Welcome to Waikato

The University of Waikato is one of the world’s leading universities, and the university of choice for more than 12,000 students each year.

Established in 1964 as a result of the demands of a local community, the University of Waikato is a world-ranked institution providing state-of-the-art facilities for staff and students. The recently completed Law Building and award-winning Student Centre provide excellent spaces for teaching and learning.

Research is the lifeblood of the University and we continue to produce research and researchers who are providing answers to some of the key problems being faced by industries, governments and nations around the world. We have six research institutes which enable our postgraduate students to contribute to regional, national and global research.

Our graduates are committed to making a real difference for their employers. Our Curriculum Enhancement Programme will see us designing and delivering a more future-focused curriculum that is responsive to changing student, employment and societal needs. This includes components that mirror real-life situations, which helps create graduates who are work-ready and attractive to employers.

Data released in early 2016 by Universities New Zealand show the value of investing in a degree; a typical graduate earns about $1.6 million more over their working life than a non-graduate, and those with masters or honours degrees were earning about 9% more than bachelor level, and those with a PhD were earning 22% more than masters or honours level.

Whatever your journey, the University of Waikato provides an outstanding learning environment and we look forward to seeing you on campus.

Professor Neil Quigley
Vice-Chancellor
Welcome to Science & Engineering

New Zealand and the world needs people with curious minds who are willing to ask the hard questions and who will work towards creating a bright future. The grand challenges facing society demand research and developments that transcend disciplinary boundaries, requiring an increase in flexibility in the way we seek to understand the world and the ways we prepare students to meet society’s future needs.

The Faculty of Science & Engineering is a cohesive cross-disciplinary unit, providing wider opportunities in teaching, research and innovation. We offer flexible programmes that produce multi-skilled, adaptable graduates who are ready for the challenges of today and have the skills to tackle the obstacles of tomorrow. Our students’ career prospects are limited only by their interests and their imagination. Our graduates find themselves employed throughout New Zealand and overseas in a wide range of well-paid, interesting and stimulating occupations.

Our academics have national and international reputations in their subjects and place an emphasis on maintaining a productive balance between the growth areas of science and engineering and applying that knowledge with technological application to give practical solutions. Along with having very well equipped laboratories and workshops, our academics are well placed to address many of the challenges outlined in New Zealand’s National Science Challenges and the UN’s Millennium Development Goals.

Professor Chad Hewitt  
Dean – Science

Professor Janis Swan  
Acting Dean – Engineering
We have endeavoured to ensure that the information in this publication is accurate at the time of printing. Readers should be aware that the online 2017 University of Waikato Calendar takes precedence.
Contact details

The Faculty Office FG.G.04

The Faculty Office can help you with the following:
• Information about your papers and your qualification
• Enrolment and programme advice
• Entry and re-entry decisions
• Degree planning
• Student orientation
• Academic support for Māori and international students, and
• Dealing with other parts of the University and outside organisations such as StudyLink.

Dean of Science
Professor Chad Hewitt

Acting Dean of Engineering
Professor Janis Swan

Faculty Registrar
Tim O’Brien

Room: FG.G.04
Phone: 07 838 4290
Email: tobrien@waikato.ac.nz

Associate Dean
(Teaching and Learning)
Dr Alison Campbell

Room: FG.G.06
Phone: 07 838 4582
Email: a.campbell@waikato.ac.nz

Associate Dean (Research)
Professor Craig Cary

Room: TRU.G.23
Phone: 07 838 4593
Email: caryc@waikato.ac.nz

Associate Dean (International)
Associate Professor Rainer Künnemeyer

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Phone: 07 838 4630
Email: rainer@waikato.ac.nz

Associate Dean (Postgraduate),
Postgraduate Research Committee
and Scholarship Committee Representative
Associate Professor Michael Mucalo

Room: FG.G.06C
Phone: 07 838 4404
Email: mucalo@waikato.ac.nz

Chair of Coastal Science
Professor Chris Battershill

Phone: 07 557 0481
Email: cbatters@waikato.ac.nz

Māori Science Support Officer
Kevin Eastwood

Room: R.1.07
Phone: 07 837 9384
Email: keastwoo@waikato.ac.nz

Please assist us in looking after the environment by returning this handbook (unmarked and undamaged) to the FSEN reception when you are finished with it so that we may reuse it. Thank you.
Contact details

Schools and research units

There are two schools and many active research groups within the Faculty, spanning a wide range of topics. Students should consult with staff in their research area to formulate a research programme. Opportunities also exist for collaboration with outside organisations as part of your research.

School offices and research units can help you with the following:

• Admission to graduate qualifications
• Programme advice and approval
• Information about possible research topics
• Academic support and supervision, and
• Scholarships and funding.

School of Science

The School of Science administers programmes of study and papers in Biological Sciences, Chemistry, Earth Sciences and Environmental Sciences.

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<th>Office:</th>
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<td>E.2.20</td>
<td>07 838 4148</td>
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<td><a href="mailto:sciadmin@waikato.ac.nz">sciadmin@waikato.ac.nz</a></td>
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<td>sci.waikato.ac.nz</td>
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Assistant Dean (Academic)  Phone:  07 838 9391
Dr Jo Lane  Email:  jlane@waikato.ac.nz

Assistant Dean (Research)  Phone:  07 838 4123
Associate Professor Karin Bryan  Email:  kbryan@waikato.ac.nz

School of Engineering

The School of Engineering administers programmes of study and papers in Electronics, Engineering, Materials and Processing and Physics.

