): ENGCV380
Assessment: Internal assessment/examination ratio: 1:0
200 LEVEL PAPERS

ENGEE211-18B (HAM)
ELECTROMAGNETICS
This paper covers engineering applications of electric and magnetic fields including capacitance, magnetic induction, and motors, taught in a problem-solving context.

Prerequisite paper(s): (ENGEN111 or ENEL111) and (ENGEN184 or ENGG184 or ENGEN183 or ENGG183 or MATHS101 or MATH101 or MATHS102 or MATH102)
Corequisites: ENGEN201
Restricted paper(s): ENEL281, ENEL284, PHYS201, PHYS304
Assessment: Internal assessment/examination ratio: 1:2

ENGEE231-18A (HAM)
CIRCUIT THEORY
This paper covers theory, analysis and frequency response of electrical circuits involving passive elements, complex impedance, complex gain, and feedback.

Prerequisite paper(s): ENEL111 or ENGEN111
Restricted paper(s): ENEL205
Assessment: Internal assessment/examination ratio: 1:1

ENGEE232-18B (HAM)
ANALOG ELECTRONICS
This paper covers the characteristics of diodes and BJTs, CE, CC, CB, Darlington and cascode configurations, push-pull amplifiers and operating class, power supply and oscillator circuits. To an assumed understanding of feedback, operational amplification, and complex impedance, the ideas of dynamic resistance and small-signal analysis are introduced.

Prerequisite paper(s): ENGE231 or ENEL205
Assessment: Internal assessment/examination ratio: 1:1

ENGEE233-18A (HAM)
DIGITAL SYSTEMS
This paper provides students with an introduction to digital electronics and microprocessors. It covers combinatorial and sequential logic, hardware description languages, and processor architecture and construction.

Prerequisite paper(s): ENGEN111 or COMP104 or ENEL111
Restricted paper(s): ENEL212
Assessment: Internal assessment/examination ratio: 1:1
ENGEE280-18B (HAM)
ELECTRONICS DESIGN
This course is an introduction to the design process in electronic engineering. The use of Computer Aided Design (CAD) as a tool is reinforced using practical exercises.
Prerequisite paper(s): ENGEN111 or ENEL111
Restricted paper(s): ENGG282
Assessment: Internal assessment/examination ratio: 1:1

300 LEVEL PAPERS
ENGEE311 (HAM)
OPTOELECTRONICS
The paper discusses the principles of modern optoelectronic components and systems in particular, lasers, semiconductor devices, electro-optic devices and optical fibers. Theoretical as well as practical aspects will be covered.
Prerequisite paper(s): ENGEE232
Restricted paper(s): ENEL324
Assessment: Internal assessment/examination ratio: 1:1

ENGEE323 (HAM)
SENSORS AND MEASUREMENT
The paper covers the theory and applications of semiconductor sensors and the basic theory and design concepts used in common electronic measurement systems used by electronic engineers.
Prerequisite paper(s): ENGEE111 & ENGEE231
Restricted paper(s): ENEL213
Assessment: Internal assessment/examination ratio: 3:2

ENGEE331 (HAM)
SIGNALS
This paper covers communications signaling and modulation, and signals fundamentals. Wired (including optical) and wireless, baseband and passband, the Fourier representation of signals, bandwidth, and transmit filtering, are taught.
Prerequisite paper(s): ENGEN201
Restricted paper(s): ENEL382
Assessment: Internal assessment/examination ratio: 1:1

ENGEE334 (HAM)
TRANSMISSION LINES AND ANTENNA
The paper uses classical electromagnetic theory to describe the propagation of electromagnetic waves and to analyse applications like transmission lines, waveguides, antennas, and microwave circuits.
Prerequisite paper(s): ENGEE211
Restricted paper(s): ENEL312
Assessment: Internal assessment/examination ratio: 1:1
ENGEE335 (HAM)
INTINTEGRATED CIRCUITS
The paper covers techniques for fabricating ICs, CMOS devices, logic gate characteristics and design, monolithic topologies such as differential pairs, multipliers, current mirrors, bandgap references, opamps, device failure mechanisms, ESD, electromigration, and estimating circuit reliability.

Prerequisite paper(s): ENGEE232, ENGEE233 or ENEL205 and ENEL211
Restricted paper(s): ENEL321
Assessment: Internal assessment/examination ratio: 1:1

ENGEE336 (HAM)
POWER ELECTRONICS
The paper covers theory, design, applications and the systems approach in power electronics. Subjects include power semiconductors, power converters, energy storage devices, DC power management, AC power conditioning and surge protection.

Prerequisite paper(s): ENGEE111A or ENEL111; ENGEE280B or ENEL282; ENGEE232B or ENEL205
Restricted paper(s): ENEL385/485/585
Assessment: Internal assessment/examination ratio: 1:1

500 LEVEL PAPERS

ENGEE517 (HAM)
OPTICAL INSTRUMENTATION
Theoretical and practical aspects of advanced electrooptical instrumentation will be discussed and applied in practical sessions. Topics include telemeters, interferometers for velocity or vibration detection, optical gyroscopes, optical fibre sensors, and others.

Prerequisite paper(s): ENGEE311
Restricted paper(s): ENEL423, ENEL522
Assessment: Internal assessment/examination ratio: 1:1

ENGEE531 (HAM)
ADVANCED SIGNAL PROCESSING
This paper introduces advanced methods for digitally processing signals. It covers signal transforms with applications in 1D and 2D, principles and practical methods of digital filter design, statistical signal processing.

Prerequisite paper(s): ENGEE331
Assessment: Internal assessment/examination ratio: 1:1
ENEE532 (HAM)
IMAGE PROCESSING AND MACHINE VISION
This paper is an introduction to image processing and machine vision in the context of machine automation and control and includes noise suppression, object recognition and tracking, and camera technologies and geometries.
Prerequisite paper(s): ENGEN103 and ENGEN201
Assessment: Internal assessment/examination ratio: 1:0

ENEE580 (HAM)
MECHATRONIC PROJECTS
The paper brings together electronic, programming, and mechanical skills into projects where real-time systems are designed, constructed, and demonstrated. Timing of actuators and sensor inputs from fastest to slowest limits of a real-time controller imparts an appreciation of scheduling what is possible in any given mechatronic product.
Prerequisite paper(s): ENEE233 or ENEE339
Restriction(s): ENEL417, ENEL517
Assessment: Internal assessment/examination ratio: 1:0
ENVIRONMENTAL ENGINEERING PAPERS

200 LEVEL PAPERS

ENGEV241
ENVIRONMENTAL ENGINEERING 1
This paper covers skills, knowledge and capability for environmental engineers so they can understand, investigate and evaluate environmental engineering problems and solutions.
Prerequisite paper(s): ENGEN180, ENGEN170, and ENGEN112
Restricted paper(s): ENMP241
Assessment: Internal assessment/examination ratio: 3:2

300 LEVEL PAPERS

ENGEV341 (HAM)
ENVIRONMENTAL ENGINEERING 2
This paper covers the fundamentals of environmental engineering.
Prerequisite paper(s): ENGV223 or ENGB223
Restricted paper(s): ENMP341
Assessment: Internal assessment/examination ratio: 1:1

ENGEV342 (HAM)
SUSTAINABLE ENGINEERING
This paper covers sustainability in engineering design within the context of quality standards, emissions, carbon accounting and life cycle analysis.
Prerequisite paper(s): ENGEN270
Assessment: Internal assessment/examination ratio: 1:1

500 LEVEL PAPERS

ENGEV541 (HAM)
ADVANCED WATER AND WASTE WATER ENGINEERING
This paper covers the design and operation of unit process in potable water and domestic and industrial wastewater treatment.
Prerequisite paper(s): ENGEV341
Restricted paper(s): ENMP341
Assessment: Internal assessment/examination ratio: 1:1
ENGEV542 (HAM)
WASTE MINIMISATION ENGINEERING
Design of processes for the handling, treatment and disposal of domestic and industrial solid wastes including treatment plant sludges, assessment and modelling of gaseous emissions, odour, particulates and air pollution control systems.
Prerequisite paper(s): ENGEV341
Assessment: Internal assessment/examination ratio: 1:1

ENGEV580 (HAM)
ENVIRONMENTAL DESIGN PROJECT
Engineering design principles applied to a complex engineering design challenge. Detailed considerations in the project to include using design standards, materials selection, life cycle costs, environmental impact, health and safety and risk assessment.
Prerequisite paper(s): ENGEV341 or ENGEV342
Assessment: Internal assessment/examination ratio: 1:0
MATERIALS AND PROCESS ENGINEERING PAPERS

200 LEVEL PAPERS

ENGMP211-18A (HAM)
MATERIALS 1
This paper will provide a foundation for understanding the relationship between material structure, processing and behaviour to support engineering of materials and engineering with materials.
Prerequisite paper(s): 15 points at Level 100 in Chemistry or equivalent credit, or ENGEN112 or ENMP102
Restricted paper(s): ENMP211
Assessment: Internal assessment/examination ratio: 1:1

ENGMP213-18A (HAM)
MECHANICS OF MATERIALS 1
Stress and failure analysis of statically determinant and material systems under axial, bending and torsional loads, including beam deflections, buckling of struts, shear in joints, twisting in circular shafts and couplings.
Prerequisite paper(s): (ENGEN184 or ENGG184 or MATHS101 or MATH101) and (ENGEN112 or ENMP102) and (ENGEN110 or ENGG110)
Restricted paper(s): ENMP213, ENGCV212
Assessment: Internal assessment/examination ratio: 1:1

300 LEVEL PAPERS

ENGMP311 (HAM)
MATERIALS 2
This paper will develop understanding of the relationship between material structure, processing and behaviour to support engineering of materials and engineering with materials.
Prerequisite paper(s): ENGMP211
Restricted paper(s): ENMP311
Assessment: Internal assessment/examination ratio: 1:1