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<td><a href="mailto:engineering@waikato.ac.nz">engineering@waikato.ac.nz</a></td>
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<td>eng.waikato.ac.nz</td>
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### School of Psychology

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<tr>
<td>Phone:</td>
<td>07 838 4032</td>
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<tr>
<td>Email:</td>
<td><a href="mailto:psychology@waikato.ac.nz">psychology@waikato.ac.nz</a></td>
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### Research units and centres

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<tr>
<th>Research unit</th>
<th>Phone:</th>
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<tbody>
<tr>
<td>Coastal Marine Group</td>
<td>07 838 4893</td>
<td><a href="mailto:cbatters@waikato.ac.nz">cbatters@waikato.ac.nz</a></td>
</tr>
<tr>
<td>Director: Professor Chris Battershill</td>
<td></td>
<td>sci.waikato.ac.nz/research/centres-and-units/cmg</td>
</tr>
<tr>
<td>Co-operative Education Unit</td>
<td>07 838 4892</td>
<td><a href="mailto:karsten@waikato.ac.nz">karsten@waikato.ac.nz</a></td>
</tr>
<tr>
<td>Director: Dr Karsten Zegwaard</td>
<td></td>
<td>sci.waikato.ac.nz/study/work-placements</td>
</tr>
<tr>
<td>Engineering Education Research Unit (EERU)</td>
<td>07 858 5171</td>
<td><a href="mailto:eeruwaikato@waikato.ac.nz">eeruwaikato@waikato.ac.nz</a></td>
</tr>
<tr>
<td>Director: Associate Professor Bronwen Cowie</td>
<td>07 838 4712</td>
<td>waikato.ac.nz/eeru</td>
</tr>
<tr>
<td>Environmental Research Institute</td>
<td>07 838 4893</td>
<td><a href="mailto:mcambel@waikato.ac.nz">mcambel@waikato.ac.nz</a></td>
</tr>
<tr>
<td>Director: Professor Marnie Campbell</td>
<td></td>
<td>waikato.ac.nz/eri</td>
</tr>
<tr>
<td>International Centre for Terrestrial Antarctic Research</td>
<td>07 858 4593</td>
<td><a href="mailto:c.cary@waikato.ac.nz">c.cary@waikato.ac.nz</a></td>
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<tr>
<td>Director: Professor Craig Cary</td>
<td>07 838 4324</td>
<td>nztabs.ictar.aq</td>
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<tr>
<td>Thermophile &amp; Microbial Biochemistry &amp; Biotechnology Unit</td>
<td>07 838 5165</td>
<td><a href="mailto:irmcdon@waikato.ac.nz">irmcdon@waikato.ac.nz</a></td>
</tr>
<tr>
<td>Director: Associate Professor Ian McDonald</td>
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<tr>
<td>Director: Professor Craig Cary</td>
<td>07 838 4593</td>
<td><a href="mailto:caryc@waikato.ac.nz">caryc@waikato.ac.nz</a></td>
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<tr>
<td>Waikato Bio-Imaging Facility</td>
<td>07 838 4179</td>
<td><a href="mailto:b.obrien@waikato.ac.nz">b.obrien@waikato.ac.nz</a></td>
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<tr>
<td>Manager: Dr Barry O’Brien</td>
<td></td>
<td>sci.waikato.ac.nz/microscopy</td>
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<tr>
<td><strong>Waikato Centre for Advanced Materials (WaiCAM)</strong></td>
<td><strong>Phone:</strong> 07 838 6753</td>
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<tr>
<td><strong>Contact:</strong> Professor Kim Pickering</td>
<td><strong>Fax:</strong> 07 838 4835</td>
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<td></td>
<td><strong>Email:</strong> <a href="mailto:engineering@waikato.ac.nz">engineering@waikato.ac.nz</a></td>
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<td><strong>Email:</strong> sci.waikato.ac.nz/waicam</td>
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<tr>
<th><strong>Waikato DNA Sequencing Unit</strong></th>
<th><strong>Phone:</strong> 07 838 4757</th>
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<tr>
<td><strong>Director:</strong> Dr Charles Lee</td>
<td><strong>Email:</strong> <a href="mailto:clee@waikato.ac.nz">clee@waikato.ac.nz</a></td>
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<td><strong>Fax:</strong> 07 838 4192</td>
<td><strong>Email:</strong> sci.waikato.ac.nz/sequence</td>
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<tr>
<th><strong>Waikato Electron Microscope Facility</strong></th>
<th><strong>Phone:</strong> 07 858 5027</th>
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<tr>
<td><strong>Manager:</strong> Helen Turner</td>
<td><strong>Email:</strong> <a href="mailto:hturner@waikato.ac.nz">hturner@waikato.ac.nz</a></td>
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<td><strong>Fax:</strong> 07 838 4384</td>
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<td><strong>Email:</strong> sci.waikato.ac.nz/microscopy</td>
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<th><strong>Waikato Mass Spectrometry Facility</strong></th>
<th><strong>Phone:</strong> 07 838 4384</th>
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<tr>
<td><strong>Manager:</strong> Associate Professor Merilyn Manley-Harris</td>
<td><strong>Email:</strong> <a href="mailto:manleyha@waikato.ac.nz">manleyha@waikato.ac.nz</a></td>
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<td><strong>Fax:</strong> 07 838 4192</td>
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<td><strong>Email:</strong> mass-spec.co.nz</td>
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<tr>
<th><strong>Waikato Radiocarbon Dating Laboratory</strong></th>
<th><strong>Phone:</strong> 07 838 4707</th>
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<tr>
<td><strong>Director:</strong> Associate Professor Alan Hogg</td>
<td><strong>Email:</strong> <a href="mailto:alan.hogg@waikato.ac.nz">alan.hogg@waikato.ac.nz</a></td>
</tr>
<tr>
<td><strong>Fax:</strong> 07 838 4192</td>
<td><strong>Email:</strong> radiocarbondating.com</td>
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<tr>
<th><strong>Waikato Stable Isotope Unit</strong></th>
<th><strong>Phone:</strong> 07 838 4613</th>
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<tr>
<td><strong>Director:</strong> Professor Brendan Hicks</td>
<td><strong>Email:</strong> <a href="mailto:b.hicks@waikato.ac.nz">b.hicks@waikato.ac.nz</a></td>
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<td><strong>Fax:</strong> 07 838 4192</td>
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<td><strong>Email:</strong> bio.waikato.ac.nz/isotope</td>
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<tr>
<th><strong>University of Waikato Herbarium</strong></th>
<th><strong>Phone:</strong> 07 838 4053</th>
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<tr>
<td><strong>Curator:</strong> Dr Chrissen Gemmill</td>
<td><strong>Email:</strong> <a href="mailto:gemmill@waikato.ac.nz">gemmill@waikato.ac.nz</a></td>
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How to enrol

To complete an application:

• Visit the University of Waikato website. An application to enrol may be completed online at: waikato.ac.nz/enrol or;
• Call 0800 WAIKATO (0800 924 528) for an application pack.

If you wish to discuss your application, programme of study or would like further information about studying at the University of Waikato, please contact the Faculty Office. Academic approval for your programme of study must be obtained from the relevant Graduate Convenor. This is done through completion of the Graduate Planner form available from the School or Faculty Office.

Enrolment in higher degrees (MPhil and PhD) is more involved and should be discussed with the Graduate Convenor or with the staff in the Postgraduate Studies Office.

View our higher degree regulations here: calendar.waikato.ac.nz/regulations/higher
Degrees and qualifications

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Master of Environmental Sciences 12
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Master of Science (Technology) 14
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Postgraduate Certificate 17
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Bachelor of Science (Honours) 18
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Entry requirements

Admission to graduate qualifications offered by the Faculty of Science & Engineering is normally at the discretion of the relevant Graduate Convenor or his/her nominee. Prospective students should contact the Graduate Convenor at their earliest convenience to discuss possible research options and the appropriate papers available to them.

Entry from a bachelors degree

This is the normal criterion for admission to graduate qualifications. You must satisfy the Graduate Convenor that you are academically prepared to enrol in the qualification and that an appropriate research topic can be supported by the School.

Entry from non-degree qualifications

Candidates with an NZCE, NZCS or equivalent and at least two years relevant work experience are normally dealt with on the same basis as those with bachelors degrees.

Entry from other qualifications

Admission to graduate qualifications is also assessed on a case-by-case basis. Normally, you will be expected to complete a programme of undergraduate papers to ensure that you are well prepared for admission.

Candidates who have already completed 120 points at 500 level for qualifications such as a Bachelor of Science (Honours) or a Postgraduate Diploma may be able to undertake a one-year Master of Science degree by thesis research.

Entry to higher degrees

Admission to higher degrees (Master of Philosophy and Doctor of Philosophy) is at the discretion of the Postgraduate Studies Committee. Prospective candidates should contact the Graduate Convenor at their earliest convenience to discuss their options.

Please refer to the 2017 University of Waikato Calendar online at calendar.waikato.ac.nz for degree regulations.
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 up skill 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.

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<th>ME – Year 1 options</th>
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<td>OPTION 1</td>
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Papers for the ME Degree

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

- Electronics page 56
- Engineering page 58
- Materials and Processing page 59
- Physics page 63

Please refer to the 2017 University of Waikato Calendar online at calendar.waikato.ac.nz for degree regulations.
Master of Science MSc

The MSc can be a 12-18 month research focused degree, where the mix of research and taught papers are tailored to suit prior learning experiences.

It is a degree that is customised to provide excellent career opportunities and a great background for further study.

The papers offered by the University of Waikato towards the Master of Science have been designed to achieve particular outcomes involving mastery of content, acquisition of skills and development of attributes. Learning experiences are incorporated into the programme to bring about these desired outcomes, and assessment is designed to ensure that students have the opportunity to demonstrate their achievement.

In practice, an MSc is normally an 18-month full-time programme of study building on the specialisation of the undergraduate degree, which combines taught papers (normally 90 points) with a research thesis (normally 90 points). The balance of theses to taught papers may be altered subject to permission from the graduate co-ordinator in your discipline of choice. It introduces students to the frontiers of knowledge and trains them in the relevant techniques of the subject. It is at a level demonstrably in advance of undergraduate study, and requires students to engage in scholarship. Excellence in MSc study is rewarded by the level of honours attained.

Please enquire with the Faculty Office about other graduate qualification options.