ENGMP312 (HAM)
ADVANCED MATERIALS MANUFACTURE
This paper deals with advanced materials science knowledge and principles underlying materials engineering. It focuses on the relationships between processing conditions and microstructures of materials and major materials processing technologies.
Prerequisite paper(s): ENGMP211
Restricted paper(s): ENMGPS12, ENMP411
Assessment: Internal assessment/examination ratio: 1:4
ENGMP313 (HAM)
MECHANICS OF MATERIALS 2
Advanced level knowledge on mechanics and performance of materials, covering stress and strain transformations, failure criteria, unsymmetrical bending, torsion of non-circular sections, fatigue, materials selection and materials testing.
Prerequisite paper(s): ENGMP213
Restricted paper(s): ENMP313
Assessment: Internal assessment/examination ratio: 1:1

500 LEVEL PAPERS

ENGMP511 (HAM)
ADVANCED MATERIALS ENGINEERING
This paper deals with advanced materials science knowledge and principles underlying materials behaviour and engineering.
Prerequisite paper(s): ENGMP311
Assessment: Internal assessment/examination ratio: 1:4

ENGMP512 (HAM)
ADVANCE MATERIALS MANUFACTURE
This paper deals with advanced materials engineering principles focused on relationships between processing conditions and technologies on materials microstructure and properties in service.
Prerequisite paper(s): ENGMP311
Restricted paper(s): ENMP411
Assessment: Internal assessment/examination ratio: 1:1
MECHANICAL ENGINEERING PAPERS

200 LEVEL PAPERS

ENGME221-18A (HAM) ENGINEERING THERMODYNAMICS
This paper covers the fundamental concepts and laws of thermodynamics, including thermodynamics properties of substances, first and second law analysis, power cycles, refrigeration cycles and simple combustion analysis of engines.
Prerequisite paper(s): ENGEN180 or ENGG180
Restricted paper(s): ENME221
Assessment: Internal assessment/examination ratio: 1:1

ENGME251-18B (HAM) DYNAMICS AND VIBRATION
This paper covers the principles and application of dynamics and vibration.
Prerequisite paper(s): (ENGEN110 or ENGG110) and (ENGEN184 or ENGG184 or MATHS101 or MATH101)
Restricted paper(s): ENME351
Assessment: Internal assessment/examination ratio: 1:1

ENGME280-18B (HAM) DESIGN AND MANUFACTURING 1
This paper covers the fundamentals of engineering design and manufacture.
Prerequisite paper(s): ENGEN180 or ENGG180
Restricted paper(s): ENGG282, ENMP215
Assessment: Internal assessment/examination ratio: 1:0

300 LEVEL PAPERS

ENGME323 (HAM) THERMOFLUIDS
Application of basic principles of fluids and heat transfer to mechatronic engineering. Topics include fluid viscosity, fluid statics, hydraulics, flow in pipes, fans and pumps, conduction, convection and radiation heat transfer, heat exchangers and cooling electronic components.
Prerequisite paper(s): ENMP221 or ENGME221
Restricted paper(s): ENGCB223, ENGCB224, ENGCV223 - up to 50% is similar in content to ENGME223, ENMP223
Assessment: Internal assessment/examination ratio: 1:1

ENGME352 (HAM) CONTROL AND APPLICATIONS
Students are introduced to first- and second-order transfer functions, the impact of feedback on a linear system, and methods such as PID, Bode analysis, and root locus to obtain stable control.
Prerequisite paper(s): ENEL111 or ENGEE111, ENGG284 & ENGG283 or ENGEN201
Restricted paper(s): ENME352, ENEL317
Assessment: Internal assessment/examination ratio: 3:1
ENGME353 (HAM)  
**ELECTRICAL AND MECHANICAL MACHINES**
This paper teaches students the theory and application of electrical and mechanical machines.

**Prerequisite paper(s):** ENGEN111 or ENGME251  
**Restricted paper(s):** ENME380  
**Assessment:** Internal assessment/examination ratio: 1:1

ENGME357 (HAM)  
**MECHATRONICS**
This paper teaches students the basics of mechatronics with advanced theory of machine control.

**Prerequisite paper(s):** ENGME352  
**Assessment:** Internal assessment/examination ratio: 1:1

ENGME380 (HAM)  
**DESIGN AND MANUFACTURING 2**
This paper covers modern aspects of engineering design and manufacture.

**Prerequisite paper(s):** ENGME280  
**Restricted paper(s):** ENME380  
**Assessment:** Internal assessment/examination ratio: 1:0

500 LEVEL PAPERS

ENGME540 (HAM)  
**FINITE ELEMENT ANALYSIS**
This paper teaches students how to use Finite Element Analysis to solve engineering problems.

**Prerequisite paper(s):** ENGME380 or ENGMP313  
**Restricted paper(s):** ENME440  
**Assessment:** Internal assessment/examination ratio: 1:1

ENGME557 (HAM)  
**ROBOTICS**
This paper teaches students advanced mechatronics with applications to mobile and industrial robotic applications.

**Prerequisite paper(s):** ENGME357 and ENGME352  
**Assessment:** Internal assessment/examination ratio: 1:0

ENGME580 (HAM)  
**PRODUCT INNOVATION AND DEVELOPMENT**
This paper covers modern aspects of product innovation and development.

**Restricted paper(s):** ENME480  
**Assessment:** Internal assessment/examination ratio: 1:0
SOFTWARE ENGINEERING PAPERS

100 LEVEL PAPERS

COMPX101-18A/B (HAM)
INTRODUCTION TO COMPUTER SCIENCE
This paper introduces computer programming in C# - the exciting challenge of creating software and designing artificial worlds within the computer. It also covers concepts such as the internals of the home computer, the history and future of computers, cyber security, computer gaming, databases, mobile computing and current research and challenges in computer science.

Restricted paper(s): ENGEN103, COMP103
Assessment: Internal assessment/examination ratio 2:1

COMPX102-18B/C/S (HAM)
OBJECT-ORIENTED PROGRAMMING
This paper continues from COMPX101, expanding upon data organisation and algorithms, and introducing code contracts, computer architecture, Boolean algebra, assembly language, program analysis and object-oriented programming.

Prerequisite paper(s): One of COMPX101, COMP103, ENGEN103, or ENGG182
Restricted paper(s): COMP104
Assessment: Internal assessment/examination ratio 2:1

200 LEVEL PAPERS

COMPX203-18A (HAM)
COMPUTER SYSTEMS
This paper provides an overview of the operation of computer systems. The central theme is the way in which the hardware and software co-operate to allow the execution of programs written in a high-level language.

Prerequisite paper(s): At least one of COMP104, COMPX102, (COMPX101 and ENGEN111), (COMP103 and ENEL111), (ENGEN103 and ENGEN111), or (ENGG182 and ENEL111).
Restricted paper(s): COMP200
Assessment: Internal assessment/examination ratio 1:1

COMPX204-18B (HAM)
PRACTICAL NETWORKING AND CYBER SECURITY
This paper provides an overview of the technologies and protocols involved in computer communications and cyber security. Practical work includes network programming.

Prerequisite paper(s): COMPX102 or COMP104
Assessment: Internal assessment/examination ratio 1:1
**COMPX223-18A (HAM)**

**DATABASE PRACTICE AND EXPERIENCE**

This paper approaches the subject of databases from a practical perspective - how do I create a database and how do I retrieve/update data. Both aspects are heavily addressed in this paper. Database creation and querying, using SQL, will be introduced in lectures as you will master practical skills associated with a commercial Database product (Microsoft SQL Server). The paper also introduces Microsoft’s extension to SQL, Transact-SQL, which provides a user interface to SQL Server. This is to promote both understanding and practice of the different tools used to build, access and maintain a database within a Client/Server database computing environment.

**Prerequisite paper(s):** COMP103 or COMPX101

**Restricted paper(s):** COMP219

**Assessment:** Internal assessment/examination ratio 1:0

**COMPX241-18A (HAM)**

**SOFTWARE ENGINEERING DEVELOPMENT**

Students will learn how to program in Java and design, analyse, and apply commonly used data structures. Broader software engineering practices will be developed through a group project.

**Prerequisite paper(s):** COMP104 or COMPX102

**Restricted paper(s):** COMP203, COMPX201

**Assessment:** Internal assessment/examination ratio 1:0

**COMPX242-18B (HAM)**

**SOFTWARE ENGINEERING PROCESS**

This paper covers object-oriented programming, primarily as seen in Java, but also touching on alternative approaches. It introduces software development methodologies and the use of support tools, particularly repositories and a testing framework. Project work starts with GUI development in Java and works through to the construction of mobile applications.

**Prerequisite paper(s):** COMP241 or COMPX241

**Restricted paper(s):** COMP204, COMPX202

**Assessment:** Internal assessment/examination ratio 1:0

**300 LEVEL PAPERS**

**COMPX301 (HAM)**

**PROBLEM SOLVING USING ALGORITHMS**

This paper description will be outlined in the 2019 handbook.

**COMPX304 (HAM)**

**ADVANCED NETWORKING AND CYBER SECURITY**

A study of computer networks with a focus on Internet protocols and security. The aim of this paper is to develop a practical understanding of the operation and programming of core internet protocols, application protocols, and transmission technologies.

**Prerequisite paper(s):** (COMPX202 and one of COMPX203 or COMPX241) or (COMP204 and one of COMP200 or COMP241).

**Restricted paper(s):** COMP312

**Assessment:** Internal assessment/examination ratio: 1:1
COMPX307 (HAM)
FUNCTIONAL PROGRAMMING
This paper description will be outlined in the 2019 handbook.