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<th>MSc Structure</th>
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Please refer to the 2017 University of Waikato Calendar online at calendar.waikato.ac.nz for degree regulations.
Master of Environmental Sciences MEnvSci

The MEnvSci is normally a 12-18 month tailorable interdisciplinary environmental science-focused degree comprising of a minimum of 90 points in taught papers at 500 level and a maximum 90 point thesis, intended for both science and engineering graduates who wish to further their knowledge and research skills in the area of Environmental Sciences.

The minimum research component for this degree is a 30 point research dissertation combined with a research method paper and the rest taught papers. However, the relative levels of research and taught papers can be varied to include a 60 point dissertation or a 90 point thesis. At least one of the taught papers should be from another Faculty.

A key feature of this degree is the development of scientific and interdisciplinary (cross-faculty) independent research skills, including collection and analysis of data and critical review of the relevant literature: students are required to engage in scholarship.

MEnvSci students gain relevant high-level subject knowledge, enhanced critical thinking skills, and practical and/or field based research skills relevant to their particular major or research area, but in particular focused on the Environmental Sciences. Assessment is designed to ensure that students have the opportunity to demonstrate their achievement.

The balance of theses to taught papers may be altered subject to permission from the Environmental Science Graduate Co-ordinator.

### MEnvSci structure

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Please refer to the 2017 University of Waikato Calendar online at [calendar.waikato.ac.nz](http://calendar.waikato.ac.nz) for degree regulations.
Master of Science (Research) MSc(Research)

The MSc(Research) is an internationally recognised qualification, valued for its flexibility and general excellence in education and training. It is a degree that is tailored to provide excellent career opportunities and a great background for further study.

The papers offered by the University of Waikato towards the Master of Science (Research) have been designed to achieve particular outcomes involving mastery of content, acquisition of skills and development of attributes. Learning experiences are incorporated into the programme to bring about these desired outcomes, and assessment is designed to ensure that students have the opportunity to demonstrate their achievement.

An MSc(Research) is normally a two-year coherent, advanced programme of study building on the specialisation of the undergraduate degree, which combines taught papers with a research thesis or dissertation.

The degree may be completed on a part-time basis. It introduces students to the frontiers of knowledge and trains them in the relevant techniques of the subject. It is at a level demonstrably in advance of undergraduate study, and requires students to engage in scholarship. Excellence in MSc(Research) study is rewarded by the level of honours attained.

Note(s): A 12-month masters degree by thesis research may be available to students who have already completed 120 points at 500 level for qualifications such as a Bachelor of Science (Honours) or a Postgraduate Diploma.

Please enquire with the Faculty Office about other graduate qualification options.

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<thead>
<tr>
<th>MSc (Research) structure</th>
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Please refer to the 2017 University of Waikato Calendar online at calendar.waikato.ac.nz for degree regulations.
Master of Science (Technology) MSc(Tech)

The MSc(Tech) is similar to the MSc, but has two important differences.

This programme must include the papers ENMP585 and ENMP586 Industrial Technology and Innovation 1 and 2 (30 points), and a thesis that reports the results of an investigation relating to some applied or industrial study.

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<th>MSc(Tech) structure</th>
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Please refer to the 2017 University of Waikato Calendar online at calendar.waikato.ac.nz for degree regulations.
Enrolment patterns for masters students

All masters students must submit an application to enrol and liaise with the appropriate School to complete a Graduate Planner form before their programme may be approved and their enrolment can be finalised. This is to ensure that you and your supervisor are aware of your proposed plan of study and final submission date. This form can be obtained from the Faculty Office or a School Office.

Candidates for MSc (Research) and MSc(Tech) degrees are required to complete 240 points at 500 level toward these degrees. Each full-time masters student will normally enrol in the first year of the masters programme in 120 points worth of taught papers. In the second year of the programme, each student will normally enrol in a 120 point thesis (Subject code: xxxx594).

Candidates for an MSc degree are required to complete 180 points at 500 level toward these degrees. Each full-time MSc student will normally enrol in the first year of the masters programme in 90 points worth of taught papers and 30 points towards their thesis. In the second year of the programme, each student will normally enrol in the remaining 60 points of their thesis (Subject code: xxxx594).

Full-time vs part-time

A full-time student must complete a masters degree (MSc(Research) and MSc(Tech)) in 24 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 240 points within four 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 (240 points). For example: A 1 August enrolment for 60 points a year will require a July submission four years from first enrolment.

A full-time MSc student must complete in 18 consecutive months from first enrolment to qualify for the award of honours.

A full-time ME student must complete their degree in 12 consecutive months from first enrolment to qualify for the award of honours. Part-time students must complete 120 points within 24 months from the date of first enrolment to qualify for honours. Part-time candidates seeking the award of honours should consult with the Faculty Registrar.

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 vs thesis papers

The relevant Graduate Co-ordinator (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

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 Graduate Convenor through the Graduate Planner 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 relevant Dean or Assistant Dean and then to the Associate Dean (Postgraduate). Candidates should note that they are welcome to raise any concerns in confidence with the Associate Dean (Postgraduate) directly at any stage.

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 Dean 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 counsellor or similar.

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

Re-enrolment

Candidates who are awarded an extension of greater than three weeks are required to re-enrol 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 and Academic Services after advice provided by the Faculty.
Postgraduate Diploma PGDip

This qualification enables science graduates to complete a postgraduate qualification in one year without committing themselves to the two years of study required for a masters degree.

The candidate’s programme of study requires approval of the Academic Board.

<table>
<thead>
<tr>
<th>PGDip structure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YEAR 1</strong></td>
</tr>
<tr>
<td>500 LEVEL</td>
</tr>
<tr>
<td>120 points</td>
</tr>
</tbody>
</table>

In summary the requirements are:
- A total of 120 points at 500 level from papers in appropriate subjects
- 90 points in one subject, and
- 30 points may be taken from a subject offered by another school or faculty.

Postgraduate Certificate PGCert

This qualification is open to graduates with a bachelors degree or similar qualification who wish to further their knowledge of a selected and limited area of applied science.

<table>
<thead>
<tr>
<th>PGCert structure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEMESTER 1</strong></td>
</tr>
<tr>
<td>500 LEVEL</td>
</tr>
<tr>
<td>60 points</td>
</tr>
</tbody>
</table>

In summary the requirements are:

60 points at 500 level or above in an approved subject.

Please refer to the 2017 University of Waikato Calendar online at calendar.waikato.ac.nz for degree regulations.
Graduate Diploma **GradDip**

The GradDip is a 120 point qualification that extends learning outside of your first degree.

It is made up of level 100, 200 and 300 papers.

Students require 120 points including at least 80 points at 300 level. Students must also gain at least 80 points in one subject.

**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.

**Bachelor of Science (Honours) BSc(Hons)**

Admission to this degree is by invitation only. Prospective students considering a BSc(Hons) must have already qualified for the award of a University of Waikato BSc or BSc(Tech) or an equivalent degree.

Students interested in undertaking the BSc(Hons) in the Faculty of Science & Engineering must first consult with the relevant Graduate Convenor. The degree requires the completion of 120 points at 500 level over one year, including a substantial component of research.

<table>
<thead>
<tr>
<th>BSc(Hons) Structure</th>
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</thead>
<tbody>
<tr>
<td><strong>YEAR 1</strong></td>
</tr>
<tr>
<td>500 LEVEL</td>
</tr>
<tr>
<td>60-90 points</td>
</tr>
<tr>
<td>DISsertation</td>
</tr>
<tr>
<td>30-60 points</td>
</tr>
</tbody>
</table>
Higher degrees

Master of Philosophy (MPhil)

The MPhil degree is a pre-eminent research-based degree in which students undertake a programme of approved and supervised research that leads to a thesis.

The thesis critically investigates an approved topic of substance and significance, demonstrates expertise in the methods of research and scholarship, displays intellectual independence and makes a substantial original contribution to the field of study, and is of publishable quality.

Doctor of Philosophy (PhD)

The PhD degree is the highest degree awarded by the University for research that is carried out under the supervision of staff members.

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

Administration of higher degrees

The Postgraduate Research Committee (PGRC) oversees the academic requirements and administration of higher degrees.

The Postgraduate Studies Office (PGSO) is the central administrative office for all higher degrees. The PGSO provides advice to candidates, liaises with School/Faculty administrators and academic staff, and keeps academic and administrative records for all candidates.

Application and enrolment

Academic prerequisites for higher degrees

To qualify to enrol in a higher degree all candidates are expected to have a BSc degree with first or upper second-class honours, or an MSc degree with first or upper second-class honours. In special cases where candidates do not meet the academic prerequisites, appropriate research experience may be acceptable.

Initial enquiries

Initial enquiries can be made to the relevant Graduate Convenor or the Postgraduate Studies Office.
Application process

Enrolment in higher degrees (MPhil and PhD) is a more involved process than that for masters degrees. Please refer to waikato.ac.nz/sasd/postgraduate for more detailed information.

Prospective candidates must complete an application to enrol form. The application must also be accompanied by evidence of the following: date of birth, New Zealand citizenship, permanent residency (if applicable), previous qualifications, and academic transcripts. In addition to these, international students must also provide evidence of study permit, English language proficiency, student statement, CV and references.

The application to enrol must also be accompanied by a research proposal. The proposal should contain the following information:

- A working title
- An outline of the topic or research question and the proposed aim(s) or objective(s) of the study
- An indication of the theoretical framework
- A description of the research methodology
- A statement indicating any ethical issues, and
- A time-line showing stages of the work and projected dates for completion of stages.

The application to enrol must be endorsed by the supervisory panel, postgraduate convenors or nominee, and Faculty Postgraduate Research Committee representative. Applications to enrol for a higher degree are subject to approval by the Postgraduate Research Committee under delegated authority of the Academic Board.

Enrolment

Candidates may enrol at any time of the year; the enrolment must commence from the first day of any month. When an application to enrol in a higher degree has been approved by the Postgraduate Research Committee, candidates will be sent an enrolment agreement, with information on how to complete enrolment. When the agreement is returned, and payment of fees has been made, the candidate will be enrolled.

Structure of a higher degree

Status

Candidates may apply for full-time or part-time enrolment. This status may be changed at any time during the enrolment.

Duration of study period

<table>
<thead>
<tr>
<th>Degree</th>
<th>Status</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master of Philosophy – MPhil</td>
<td>Full-time</td>
<td>1 year</td>
<td>2 years</td>
</tr>
<tr>
<td></td>
<td>Part-time</td>
<td>2 years</td>
<td>4 years</td>
</tr>
<tr>
<td>Doctor of Philosophy – PhD</td>
<td>Full-time</td>
<td>3 years</td>
<td>4 years</td>
</tr>
<tr>
<td></td>
<td>Part-time</td>
<td>4 years</td>
<td>8 years</td>
</tr>
</tbody>
</table>

Candidates must be enrolled for the minimum term of the degree in which they are enrolled, before the thesis can be submitted.
Conditional enrolment

All PhD candidates will be conditionally enrolled for a period of 6 months (full-time status) or 12 months (part-time status). In this period, the candidate is expected to develop a full research plan, and obtain any necessary ethical approval. There is no period of conditional enrolment for the MPhil degree.