COMPX324 (HAM)
USER EXPERIENCE DESIGN
An introduction to the field of human-computer interaction (HCI) where students develop skills and techniques for the design and evaluation of modern computer interfaces.
Prerequisite paper(s): COMPX101 or COMP103
Restricted paper(s): COMP324
Assessment: Internal assessment/examination ratio: 2:1

COMPX341 (HAM)
SOFTWARE ENGINEERING METHODOLOGY
This paper description will be outlined in the 2019 handbook.

COMPX361 (HAM)
LOGIC AND COMPUTATION
The syllabus includes: further development of predicate logic with application to program verification; mathematical induction including structural induction; finite state automata and regular languages; Kleene's Theorem; Turing machines, the Church-Turing thesis, universal Turing machines and the Halting problem; formal grammars and the Chomsky hierarchy.
Prerequisite paper(s): MATHS135
Assessment: Internal assessment/examination ratio: 1:1

COMPX374 (HAM)
SOFTWARE ENGINEERING PROJECT
Students work in small groups to build a medium sized software project. They develop requirements and specification, design the system structure and user interface, carry out documentation preparation, implementation, and maintenance.
Prerequisite paper(s): (COMPX202 or COMPX242) and COMPX223 OR (COMP204 or COMP242) and COMP219
Restricted paper(s): COMPX375, COMP314, COMP315
Assessment: Internal assessment/examination ratio: 1:0

500 LEVEL PAPERS

COMPX524 (HAM)
TOPICS IN INTERACTION DESIGN
This paper offers advanced topics in Interaction Design. It takes a practical approach to interaction design for better user experience.
Prerequisite paper(s): COMP324 or COMP325
Assessment: Internal assessment/examination ratio: 1:0
COMPX526 (HAM)
ENGINEERING INTERACTIVE SYSTEMS
This paper introduces the topic of engineering methods for interactive systems. It provides both the background theory and practical methods for modelling and testing interactive systems.

Prerequisite paper(s): COMP534
Assessment: Internal assessment/examination ratio: 1:0

COMPX539 (HAM)
USABILITY ENGINEERING
This paper covers the design and evaluation of interactive computer systems with a focus on user studies. Topics covered include: scenarios, ethnography, designing and performing user studies, and ethical issues involved in studying human-computer interaction.

Prerequisite paper(s): COMP325 and 40 further points at 300 level in Computer Science.
Restricted paper(s): COMP425 and COMP525
Assessment: Internal assessment/examination ratio: 1:0

COMPX548 (HAM)
DEVELOPING MOBILE APPLICATIONS
This paper covers practical design and implementation of interactive applications for mobile devices such as smartphones and table computers.

Prerequisite paper(s): 60 points at 300 level in Computer Science.
Assessment: Internal assessment/examination ratio: 1:0

COMPX552 (HAM)
MODEL CHECKING
This paper shows how reactive systems can be modelled and analysed using finite-state machines and temporal logic, and how model checking tools can be used to verify crucial properties of safety-critical systems. It also provides an introduction into the algorithms and data structures used to model check very large finite-state systems.

Prerequisite paper(s): COMP235 and 60 points at 300 level in Computer Science.
Assessment: Internal assessment/examination ratio: 1:0

COMPX554 (HAM)
SPECIFICATION LANGUAGES AND MODELS
This paper deals with various aspects of modelling systems using advanced best practice methods from the software engineering field. It will introduce at least one of the main software modelling languages, Z, including its semantics, logic and associated tools.

Prerequisite paper(s): COMP235, COMP340 and a further 40 points at 300 level in Computer Science.
Assessment: Internal assessment/examination ratio: 1:0
COMPX554 (HAM)

SPECIFICATION LANGUAGES AND MODELS

This paper deals with various aspects of modelling systems using advanced best practice methods from the software engineering field. It will introduce at least one of the main software modelling languages, Z, including its semantics, logic and associated tools.

Prerequisite paper(s): COMP235, COMP340 and a further 40 points at 300 level in Computer Science.

Assessment: Internal assessment/examination ratio: 1:0
GRADUATE STUDY
INTRODUCTION

Ground breaking research and state-of-the-art facilities, coupled with internationally renowned staff and top students, make Waikato’s School of Engineering an exciting place to research and study.

Our research projects exist across a wide range of disciplines, and are supported by multi-million dollar investments from national and local government, many of which have significant iwi and other community involvement.

For more information on our activities, visit sci.waikato.ac.nz

GRADUATE AND POSTGRADUATE QUALIFICATIONS SUMMARY

The School of Engineering offers the following graduate and postgraduate qualifications:

• Graduate Certificate (GradCert)
• Graduate Diploma (GradDip)
• Postgraduate Certificate (PGCert)
• Postgraduate Diploma (PGDip)
• Master of Engineering Practice (MEngPrac)
• Master of Engineering (ME)
• Master of Philosophy (MPhil)
• Doctor of Philosophy (PhD).

What follows is a brief description of each qualification. Precise details of the regulations can be found in the 2018 University of Waikato Calendar.

CONTACT

ASSOCIATE DEAN (POSTGRADUATE), POSTGRADUATE RESEARCH COMMITTEE AND SCHOLARSHIP COMMITTEE REPRESENTATIVE

Associate Professor Michael Mucalo

Room: FG.06C Phone: 07 837 4404
Email: michael.mucalo@waikato.ac.nz

POSTGRADUATE STUDY ADVISOR

Dr James Carson

Room: EF.3.01 Phone: 07 838 4206
Email: james.carson@waikato.ac.nz
GRADUATE AND POSTGRADUATE QUALIFICATIONS

You will need to discuss the choice of your programme of study – that is, the papers you are going to take and the area in which you plan to write a thesis – with the Postgraduate Convenor from the School of Engineering. They will go over your entire proposed programme with you, not just the papers you plan to take in the first year. The outcome of the discussion will be recorded on your student file. If you cannot come to the university in person, we can discuss your proposed programme by email or on the phone.

GRADUATE CERTIFICATE (GRADCERT)
The Graduate Certificate (GradCert) is a qualification for graduates with at least a bachelors degree in any subject. The normal minimal time for completion of the GradCert is one semester. You will need to pass 60 points at 100 level or above, including at least 45 points at 300 level or above. At least 45 points must be in your subject area.

GRADCERT PLANNER 60 points 6 months

| 100 level or above | 300 level | 300 level | 300 level |

KEY

Compulsory  Elective paper

GRADUATE DIPLOMA (GRADDIP)
The Graduate Diploma (GradDip) is a qualification for graduates with at least a bachelors degree in any related subject. The normal minimal time for completion of the GradDip is one year. You will need to pass 120 points at 100 level or above, including at least 75 points at 300 level or above. At least 90 points must be in your subject area.

GRADDIP PLANNER 120 points 1 year

| 100 level or above | 100 level or above | 100 level or above | 300 level | 300 level | 300 level | 300 level |

TECHNOLOGY TEACHING

This specialisation can be taken with a Graduate Diploma in Engineering and is done in conjunction with a Graduate Diploma in Teaching (Secondary).

Please refer to the Faculty of Education Handbook for further details.

There are other Graduate Diploma options available within the Faculty of Science & Engineering. Please contact the Faculty Office for further details.
POSTGRADUATE CERTIFICATE (PGCERT)
The Postgraduate Certificate (PGCert) is a qualification for graduates with at least a bachelors degree in a related subject. The normal minimal time for completion of the PGCert is one semester. You will need to pass 60 points at 500 level in your subject area.

POSTGRAD CERT PLANNER 60 points 6 months

POSTGRADUATE DIPLOMA (PGDIP)
The Postgraduate Diploma (PGDip) is a qualification for graduates with at least a bachelors degree in a related subject. It normally takes one year of full-time study. You will need to pass 120 points at 500 level with at least 90 points in your subject area.

You should design your programme in consultation with the Postgraduate Convenor in the School of Engineering.

PGDIP PLANNER 1 year 120 points
MASTERS QUALIFICATIONS

MASTER OF ENGINEERING PRACTICE (MENGPRAC)

The Master of Engineering Practice is a taught programme that prepares graduates with specialist skills and knowledge in the strategic areas of electronics, materials and processing or mechanical engineering, complemented with business training to work in diverse industries and fields in New Zealand and worldwide.

Students will learn about the latest advances in engineering practices and technologies so they are ready to take the next step in their engineering career. The course also includes a management component and a Capstone research and development project that will allow students to apply their advanced technical skills to an industry relevant problem.

ENTRY REQUIREMENTS

Candidates for the programme must have:

a) completed a relevant 3 or 4 year undergraduate qualification in a related discipline with at least a B grade average across the final year papers and

b) satisfy the prerequisites for graduate study in the subject(s) being presented for the degree.

PROGRAMME OVERVIEW

The programme is comprised of 180 points: 30 points of problem-based engineering systems analysis, 30 points of management skills and professional practice, 60 points of Level 8 specialised technical training, and 60 points of project work (Capstone Project). The MEngPrac may be completed in either 12 or 18 months.

Students must achieve at least a B average in their first semester’s papers in order to continue in the programme. When this isn’t achieved, students can continue their study with a Postgraduate Certificate or Diploma.

Semester 1 Semester 2 Semester 3

<table>
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<tr>
<th>30 points</th>
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<th>60 points</th>
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<tbody>
<tr>
<td>System Analysis</td>
<td>Management papers</td>
<td>Advanced Technical Papers</td>
<td>Capstone Project</td>
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Note: To complete the Master of Engineering Practice programme in one academic year, students will normally perform the majority of their work for the capstone projects over the summer months (November to February). Alternatively, if students opt for an 18-month programme, they will carry out the projects in A Semester.