Confirmed enrolment

The full research plan must be presented orally in front of a preferably wide audience of academic peers in the discipline or across disciplines and in writing and then approved by the supervisory panel, Graduate Convenor and Faculty Postgraduate Research Committee representative. The plan is then submitted to the Postgraduate Studies Committee for final approval. Once approval is given, the candidate’s enrolment is confirmed.

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 Postgraduate Studies Office. 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, Graduate 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(s): This is an attempt to summarise processes related to Higher Degrees enrolment. You can find more information and a link to the Higher Degrees Handbook on the Postgraduate Studies website waikato.ac.nz/sasd/postgraduate
### Subject Areas

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<td>Psychology</td>
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<tr>
<td>Radiocarbon Dating</td>
<td>42</td>
</tr>
</tbody>
</table>
Biological Sciences

Contact details

bio.waikato.ac.nz

School of Science Office
Room: E.2.20
Phone: 07 838 4148
Email: sciadmin@waikato.ac.nz

Ecology & Whole Organism Room: R.2.20
Biology Co-ordinator
Professor Conrad Pilditch
Email: conrad@waikato.ac.nz

Cellular and Molecular Biology Room: CD.2.03
Co-ordinator
Dr Linda Peters
Email: lpeters@waikato.ac.nz

Biological Sciences provides research and postgraduate study opportunities where all research students acquire basic research skills and a knowledge of techniques, as well as training in specialist disciplines. All students will obtain a wide experience of practical and field research.

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

- Animal behaviour
- Animal physiology
- Antarctic ecosystems
- Biochemistry
- Biotechnology
- Botany
- Cellular and molecular biology
- Freshwater ecosystems
- Genetics
- Marine ecosystems
- Microbiology
- Science education
- Terrestrial ecosystems
- Thermophiles
- Zoology.

Biological Sciences research projects are supported by multi-million dollar investments from national and local government, many of which have significant iwi and other community involvement. These include lakes management, freshwater ecology, urban restoration, medical microbiology and Antarctic ecosystems. This funding also supports a variety of student and collaborative projects, together with scholarships and postgraduate opportunities.

Research units and facilities within Biological Sciences include the Waikato Stable Isotope Unit, the Waikato DNA Sequencing Facility, the Centre for Biodiversity & Ecology Research, the Thermophile & Microbial Biochemistry & Biotechnology Unit, Molecular Ecology and Systematics, Biomedical Research Unit, and the University of Waikato Herbarium (WAIK).
Academic staff

Professor Vic Arcus **BSc, MSc Waikato, PhD Cambridge**
Email: varcus@waikato.ac.nz
Research interests: Molecular biology; structural biology; and protein engineering.

Professor Chris Battershill **BSc MSc(Hons) PhD Auckland**
Email: c.battershill@waikato.ac.nz
Research interests: Marine science; coastal science; environmental science; marine biosystematics; marine biodiversity; marine conservation; marine ecology; marine microbiology; chemical ecology; environmental toxicology; environmental impacts; marine biodiscovery; aquaculture; temperate reefs; tropical reefs; and Antarctic marine science.

Dr Steven Bird **BSc(Hons), PhD Aberdeen**
Email: s.bird@waikato.ac.nz
Research interests: Molecular immunology, genetic evolution of immune system communication in vertebrates, immune genes as markers of fish health, development of antibodies to immune genes in vertebrates.

Dr Clare Browne **BSc, MSc, PhD Waikato**
Email: cbrowne@waikato.ac.nz
Research interests: Animal behaviour and welfare; learning in animals; communication; detection dogs, particularly conservation detection dogs and companion animal behaviour.

Dr Alison Campbell **BSc(Hons), PhD Massey, TTC**
Email: a.campbell@waikato.ac.nz
Research interests: The disparate fields of animal behaviour and science education, with a particular interest in students’ understanding of the language of science; gaps in student knowledge (and how to bridge them); and attitudes to the theory of evolution.

Professor Marnie Campbell **BSc(Hons), PhD**
Email: mcampbel@waikato.ac.nz
Research interests: Biosecurity; ecosystem restoration; conservation; risk and risk perceptions; environmental management; marine debris; environmental generational amnesia.

Professor Craig Cary **BSc Florida Tech, MSc San Diego State, PhD UC San Diego**
Email: c.cary@waikato.ac.nz
Research interests: Comparative physiology; biochemistry and ecology of microbial communities, with a focus on free-living syntrophic bacterial associations in extreme environments including hydrothermal vents and Antarctic soils; the use of high through-put genomic and molecular approaches to resolve biochemical adaptations to life in these extreme geochemical environments; interfacing new bioinformatic capabilities with genomic technologies in the metagenome analysis of complex microbial communities; and thermal stability of eurythermal proteins.

Dr Michael Clearwater **BSc, MSc(Hons) Auckland, PhD Edinburgh**
Email: m.clearwater@waikato.ac.nz
Research interests: Plant biology; plant physiology; plant physiological ecology; plant water relations; xylem and phloem transport; photosynthesis; tree biology; horticulture; fruit production; kiwifruit; avocado; sap flow; and forest ecology.
Associate Professor Kevin Collier  
**BSc Waikato, PhD Canterbury**  
Email: kcollier@waikato.ac.nz  
Research interests: Interactions between land use and stream macroinvertebrate communities; restoration of urban streams; development of indicators for monitoring aquatic ecosystem health; and the ecology of large rivers.

Dr Ray Cursons  
**BSc(Hons), MSc, PhD Massey**  
Email: r.cursons@waikato.ac.nz  
Research interests: Host and pathogen relationships; inflammation; innate immune markers; and mastitis.

Dr Ian Duggan  
**BSc, MSc, PhD Waikato**  
Email: i.duggan@waikato.ac.nz  
Research interests: Invasion biology and zooplankton ecology, particularly the exploration of biological invasion vectors responsible for transportation of species at global or finer scales. Such investigations are useful for prediction and prevention of invasions of non-indigenous species.

Dr Chrissten Gemmill  
**BSc California, PhD Colorado**  
Email: c.gemmill@waikato.ac.nz  
Research interests: Molecular systematics; conservation and restoration genetics; and biogeography of endemic Pacific plants, in particular plants of New Zealand and New Caledonia.

Professor David Hamilton  
**BSc, PhD Otago**  
Email: d.hamilton@waikato.ac.nz  
Research interests: Lake management and restoration, modelling of water quality in lakes and reservoirs, high frequency lake data, cyanobacteria blooms and toxins. Research on the Rotorua Lakes is supported through the Bay of Plenty Regional Council Chair in Lake Restoration.

Professor Chad Hewitt  
**AB California, PhD Oregon**  
Email: c.hewitt@waikato.ac.nz  
Research interests: Marine and coastal science; marine community ecology; marine biosecurity; invasion biology and ecology; community assembly; experimental ecology and biology; taxonomy of marine invertebrates (bryozoans and hydroids); marine biogeography; ocean governance; coastal zone management; environmental impacts; aquaculture; environmental risks; risk assessment and communication; consequences of global change and globalisation; environmental planning; environmental policy; science/policy interface.

Professor Brendan Hicks  
**BSc, MSc(Hons) Auckland, PhD Oregon State**  
Email: b.hicks@waikato.ac.nz  
Research interests: Ecology of freshwater fish; pest otolith microchemistry; and stable isotopes in food webs.

Associate Professor Ian Hogg  
**BSc(Hons) Toronto, MAppSc Canberra, PhD Toronto**  
Email: i.hogg@waikato.ac.nz  
Research interests: Ecology and consequences of environmental change/disturbance. In particular, the biodiversity of Antarctic invertebrates; genetic diversity and conservation of natural populations; freshwater and estuarine ecology; global climate change and environmental stress.
Professor C M King BSc(Hons) Liverpool, DPhil Oxford, PhD Waikato

Email: c.king@waikato.ac.nz

Research interests: Biology of carnivores, especially stoats and weasels; the ecology of small mammals, especially rodents and mustelids; the philosophy and management of nature conservation in national parks in New Zealand and Africa; and historical and contemporary relationships between science and theology.

Dr Anica Klockars MSc Örebro, PhD Uppsala

Email: aklockar@waikato.ac.nz

Research interests: The relationship between brain activity in social deficit disorders and neuroendocrine and behavioural parameters.

Dr Charles Lee BSc (Life Science) Tsing-Hua Taiwan, PhD Waikato

Email: c.lee@waikato.ac.nz

Research interests: I study the microbial ecology of a wide range of unusual ecosystems, including deep-sea hydrothermal vents and the Antarctic Dry Valleys, using molecular genetic and bioinformatic tools. I’m interested in the development and validation of novel molecular techniques and bioinformatic analyses, and I use them in conjunction with geochemistry to examine the interactions between microbial communities and their environments.

Dr Moritz Lehmann BSc(Hons) Newcastle, MSc York, PhD Dalhousie

Email: mlehmann@waikato.ac.nz

Research interests: My primary area of research is water quality of lakes and coastal oceans. I use coupled hydrodynamic-ecological models and observations from a variety of sources to understand water quality dynamics at a range of time and space scales. My research is applied and problem driven and has applications from the restoration of individual lakes to climate-change adaptation.

Associate Professor Nick Ling BSc, MSc(Hons), PhD Auckland

Email: nling@waikato.ac.nz

Research interests: Comparative physiology, particularly of fishes; ecotoxicology of fish and invertebrates; ecology of fishes; and physiology of vertebrate muscle.

Dr Chris Lusk BSc Massey, PhD, Auckland

Email: clusk@waikato.ac.nz

Research interests: Plant ecology; forest ecology; forest dynamics; plant functional ecology; plant physiological ecology.

Dr Ryan Martinus BSc, MSc Waikato, PhD Massey

Email: r.martinus@waikato.ac.nz

Research interests: Understanding relationships between mitochondrial stress and cellular inflammation in a) brain (ageing and neurodegeneration), b) pancreatic islet cells (diabetes) and c) reproductive processes (male fertility).
Associate Professor Ian McDonald  
**BSc(Hons) Ulster, PhD Liverpool**  
Email: i.mcdonald@waikato.ac.nz  
Research interests: Microbiology, molecular biology and biochemistry of atmospheric trace gas degrading bacteria; microbial ecology of methane, methyl halide and carbon monoxide utilising bacteria; and microbial ecology in extreme environments, including the Antarctic and New Zealand geothermal environments.