For brief descriptions of the MEngPrac papers, please see the Catalogue of Papers at papers.waikato.ac.nz
**MENGPRAC - ELECTRONICS**

Compulsory paper:

ENGEE506  
**ELECTRONIC SYSTEMS ANALYSIS**  
30 points

Plus choose 30 points from the following management papers, to be completed in A Semester:

EXPM501  
**LEADERSHIP INFLUENCE AND POWER**  
10 points

EXPM502  
**ORGANISATIONAL CULTURE AND COMMUNICATION**  
10 points

EXPM505  
**HUMAN RESOURCE MANAGEMENT**  
10 points

EXPM506  
**ECONOMICS**  
10 points

EXPM507  
**STRATEGIC MANAGEMENT**  
10 points

EXPM510  
**MARKETING**  
10 points

Plus 60 points of advanced technical papers from the following list, to be completed in B Semester:

ENEL501  
**SPECIAL TOPIC IN ELECTRONICS**  
30 points

ENEL504  
**ANALOG FILTER DESIGN**  
15 points

ENEL506  
**SURGE PROTECTION OF ELECTRONIC SYSTEMS**  
15 points

ENEL522  
**ELECTRO-OPTICAL INSTRUMENTATION**  
30 points

ENEL585  
**POWER ELECTRONICS**  
30 points

ENGEE531  
**ADVANCED SIGNALS**  
15 points - (available after 2018)

60 point capstone research and development project.

ENGEN508  
60 points
MENGPRAC - MATERIALS AND PROCESSING

Compulsory paper:

ENGMP506 MATERIALS AND PROCESS SYSTEMS ANALYSIS
30 points

Plus 30 points from the following management papers, to be completed in A Semester:

EXPM501 LEADERSHIP INFLUENCE AND POWER
10 points

EXPM502 ORGANISATIONAL CULTURE AND COMMUNICATION
10 points

EXPM505 HUMAN RESOURCE MANAGEMENT
10 points

EXPM506 ECONOMICS
10 points

EXPM507 STRATEGIC MANAGEMENT
10 points

EXPM510 MARKETING
10 points

Plus 60 points of advanced technical papers from the following list, to be completed in B Semester:

ENMP505 SPECIAL TOPIC IN MATERIALS AND PROCESSING
15 points

ENMP516 MATERIALS CHARACTERISATION
15 points

ENMP542 DESIGN FOR ENERGY AND THE ENVIRONMENT
30 points

ENMP544 ENVIRONMENTAL TECHNOLOGY AND WASTEWATER 2
15 points

ENMP561 BIOPROCESSING 1
15 points

ENMP564 FOOD TECHNOLOGY 2
15 points
ENMP586
INDUSTRIAL TECHNOLOGY AND INNOVATION 2
15 points

Students will be required to enrol in a capstone research and development project. For electronics students this will be:

ENGEN508
60 points

MENGPRAC - MECHANICAL ENGINEERING

Compulsory paper:

ENGME506
MECHANICAL ENGINEERING SYSTEMS
30 points

Plus choose 60 points from the following papers:

ENGME513
MATERIALS PERFORMANCE IN SERVICE
15 points

ENGME555
ADVANCED CONTROL IN MECHATRONICS
15 points

ENGME580
PRODUCT INNOVATION AND DEVELOPMENT
15 points

ENGME515
CAD/CAM FOR ENGINEERING
15 points

ENGME516
MATERIALS CHARACTERISATION
15 points

ENGME542
DESIGN FOR ENERGY AND THE ENVIRONMENT
30 points

ENGME586
INDUSTRIAL TECHNOLOGY AND INNOVATION 2
15 points

60 point capstone research and development project.

ENGEN508
60 points
MASTER OF ENGINEERING (ME)

This research-focused degree is designed for engineering graduates who wish to further their knowledge of the innovative research methodologies required in industry, and for professional engineers who wish to upskill in new areas related to their work.

Excellence in advanced engineering design, research and development skills are core features of the degree. The degree involves following an approved research investigation in either the Faculty of Science & Engineering or the Faculty of Computing & Mathematical Sciences. Candidates are required to complete a total of 120 points at 500 level over 12 months full-time or the equivalent in part-time study. Entry is via a recognised four-year professional engineering bachelors degree that contains a substantial design project. Potential candidates may be asked to complete a postgraduate certificate or postgraduate diploma before enrolling in an ME.

**ME - YEAR 1 OPTIONS**

Option 1

| 500 level | 30 pts | Thesis | 90 pts |

Option 2

| Thesis | 120 pts |

Up to 30 points of the ME can be level 500 taught papers including papers from other subjects. Please refer to pages 56-63 for Engineering related papers.

Please refer to the 2018 University of Waikato Calendar online at calendar.waikato.ac.nz for degree regulations.

**KEY**

![Compulsory](image1.png) ![Elective paper](image2.png)
HIGHER RESEARCH DEGREES

DOCTOR OF PHILOSOPHY (PHD)
To enrol for a PhD you normally need a Masters qualification or an honours degree with first or second class honours (first division).

A PhD involves advanced study and research under the direction of a supervisor for at least three years (full-time). You write a thesis on an original investigation relating to some branch of your chosen subject.

Although the PhD does not normally involve coursework, you may be required to take up to two preliminary papers. More details on the PhD regulations and general guidelines can be found in the Higher Degrees Handbook which can be obtained from the School of Graduate Research Office, or online in PDF format from the website.

Enrolment of all new candidates for the PhD approved by the Postgraduate Studies Committee is conditional for an initial period of six months. Confirmation of enrolment by the Postgraduate Studies Committee after the initial period of six months is subject to the submission by the candidate of:

- An acceptable research plan, and
- A formal presentation to a Confirmed Enrolment Panel, and
- A report by the supervisors recommending confirmation of enrolment, and
- Evidence of ethical approval or a statement confirming that it is not required, in accordance with the Ethical Conduct in Human Research and Related Activities Regulations 2008.

PhD application closing dates are 1 March, 1 July and 1 November annually. Applications must be completed online and received by midnight (NZ time) on the deadline of the application round for which you are applying. Please note that paper applications cannot be accepted. If your online application to enrol arrives after one of these closing dates, your application will be considered in the following application round. All incomplete or incorrect applications are unable to be considered further.

Visit waikato.ac.nz/study/apply/higher-research-degrees-application-process

MASTER OF PHILOSOPHY (MPHIL)
To enrol for a MPhil you normally need an honours degree with first or second class (first division) honours in a relevant subject (software engineering, computer science, mathematics or statistics). Like the PhD, this is a research degree, but of more limited scope, and the aim is to complete in one year (full-time). As with the PhD, you first choose a supervisor, topic, write a proposal and apply to the Postgraduate Studies Committee. You may be required to take up to two preliminary papers.

It is sometimes possible to transfer from an MPhil to a PhD, usually after one year, provided you have made good progress. An application and expanded research proposal must be submitted to the Postgraduate Studies committee.
PROGRESS REPORTS
Progress reports are an integral part of enrolment in a higher degree. The Postgraduate Research Committee may terminate a candidate’s enrolment if progress reports are not submitted in a timely manner, or if progress is continually recorded as unsatisfactory.

PhD candidates must submit progress reports six-monthly from the date of confirmed enrolment; and MPhil candidates must submit progress reports six-monthly from the date of enrolment.

Progress reports require candidates to report on progress made in the previous six months, and to report on work that is to be achieved in the next six months. Reports must be endorsed by the supervisory panel, postgraduate convenors, and Faculty Postgraduate Research Committee representative. Copies of progress reports are sent to candidates. PhD candidates are encouraged to discuss progress reports with their supervisory panel first, before submission.

CHANGES TO CONDITIONS OF ENROLMENT
Candidates wishing to change their conditions of enrolment should seek advice from the School of Graduate Research. Changes to conditions of enrolment include: topic change, status change (full-time/part-time), supervisory panel change, school/faculty change, suspension of enrolment, and extension of enrolment.

Candidates must complete a Change of Conditions Form, which must be endorsed by the supervisory panel, Postgraduate Convenor and Faculty Postgraduate Studies Committee Representative. Any application for changes to conditions of enrolment must be approved by the Postgraduate Research Committee.

EXAMINATION
The Postgraduate Research Committee approves nominated examiners to examine the thesis; the examiners must be external to the University and must not be directly associated with the candidate or the candidate’s research.

An oral examination is also part of the examination process for the PhD degree. Oral examinations are not usually held for the MPhil degree. The oral examination gives the candidate an opportunity to further demonstrate their knowledge in the field of study, and is also an opportunity for the candidate to explain or justify aspects of the thesis that require clarification.

It is expected that the thesis will be under examination for three months from the time of submission of the thesis. The Postgraduate Studies Committee, after considering the examiners’ recommendations, will make the final decision on awarding the degree.

Note: This is a summary of the processes related to Higher Degrees enrolment.
FULL-TIME VS PART-TIME
A full-time student must complete a masters degree (ME) in 12 consecutive months from first enrolment to qualify for the award of honours.

A part-time student is defined as one who is enrolled in papers less than or equal to 90 points. To qualify for honours, part-time students must complete 120 points within two calendar years of first enrolment in the degree. Part-time students will normally enrol in a thesis with the weighting of 60 points over two of the years. Part-time candidates seeking the award of honours should consult with the Faculty Registrar.

For part-time enrolment, the deadline will be the corresponding date in the year in which the enrolment adds up to 24 months full-time (120 points).

A full-time ME student must complete in 12 consecutive months from first enrolment to qualify for the award of honours.

The deadline for submission of a dissertation or thesis for candidates enrolling in a graduate degree in the Faculty of Science & Engineering is 4pm on the last working day of the candidate’s minimum period of enrolment for the degree.

TAUGHT PAPERS VS THESIS PAPER
The relevant Postgraduate Convenor (or nominee) approves the papers taught in graduate qualifications. This ensures the candidate is well-prepared, in terms of skills and knowledge, to undertake the thesis topic proposed. The assessment in taught papers is varied and can be assessed exclusively on coursework, examination, or a mixture of both. Candidates should be certain of their deep interest in the proposed topic, as a thesis is a demanding activity and requires a high level of academic ability, commitment and stamina.
EXTENSIONS FOR MASTERS THESES

APPLYING FOR AN EXTENSION
Candidates are expected to make a written application to the Faculty Registrar in the first instance. The application should outline the reasons for the extension, must be written by the candidate and include supporting documentation as appropriate, such as a medical statement or a support note from the supervisor. The Faculty Registrar may approach the supervisor and the Dean of Engineering independently to confirm the student’s version of events. Subject to these comments, the application may then be forwarded to the Associate Dean (Postgraduate) for consideration. In making an application for an extension, the obligations of candidates are as outlined below:

- Candidates must contact their supervisor as soon as they are able once a problem has been identified
- Candidates must make a formal application as soon as the period of impairment has been identified
- Applications on the basis of medical or personal problems must be accompanied by a medical certificate or a statement from a counselor or similar.

Except in exceptional circumstances, the Faculty undertakes to make a decision on any application within 10 working days.

RE-ENROLLMENT
Candidates who are awarded an extension of greater than three weeks are required to re-enroll and normally pay the equivalent of two-thesis papers of fees per semester of study.

If there are reasonable grounds provided, this fee may be waived with the ultimate decision on this being made by Student Services Division after advice provided by the Faculty.

GUIDELINES FOR THE APPROVAL OF EXTENSIONS TO THE SUBMISSION DATE OF A MASTERS THESIS
The commencement and submission dates are agreed to by the candidate and the Postgraduate Convenor when the degree is started.

The circumstances under which an application for an extension to this submission date may be considered by the Associate Dean (Postgraduate) are:

- Medical or personal problems leading to a period of significant impairment
- Significant and unforeseen equipment failure

The Associate Dean (Postgraduate) on a case-by-case basis will make decisions on what constitutes a period of significant impairment. Candidates should note that the following do not represent valid grounds for an extension (please note that this list is not exhaustive):

- Staff leave
- Requirements for editorial revision
- Loss of electronically-stored data

Candidates who feel that they have been unfairly disadvantaged in their interactions with their supervisor or any other persons, should in the first instance discuss this with their supervisor. If a satisfactory resolution cannot be found, candidates may then take their concerns to the Assistant Dean (Academic) and then to the Associate Dean (Postgraduate) as appropriate. Candidates should note that they are welcome to raise any concerns in confidence with the Associate Dean (Postgraduate) directly at any stage.
SUBJECT AREAS WITHIN ENGINEERING

The School of Engineering is committed to fostering synergistic relationships between science, engineering, industry and management, which is essential for turning scientific knowledge into commercial products, processes and services.

The School of Engineering has developed a very strong research base to support its aims of providing students with in-depth knowledge, analytical skills, ideas on innovation, and techniques to translate science into technology in the real world.

Research programmes exist across a wide range of disciplines, supported by the primary research interests of staff. Research areas include:

- Applied Optics and Opto-electronics
- Bioprocess Engineering
- Biotechnology
- Electronics
- Engineering
- Environmental Technology
- Fermentation Engineering
- Food Engineering
- Imaging
- Materials Engineering
- Mechanical Developments and Design
- Mechanical Technology
- Metallics
- Numerical Modelling
- Physics
- Power Symptoms and Control
- Process Engineering
- Technology Innovation

Students may undertake the following specialisation with the relevant Graduate Diploma:
Technology Teaching – Graduate Diploma in Engineering (Technology Teaching) see page 65.

Collaborative work with industry and research associations are also available.

CONTACT

SCHOOL OF ENGINEERING OFFICE
Room: E.2.07 Phone: 07 838 4266
Email: engineering@waikato.ac.nz

POSTGRADUATE STUDY ADVISOR
Dr James Carson
Room: EF.3.01 Phone: 07 837 4206
Email: james.carson@waikato.ac.nz
ACADEMIC STAFF

Professor Mark Dyer, Dean of Engineering mark.dyer@waikato.ac.nz
BBEng, BSc, MA, DPhil, FICE, FTCD, CEng
Research interests: Flood risk management and stability of flood levees as well as the biologically mediated processes in the soil for remediation of organic pollutants and deposition of calcite cement for ground improvement.

Emeritus Professor Janis Swan janis.swan@waikato.ac.nz
B.Tech, M.Tech Massey, PhD Waterloo, FNZIFST, FIPENZ, MNZM
Research interests: Developing processes to add value to biological products; functional properties of meat used in manufacturing; meat product yield and quality; extracting high-value biochemicals from animal glands; product development of foods for niche markets; bioseparations; and engineering education.

Dr Chi Kit Au chikit.au@waikato.ac.nz
BSc, MSc, PhD Hong Kong
Research interests: Computation; geometric modelling; and manufacturing technology.

Dr Aydin Berenjian aydin.berenjian@waikato.ac.nz
BE, ME SUT, PhD USyd

Dr Leandro Bolzoni leandro.bolzoni@waikato.ac.nz
BMechEng Polytechnic of Turin, MMatSci Carlos III de Madrid, PhD Carlos III de Madrid
Research interests: Development, processing and characterisation of novel lightweight metals and composites via near-net-shape manufacturing techniques.

Dr James K Carson james.carson@waikato.ac.nz
BE(Hons), ME Canterbury, PhD Massey
Research interests: Measuring and predicting thermo-physical and transport properties; mathematical modelling of thermal processes; refrigeration; food engineering; heat transfer; and thermodynamics in general.

Dr Michael Cree michael.cree@waikato.ac.nz
BSc(Hons), PhD Canterbury, SMIEEE, MNZIP, MACPSEM
Research interests: Computer vision; medical physics; retinal imaging; range imaging; and image sensor technology.

Associate Professor Mike Duke mike.duke@waikato.ac.nz
BEng(Hons) SBankPoly, PhD South Bank, MISES, MANZSES
Research interests: Building integrated photovoltaic thermal systems (BIPVT); high performance battery electric vehicles (BEV), sustainable transport; renewable energy products; and vibrations and dynamics.

Dr Graeme Glasgow graeme.glasgow@waikato.ac.nz
BE(Hons) Strath UK, MSc Strath UK, PhD Loughborough UK
Professor Ilanko Sinniah ilanko.sinniah@waikato.ac.nz
BSc(Eng)(Hons), MSc Manchester, PhD University of Western Ontario
Research interests: Numerical modelling; vibration and stability of mechanical/structural systems; passive vibration control; adaptive mechanisms; and engineering education.

Associate Professor Nihal Kularatna nihal.kularatna@waikato.ac.nz
BSc(Eng) Ceyl, DSc Waikato, FIET, FIE, SMIEEE, FIENZ
Research interests: Power conditioning and power protection for electronic systems; DC-DC converters; mixed signal circuits; supercapacitor applications; and smart sensor systems.

Dr Mark Lay mark.lay@waikato.ac.nz
BSc, MSc, PhD Waikato
Research interests: Biotechnology and process chromatography; chromatographic modelling; science education research; and co-operative education.

Dr Shen Hin Lim him.lim@waikato.ac.nz
BE(Hons) UNSW Australia, PhD UNSW Australia
Research interests: Agricultural engineering, autonomous systems, Magnetorheological (MR) fluids and dampers, composites materials and structures modelling and applications.

Dr Ginghis Maranan ginghis.maranan@waikato.ac.nz
BSCE, MEng, PhD University of Southern Queensland
Research interests: structural analysis, structural testing and investigation, analytical modelling and simulation, reinforced concrete and FRP-reinforced concrete systems, earthquake engineering, and fibre composite materials for civil engineering applications.

Professor Kim Pickering kim.pickering@waikato.ac.nz
BSc(Eng)(Hons) London, PhD Surrey, FIPENZ, MIMMM
Research interests: Natural and synthetic composite materials; optimising advanced composite properties; and failure mechanisms of composite materials.

Professor Jonathan Scott jonathan.scott@waikato.ac.nz
BSc, BE, MEngSc, PhD Sydney, SMIEEE, MAES, MSPIE
Research interests: Analogue and digital electronics; microwave and millimetre-wave components; instrumentation and metrology; audio; linearity and distortion; vector correction; III-V and wide-bandgap devices and device models; embedded microcontrollers; electric traction; RF amplifiers; and microwave systems.

Dr Ali Shokri ali.shokri@waikato.ac.nz
BSCE, MEng, PhD
Research interests: Hydrodynamics in porous media and developing integrated surface/subsurface flow codes and numerical models.
Associate Professor Alistair Steyn-Ross alistair.steyn-ross@waikato.ac.nz
BSc, MSc, PhD Waikato, MNZIP, MRSNZ
Research interests: Cortical modelling; anaesthetics phase-change studies; quantifying brain state; and computational physics.

Professor Moira Steyn-Ross moira.steyn-ross@waikato.ac.nz
BSc, MSc, PhD Waikato, MNZIP
Research interests: Cortical modelling; theoretical modelling of bulk electrodynamics of the human brain; EEG simulation; and modelling of sleep, anaesthesia and cognition.

Dr Rob Torrens rob.torrens@waikato.ac.nz
BSc(Tech), MSc, PhD Waikato
Research interests: Preparing ceramic powders by chemical methods; processing, consolidation, characterisation and properties of advanced ceramic materials; ceramic oxygen ion conductors; and biomaterials.

Associate Professor Johan Verbeek johan.verbeek@waikato.ac.nz
BEng, MEng, PhD Pretoria, MIPENZ
Research interests: Using renewable and waste materials to produce polymeric composites; filled and functionally filled polymers; polymer modification and reactive extrusion; biodegradable polymers; and predicting mechanical properties of polymer composites.

Professor Michael Walmsley michael.walmsley@waikato.ac.nz
BE, PhD Auckland, MAIChE
Research interests: Fluid mechanics, applied thermodynamics and multiphase separation processes for improving energy efficiency of milk powder plants; and integrated pulp and paper mills.

Dr Marcus Wilson marcus.wilson@waikato.ac.nz
BA(Hons) Cambridge, PhD Bristol, PGCert(Tertiary Teaching) Waikato, MinstP CPhys, MNZIP
Research interests: Numerical modelling and analysis of the electrical behaviour of the brain; electrophysiology; many-body theory; and physics and engineering education.
It is University policy to provide equal opportunities in both education and employment for all people regardless of factors that are irrelevant to their abilities, thereby deriving benefit from the overall pool of talent that exists in New Zealand society and contributing to its enrichment.

The School is also committed to a policy of selection and appointment on the basis of merit. The interpretation of merit is comprehensive, and includes a diverse range of areas of experience and personal qualities as well as formal qualifications.

We seek a higher proportion of both Māori and people with disabilities in all areas of University life, and a more equal representation of genders, particularly at graduate level. There is recognition, too, that socio-economic situation and ethnic origins significantly affect access to university study. The University actively encourages participation from under-represented groups through student recruitment policies and student support services.

**YOUNG ENGINEERS SOCIETY (YES)**

YES supports student networking with engineering staff and industry in order to take advantage of the vast opportunities that engineering offers.

Come and find us every Wednesday during cultural hour (1.00 – 2.00pm) upstairs in LSL, you can get your membership sticker and meet the team.

[yeswaikato.co.nz](http://yeswaikato.co.nz)

**WESMO**

WESMO is a group of students working together to design, build and test an open wheeled single-seat race car to compete in Formula SAE Australasia.

Formula SAE-A is an exciting international education program where university students design, build and compete in small open-wheeled vehicles. Formula SAE graduates worldwide are considered to be among the most work-ready graduates emerging from the university system.

Formula SAE promotes careers and excellence in engineering as it encompasses all aspects of the automotive industry including research, design, manufacturing, testing, developing, marketing, management and finances. Formula SAE takes students out of the classroom and allows them to apply textbook theories to real work experiences and challenges students all over the globe.

[eng.waikato.ac.nz/wesmo/](http://eng.waikato.ac.nz/wesmo/)
UNDERGRADUATE AND POSTGRADUATE SCHOLARSHIPS

For further information on Engineering undergraduate and postgraduate scholarships contact the Scholarships Office:

ENGINEERING ADMISSION FEES SCHOLARSHIP
UP TO $4,000
For students who are intending to enrol full-time (120 points) in the first year of a Bachelor of Engineering (Honours) degree in the Faculty of Science & Engineering at the University of Waikato and are currently completing the final year of secondary school.

SCIENCE AND ENGINEERING MASTERS FEES AWARDS
UP TO $2,000
For students enrolling full-time in the first year MSc (Research), MSc, MSc (Tech) ME or MEnvSci programme in the Faculty of Science & Engineering. Part-time applicants may be considered but any scholarship awarded will be on a pro-rata basis.

EXTERNAL FUNDING
External funding is often available for specific research projects. Students should initially consult with their Postgraduate Convenor or the director of the centre about external funding opportunities.

Dr Michael Mucalo is the Faculty representative for the Scholarships Committee and can also be contacted for advice.

SOURCES OF FUNDING FOR DOCTORAL STUDY

UNIVERSITY OF WAIKATO DOCTORAL SCHOLARSHIPS
These awards provide three years of funding for students undertaking a full-time Doctoral degree at The University of Waikato. Awards are made on academic merit and the minimum average grade required for application is an A- (80%). Both international and domestic students are eligible to apply.

Application forms are available from the Scholarships website waikato.ac.nz/scholarships

INTERNATIONAL STUDENTS
International PhD students are eligible for domestic fees for their PhD studies. Conditions apply. International (non-New Zealand resident) students can apply for a “New Zealand Scholarship” funded by the New Zealand Government or for scholarships funded by their own country.

SCHOLARSHIPS OFFICE
The Scholarships Office is located in W Block and provides advice and administration services and information about available scholarships.
The University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand

Phone: +64 7 838 4489
Email: scholarships@waikato.ac.nz
Web: waikato.ac.nz/scholarships
UNIVERSITY OF WAIKATO AND OTHER SCHOLARSHIPS

SIR EDMUND HILLARY SCHOLARSHIP PROGRAMME
FULL FEES
The Sir Edmund Hillary Scholarship Programme provides support for students studying at Waikato who have an established record of excellence in sport, or in performing or creative arts, exhibit leadership qualities, have University Entrance, and have achieved a specified number of credits at Level 3 NCEA in a specified number of approved subjects.

THE VICE-CHANCELLOR’S ACADEMIC EXCELLENCE SCHOOL LEAVER SCHOLARSHIP
$5,000 towards fees or accommodation, awarded to students in their first year of study who gain NCEA level 3 Certificate with an Excellence endorsement*, University Entrance and meet the criteria for entry to their programme and in their first year are enrolled in a full-time programme.

THE UNIVERSITY OF WAIKATO ACADEMIC MERIT SCHOOL LEAVER SCHOLARSHIP
$3,000 towards fees or accommodation, awarded to students in their first year of study who gain NCEA level 3 Certificate with an Merit endorsement*, University Entrance and meet the criteria for entry to their programme and in their first year are enrolled in a full-time programme.

Your eligibility for the school leaver scholarship will be assessed when the University receives the NCEA results (*or equivalent in CIE or IB).

UNIVERSITY OF WAIKATO MASTERS RESEARCH SCHOLARSHIP
These awards provide one year of funding for students commencing the second or final year of a full-time masters degree at The University of Waikato. The awards are made on academic merit and the minimum average grade required for application is an B+ (75%).

Application forms are available from the Scholarships website waikato.ac.nz/scholarships

UNIVERSITY OF WAIKATO TAUGHT POSTGRADUATE FEES SCHOLARSHIP
The University of Waikato established the Taught Postgraduate Fees Scholarship to support students studying at postgraduate level, primarily undertaking coursework. Preference will be given to students on a pathway to research qualifications at The University of Waikato. Awards will be determined on academic merit.

Application forms are available from the Scholarships website waikato.ac.nz/scholarships

COMMONWEALTH SCHOLARSHIP
If you live in one of the 60 member countries involved in the Commonwealth Scholarship and Fellowship Plan, you may apply in your own country for a Commonwealth Scholarship to be taken up at The University of Waikato. If you do have a scholarship, or other funds, that will allow you to cover the cost of your education, then we encourage you to apply to enter our graduate programme.
THE STUDENT CENTRE/ TE MANAWA

STUDENT ASSISTANCE
The Student Administration Desk is located on Level 2 of the Student Centre. Come here if you need any help, including the following:

- All student Enquiries
- StudyLink Liaison
- Academic Records
- Academic Credit
- ID Cards
- International Student Services

PAYMENTS
The Payment Office is located on level 2 of the Student Centre. The following can be paid here:

- Tuition Fees
- Library Invoices
- Course-related costs including lab coats and science equipment
- Student visas for International students

THE LIBRARY
The Library is located in the Student Centre/Te Manawa. The Library provides students with access to:

BUILDING RESOURCES

- Computers, laptops, photocopiers, scanners
- Group study rooms
- Quiet study spaces

STUDY AND RESEARCH RESOURCES

- Books/Journal articles/Proceedings/Technical reports – print and online
- Other resources (DVDs, maps, microfilms etc).

STAFF ASSISTANCE

- Library tours
- Tutorials (how to find, reference and present your information; computing skills)
- General queries and information (Information desks, online chat, Virtual Reference Desk, Facebook)
- 1:1 consultations with your Subject Librarian

SCIENCE AND ENGINEERING LIBRARIAN – CHERYL WARD
The Library, The University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand
Phone: +64 7 837 9132
Email: cheryl.ward@waikato.ac.nz
GENERAL INFORMATION FOR INTERNATIONAL STUDENTS

Under the Ministry of Education’s Code of Practice for the Pastoral Care of International Students there are statutory requirements in regards to the information we must include in our publications.

ENGLISH LANGUAGE REQUIREMENTS FOR UNDERGRADUATE STUDY IN THE SCHOOL OF ENGINEERING
All students whose application for admission is on the basis of study completed overseas where the medium of instruction is not English, are required to provide evidence of a satisfactory level of competence in the English Language.

A TOEFL iBT score of 79-80 (with a writing score of 20) or an IELTS score of 6.0 or above (with at least 6.0 in the Writing band) or a PTE Academic overall score of 57 (and no less than 57 for Writing) is considered to be evidence of such competence. Other evidence is considered on a case-by-case basis.

International students seeking admission via The University of Waikato Pathways College may be accepted on the basis of a B grade or higher at level 7 of the Pathways College English Language programme.

A higher standard of English will be required of students wishing to enter graduate study programmes.

ENGLISH LANGUAGE REQUIREMENTS FOR GRADUATE AND POSTGRADUATE STUDY
You are required to meet the English language requirements for admission into Graduate and Postgraduate qualifications. You are required to achieve an IELTS (academic stream) overall score of 6.5 with at least 6.0 in the Writing band OR successfully complete The University of Waikato Pathways College English Language level 8 with a B grade or higher OR a TOEFL iBT score of 90 (with a writing score of 22).

CODE
The University of Waikato has agreed to observe and be bound by the Code of Practice for the Pastoral Care of International Students. Copies of the Code are available from education.govt.nz/quick-links/international-students

IMMIGRATION
Full details of immigration requirements, advice on rights to employment in New Zealand while studying, and reporting requirements are available from Immigration New Zealand, and can be viewed on their website at immigration.govt.nz

INTERNATIONAL STUDENT SUPPORT
All Graduate and Postgraduate International students should make contact with both the Postgraduate Study Advisor, and with the Associate Dean (Academic) in the Faculty, who can help with any problems or issues outside of the School.
FACULTY SUPPORT

AFTER-HOURS ACCESS
After-hours access to the Faculty complex for undergraduate students is normally not available. Undergraduate students may be allowed access after hours only with the written permission of a member of University staff, granted for a specific occasion.

ENROLMENT AND PROGRAMME ADVICE
The FSEN Faculty Office staff are available to help you make the best choices for your programme of study, answer any questions you may have about choosing papers, changing your enrolment, graduating from university, and more. We are available Monday – Friday, 8.30am – 5.00pm, FG Link reception. Email science@waikato.ac.nz

CLASS REPRESENTATION
All papers in the University should elect at least one class representative, and possibly more depending on the size of the paper. Class representatives are mainly concerned with academic matters, things that can impact on the quality of your education, and the ability to study effectively.

The election of class representatives leads to a greater spread of interest, involvement and responsibility among members of the student body. It results in greater student participation in the running of the University. Student involvement in the governance and management of the University is essential to the high quality of academic and institutional life, of which class representatives are an integral part. For more information relating to class representatives email student.reps@waikato.ac.nz

INTERNAL ASSESSMENT EXTENSIONS
Applications for an extension must be made no later than 48 hours before the deadline. After this you should hand in what you’ve done and request the marker take your circumstances into consideration. An application is to be made on the appropriate Application for an Extension of Deadline Form available by emailing engineering@waikato.ac.nz
TE PŪTAHI O TE MANAWA - MĀORI STUDENT SUPPORT
Te Pūtahi o te Manawa is a support service available to all Māori Students doing papers in The Faculty of Science and Engineering. This includes advice and support, whether study orientated or otherwise. Please drop in to the support office on the ground floor of F Block (F.G.06A) or use our contact details to make an appointment. And remember 'Sooner is Better than Later'.

STUDY WĀNANGA AND WORKSHOPS
There comes a time in the academic year where students have to make sure that they are on-track and are well positioned heading into exams and peak assessment time.

Attending these workshops can help ensure your success and those on offer include: Time Management; MS Word; MS Excel; Essay Writing; Exam Preparation; APA Referencing and others if needed.

Study Wānanga will help students heading into exams to prepare, review and revise over their paper content before the final exams. Our Student Success Coordinator will let you know when wānanga will be held during the year.

MĀORI MENTORS
Our team of successful Māori Mentors are available to help you with subject specific areas within your programme.

ONLINE SUPPORT
Online Support via Moodle is a Te Pūtahi o te Mānawa/Māori Science Support presence. This provides another forum where students can communicate with kaitiaki/mentors and the Student Success Coordinator, or as a forum to talk to each other.
UNIVERSITY SUPPORT

CAREER DEVELOPMENT SERVICES
Career Development Services offers free advice to University of Waikato students, recent graduates and alumni. Our team can help you with career planning, developing your CV and cover letter, interview skills, social media, and personal brand. We also connect students and graduates with employers through Careers Fairs, employer campus visits and promoting employment opportunities. Please email careers@waikato.ac.nz to attend a workshop or to book a one-on-one consultation.

CHAPLAINCY
There is a chaplaincy service available at the University of Waikato. This service is available to students and staff of all religious backgrounds in the spirit of mutual respect and deepening understanding. Email chaplain@waikato.ac.nz

CHILDCARE SERVICES
We have a crèche on campus available for children aged three months to five years. We also have a Kohanga Reo (preschool taught in te reo Māori) near the Hamilton campus. Call 07 856 2982 for more information.

COMPLAINTS PROCEDURE
If you feel you have been unfairly disadvantaged, you should in the first instance consult the lecturer concerned. If the situation is not resolved you should then consult your supervisor.
Your next port of call should be the Dean of Engineering. Unresolved complaints should be referred to Associate Dean (Teaching and Learning) for undergraduate students and to the Associate Dean (Postgraduate) for all graduate and postgraduate students. Appeals may also be made to the office of the Vice-Chancellor.
Please also feel free to contact the Faculty Registrar if you feel that you have been unfairly disadvantaged in your dealings with staff in any part of the University.

CULTURAL HOUR
Cultural Hour is every Wednesday 1.00 – 2.00pm and is a time free of lectures and tutorials so clubs and societies can meet and other student and University activities can be held.

STUDENT COUNSELLING SERVICE
The Student Counselling Service aims to ensure that your time at University is the best it can be. Counselling can help with a range of issues, big and small. Some of the life issues the counselors deal with are; loneliness, living arrangements, anger, study overload, grief, stress, anxiety, relationships, sexuality and depression. The Counselling service also offers workshops and seminars to assist you in preparing for exams and other issues.
Most appointments last for one hour. You can make a confidential appointment by phoning 07 838 4037.

DISABILITY SUPPORT SERVICES
Disability Support Services – Te Tari Kai Awhina Hauā provides you with access to a range of services, including lecture material, learning support, alternative examination arrangements, access to assistive technology, alternative formatting, ergonomic furniture, hearing equipment, specialist staffing and much more.
The Students with Disability Handbook provides comprehensive information about access arrangements and support available at the University. Contact the disability support staff by email disability@waikato.ac.nz to discuss any arrangements or accommodations you require.
DISABLED ACCESS IN THE FACULTY OF SCIENCE & ENGINEERING

Disabled access to the blocks housing the Faculty of Science & Engineering is by way of the lifts in D, F and FG Blocks. The ground floors of these blocks can be entered by ramps from the respective car park area.

DISCIPLINE POLICY

The University Discipline Regulations are set out in the 2018 University of Waikato Calendar and apply to misconduct, including cheating, plagiarism, misuse of computer facilities, or other breach of the University regulations. Plagiarism is unacknowledged copying or paraphrasing of someone else’s work, whether published or not. It may be heavily penalised and can even result in refusal of credit for the paper.

JUSTICE OF THE PEACE

We have many Justices of the Peace (JPs) on campus who can verify your documents for enrolment or other purposes. If you require the services of a JP, see the Student Centre for more information.

SPECIAL CONSIDERATION FOR IMPAIRED PERFORMANCE OR MISSED EXAMINATION

The Assessment and Graduation Office is responsible for the special consideration process for formal examinations only.

Application forms are available from: The University’s Student Health Service, Student Counselling Service or the Student Administration Counter in the Student Centre.

If you need help with completing the form or you need further information on special consideration, contact staff in the Assessment Office on 07 838 4941.

For missed or impaired performance in items of a internal assessment, including tests, applications should be made in writing to the examiner of the relevant paper no later than three days after the date on which the item of internal assessment is due.

STUDENT LEARNING

The Student Learning team (W.G.50) provides a University-wide service to support students’ academic learning needs. We actively seek opportunities to collaborate with staff to embed appropriate and effective learning development opportunities within Faculties, and we also work closely with the Library. Our overall goal is to help students acquire the skills, knowledge and attributes to become independent, successful learners.

STUDENT HEALTH SERVICE

We have a team of qualified doctors and nurses on our Hamilton campus to look after your healthcare needs. Routine consultations and prescriptions are free if you enrol with Student Health Services. No appointment is necessary, simply drop-in to see them.

STUDYLINK SUPPORT

Contact our StudyLink Liaison Officer for help and advice on how best to use StudyLink services. Email nadine.hayes@waikato.ac.nz or call 07 838 4790 for free and confidential support.
COMPUTING FACILITIES

The Faculty of Science & Engineering has three computer labs for student use. All three labs are only available to students taking courses in the Faculty of Science & Engineering.

The Large Scale Lab features a suite of equipment dedicated to engineering teaching and research, including 3D printers, a mechanical workshop and computer labs with engineering design software. LSL.1.16 is open from 8am – 6pm (Monday to Friday). After hours swipe card access to LSL.1.16 is provided for graduate students only.

F.1.14 is open from 7.45am – 6.30pm (Monday to Friday). After hours swipe card access to this lab is provided for graduate students only.

The order of priority for using F.1.14 and R.1.22 is:

• Booked classes
• Graduates
• Undergraduates.

R.1.22 is open from 8am – 6pm (Monday to Friday). After hours swipe card access to this lab is provided for both undergraduate and graduate students.

Students should see their School administrator to obtain swipe card authorisation forms and to sign a Terms of Use agreement form for the computer labs.

Each School/centre/unit within the Faculty has designated areas for graduate students and their research studies. These areas are equipped with specialised software and computing facilities for research purposes.

Note: All students using University computer facilities must abide by the computer systems regulations. Personal devices should be connected using the wireless network only. Attention is drawn in particular to the provisions relating to the privacy of information on the system, the copyright provision covering most of the software and the unlawful possession of material breaching the Code of Conduct.

Disciplinary action will result if students or staff are found contravening these regulations. The systems may not be used for work other than University business without prior arrangement. Private computers/laptops are not covered by University insurance if stolen from University buildings or grounds.

GENERAL RULES

• Smoking is not permitted in any part of the University campus
• Dogs (except guide dogs) and bicycles are not allowed in University buildings
• Only those who have enrolled in the paper, except with the written permission of the lecturer, may attend lectures
• Photocopying is available for undergraduate students in the Student Centre. Lecturers will tell you if you can use the School photocopier for a piece of assessment
• Footwear must be worn at all times in the Science & Engineering buildings.

STEM TECHNICAL SUPPORT GROUP
Phone: +64 07 858 5006
Email: stem_help@waikato.ac.nz

INFORMATION TECHNOLOGY SERVICE (ITS) SERVICE DESK
Phone: +64 07 838 4008
CODE OF CONDUCT

It is a basic assumption that researchers are committed to the highest standards of professional conduct when undertaking and supervising research. They have a duty to maintain the highest standards of probity in research applicable to their discipline and to the good standing of the University.

- Rigorous opposition to all forms of fraud, including misrepresentation and falsification of results.
- Observance of highest standards of safety in relation to themselves, co-workers and research participants.
- Maintenance of confidentiality where appropriate and full attribution of the sources of assistance and guidance.
- Acknowledgment of authorship of all published material.
- Researchers should only participate in work which conforms to agreed ethical standards, and for which they are capable to perform.

Misconduct Constitutes:

- Fabrication of data by claiming results where none have been obtained.
- Falsification of data by changing records or falsely claiming the use of techniques, methods or levels of precision.
- Plagiarism including the direct copying of handwritten, typed, printed or published text or notation; use of other people’s data, arguments or literature reviews without appropriate acknowledgment or permission; and deliberate use of published or unpublished ideas from other people without adequate attribution or permission for such use.
- Misleading ascription of authorship, including listing authors without their permission where this is relevant, attributing work to others who have not contributed to the research and failing to acknowledge work primarily produced by a student, trainee or associate.
- Other practices that deviate from those accepted within the research community for proposing, conducting or reporting research, such as intentional infringement of the University’s code of ethical behaviour.

Misconduct does not include honest error or honest difference in the interpretation or judgement of data.
UNDERGRADUATE SAFETY POLICY

1. Footwear must be worn inside all Faculty of Science & Engineering buildings. Some laboratories and workshops restrict entry to those wearing reinforced shoes. Read the notices on the door of any room you are about to enter to see the restrictions that apply.

2. When the fire alarm sounds, you must obey the instructions of the laboratory supervisor and floor warden, leave by the nearest exit, and go down the nearest staircase to the assigned assembly point outside. Lifts must not be used in a fire. If you have a medical condition or a disability, please let your laboratory supervisor know, so they may provide you with assistance during an emergency.

3. You must wear safety glasses and other protective equipment as directed by the laboratory supervisor. Prescription glasses are NOT safety glasses. There are specific requirements for some specialised laboratories. Laboratory coats and ‘covered in’ shoes must be worn in laboratories and workshops where hazardous substances are used.

4. You must not eat or drink in any laboratory.

5. You may not enter any laboratory outside the times scheduled for laboratory classes except with the permission of the supervisor or technician in charge.

6. You are not permitted to take any chemicals, equipment or any other material from any laboratory for private use.

7. Laboratory equipment, chemicals, or materials may be taken out of laboratories only with the written permission of the supervisor or technician in charge.

8. Visitors may be allowed in laboratories only with the permission of the supervisor or technician in charge. ALL visitors must sign in at the Faculty Office, or a School office, or the entrance to the Large Scale Laboratory.

9. For their own safety, children under 16 are not permitted in laboratories or workshops, unless on a visit organised in conjunction with the Laboratory Safety Supervisor.

10. Before going on a field trip, you must read and adhere to the field trip safety regulations supplied to you by the lecturer in charge. Please note that it is not permitted to take alcohol, drugs, or firearms on any field trip.

11. Accidents, incident, and near misses that occur in laboratories, workshops, or on field trips, must be reported as soon as possible (within 48 hours for non-serious, or immediately for serious accidents) to the appropriate supervisor and the prescribed form must be filled in. Accidents in the University grounds should be reported to Student Services.
GRADUATE SAFETY, SECURITY AND RESPONSIBILITIES POLICY

All graduates must read, understand and acknowledge the booklet Introduction to Health and Safety in the FSEN before starting work in the Faculty. Student research projects need to be discussed between the student, their academic supervisor and the laboratory safety supervisor BEFORE the project begins.

All laboratories have a designated laboratory safety supervisor. Each laboratory safety supervisor is responsible for the safe operation of his/her laboratory and has full authority over all operational and health and safety matters relating to the laboratory. The supervisor’s name and contact details are on the laboratory safety signage, posted on the entrance doors to each laboratory complex. Make sure you know who your laboratory safety supervisor is and how to contact him/her.

There is a laboratory safety folder in each laboratory which contains details of the hazards and safety requirements pertinent to the laboratory; details of any special handling requirements and precautions necessary when using equipment and instrumentation; matters related to storage of chemicals; details of any training that may be required to work in the laboratory and; copies of Material Safety Data Sheets for any toxic or dangerous substances that may normally be used in the laboratory.

Student inductions must be completed with the academic or laboratory safety supervisor BEFORE starting any laboratory work. Make sure you are familiar with all the hazard, accident and emergency information in the laboratory safety folder in any laboratory that you work in.

All laboratory hazards must be appropriately controlled. Report any new or uncontrolled hazards to the laboratory safety supervisor immediately.

Students must comply with the safety requirements of the laboratory, which includes the use of gloves, masks and other protective equipment as advised. You must be fully trained to use laboratory chemicals and equipment, and this must be documented.

You will be advised where the fire exits, fire extinguishers, and first aid boxes are located in any laboratory or workshop you occupy. If you are unsure or have questions regarding what to do in an emergency, please ask your laboratory safety supervisor for assistance.

1. It is not permitted to eat or drink in laboratories.
2. Smoking is not permitted in any areas of the University campus.
3. Bare feet are not permitted in the Science & Engineering buildings. Jandals and sandals are not adequate foot protection in workshops and some laboratories. Beware – the vinyl flooring can become very slippery when wet.
4. Chemicals and equipment must not be taken for private use. Equipment taken out of the buildings for research use must be properly logged.
5. It is not permitted to carry out experimental work in laboratories after hours unless permitted by the laboratory safety supervisor, and at least one other person is in the building and knows you are there.
6. Card keys are issued through the School offices to research students and staff who need access to the buildings after normal working hours. Security staff are authorised to ask anyone who cannot produce a card key to leave at once. You must not lend your card key to anyone else; this may lead to your key being withdrawn. Visitors must be approved by the laboratory safety supervisor.
7. All visitors must report to the Faculty Office FG.G.04, or relevant School for a visitors’ pass. You are responsible for anyone who visits you in the laboratory.
8. Experimental equipment that is left running overnight must have a Leave On Card attached showing the date, your name, address, and contact phone number. Normally, water stills and water-cooled equipment should not be left running overnight. The security staff may turn off unlabeled equipment. Before use, any electrical equipment must have an up-to-date electrical test sticker attached; if not, advise the laboratory safety supervisor. Electrical equipment should be unplugged from the mains supply when not in use. All hoses must be securely fixed to equipment using approved clamps.

9. Acids, strong alkalis, solvents, hydrogen peroxide, and formaldehyde should normally be supplied and stored in glass or approved types of containers only. Plastic containers can become brittle and break.

10. The Science Store will issue chemicals and other requirements only to properly authorised users. Make sure you know the authorisation system applied by your School. A filled-out Requisition Form is required, stating full name, School, account code and authorising signature.

11. The Science Store will issue 2 or 2.5 litre containers of any chemical only to customers who come equipped with an approved Winchester carrier.

12. Gas cylinders must be securely restrained in laboratories. Chains are recommended. Gas cylinders may be moved about the corridors only in purpose-built trolleys and should have their regulators removed or capped before moving out of position. Valves must never be greased.

13. Glassware and other equipment must be clean and free from contaminants or mercury residues before being taken to a Technical Service for repair. All equipment for repair must be accompanied by a signed Contaminant Declaration Label available from your laboratory safety supervisor. Workshop job forms are available on the intranet (info.sci.waikato.ac.nz)

14. For advice on the disposal of all samples and chemicals, consult your supervisor or the laboratory safety supervisor.

15. Field trips require special safety precautions. Faculty policy relating to field trips and industrial site visits can be viewed on the intranet (info.sci.waikato.ac.nz)

16. Only authorised users may drive University vehicles. Consult your School to obtain the necessary authorisation. University vehicles cannot be used for personal purposes.

RESPONSIBILITIES

It is your responsibility to find out about any hazards associated with your laboratory work and to ensure that you wear gloves, masks and other protective equipment as advised. You must be fully trained to use equipment and this must be documented. Each laboratory area has its own safety folder and instructions – make sure you are familiar with them.

In case of fire, you must report it to a staff member, activate the alarm, and leave the building.
HEALTH AND SAFETY INFORMATION AND CONTACTS

If you have any safety and health concerns, contact your supervisor in the first instance. Your first contact in all matters relating to the use and function of any laboratory that you work in should normally be with the Laboratory Safety Supervisor.

THE CHAIR OF THE FACULTY OCCUPATIONAL HEALTH AND SAFETY COMMITTEE

Shelley Catlin
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Email: shelley.catlin@waikato.ac.nz

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FACULTY FIELD TRIP HEALTH AND SAFETY OFFICER

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Email: annie.barker@waikato.ac.nz

EVACUATION OFFICER

Ivan Bell
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Email: ivan.bell@waikato.ac.nz

RADIATION SUBCOMMITTEE CHAIRPERSON

Associate Professor Johan Verbeek
Phone: +64 7 838 4947
Email: johan.verbeek@waikato.ac.nz

LASER SAFETY CHAIRPERSON

Shelley Catlin
Phone: +64 7 838 4292
Email: shelley.catlin@waikato.ac.nz

Sources of Health and Safety information in the Faculty can be found on our info.sci website: info.sci.waikato.ac.nz/health_safety/has_intro.shtml and the Health and Safety notice board in the Faculty of Science & Engineering Tearoom. Many staff in the Faculty hold current first aid certificates; these are listed in the internal phone book: phonebook.waikato.ac.nz

CONTACTS FOR EMERGENCY USE ARE:

CHEMICAL EMERGENCIES
Phone: +64 7 838 2889 extn 8888 OR 027 629 1802

UNIVERSITY SECURITY
Phone: +64 7 838 4444

EMERGENCY SERVICES
Phone: 111
## 2018 TEACHING AND ASSESSMENT PERIODS

<table>
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<tr>
<th>State School dates</th>
<th>Week</th>
<th>Starting</th>
<th>Mon</th>
<th>Tue</th>
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WHERE THE WORLD IS GOING
TE AHUNGA O TE AO