Dr Pawel K Olszewski  
**MSc Warsaw, PhD Minnesota/Cracow (joint programme)**  
Email: pawel@waikato.ac.nz  
Research interests: Regulation of appetite and body weight; brain circuits that control hunger, satiety and feeding reward; and pharmacological agents that modify food intake.

Dr Linda Peters  
**BSc(Hons) Victoria, PhD Waikato**  
Email: lpeters@waikato.ac.cnz  
Research interests: Human molecular genetics and bioinformatics; in particular, identifying genetic changes that contribute to common hereditary disorders in New Zealand.

Professor Conrad Pilditch  
**BSc, MSc Otago, PhD Dalhousie**  
Email: c.pilditch@waikato.ac.nz  
Research interests: Marine benthic ecology and oceanography, in particular how water movement affects benthic community dynamics through sediment transport, recruitment and food supply, ecology of suspension-feeders and bivalve aquaculture.

Dr Phil Ross  
**BSc, MSc Auckland, PhD Waikato**  
Email: rossp@waikato.ac.nz  
Research interests: Temperate soft sediment and rocky reef ecosystems; marine community ecology and molecular ecology; disturbance, dispersal, recruitment and recovery in marine ecosystems.  
My recent research has focused on connectivity among fragmented populations of New Zealand’s coastal benthos (primarily marine invertebrates) with the broad aims of a) better understanding the process of larval dispersal, and b) generating knowledge that can be used to improve the way in which New Zealand’s marine biological resources are managed.

Professor Joe Waas  
**BSc(Hons) Trent, PhD Canterbury**  
Email: waasur@waikato.ac.nz  
Research interests: Behaviour and ecology of birds, fish and mammals including studies of a) animal communication, b) the biology of aggression, c) animal welfare, d) social factors influencing reproductive physiology, e) conservation biology, f) social recognition systems, g) the ontogeny of social behaviour.
Chemistry

Contact details
chem.waikato.ac.nz

School of Science Office  Room:  E.2.20
Phone:  07 838 4148
Email:  sciadmin@waikato.ac.nz

Graduate Co-ordinator  Room:  E.3.06
Associate Professor Michèle Prinsep  Email:  michele@waikato.ac.nz

All staff in Chemistry are pleased to discuss their research interests.

Prospective students should contact those lecturers who work in an area of interest.

Areas of research include:

• Bioorganic chemistry
• Biomaterials
• Carbohydrate chemistry
• Colloid chemistry
• Crystal engineering
• Electrochemistry
• Environmental chemistry
• Fluorine chemistry
• Geochemistry
• Inorganic chemistry
• Mass spectrometry
• Natural products chemistry
• Organometallic chemistry
• Physical chemistry
• Polymers in materials chemistry
• Solid state NMR
• Theoretical chemistry.

Sometimes staff may have student scholarships associated with grants obtained as part of their research and so it is worthwhile asking about these opportunities. Please make contact with a Chemistry academic about any possible opportunity.
Academic staff

Dr Adam Hartland  BSc(Hons), PhD Birmingham
Email: ahrtland@waikato.ac.nz
Research interests: All aspects of trace element and isotope biogeochemistry. In particular: Interactions between dissolved organic matter, nanoparticles and trace metals and feedbacks with the terrestrial carbon cycle.

Professor Bill Henderson  BSc(Hons), PhD Leicester, FNZIC
Email: w.henderson@waikato.ac.nz
Research interests: Co-ordination and organometallic chemistry of platinum metals and gold; synthesis and applications of new organophosphorus compounds; electrospray mass spectrometry.

Dr Joseph Lane  BSc(Hons), PhD Otago FNZIC
Email: j.lane@waikato.ac.nz
Research interests: The application of computational chemistry methods to predict/interpret various aspects of chemistry. Primarily interested in modelling small atmospherically relevant molecules and understanding weak intermolecular interactions.

Associate Professor Merilyn Manley-Harris  BSc(Hons) James Cook, PhD Montana
Email: manleyha@waikato.ac.nz
Research interests: Chemistry of honey; prebiotic carbohydrates; analysis of various substrates using a variety of chromatographic and spectroscopic techniques; structure and chemistry of biochars.

Associate Professor Michael Mucalo  MSc, PhD Auckland, FNZIC
Email: m.mucalo@waikato.ac.nz
Research interests: Biomaterials; dairy chemistry; polymers in materials chemistry; drug delivery; preparation and properties of nanoparticles; and spectroelectrochemistry.

Associate Professor Michèle R Prinsep  BSc(Hons), PhD Canterbury, FNZIC
Email: michele@waikato.ac.nz
Research interests: Natural products chemistry, especially that of bryozoans and cyanobacteria (blue-green algae); structural determination of novel biologically active compounds using high-field NMR spectroscopy and mass spectrometry; structure-activity relationships; chemical ecology of marine organisms; secondary metabolites of terrestrial and marine fungi.

Dr Mohamed Rishard  BSc (Hons), PhD Texas A&M, PGDipSci Auckland
Email: rzuhair@waikato.ac.nz
Research interests: Molecular spectroscopy, computational chemistry, vibrational potential energy surfaces, abiotic polymerisation of amino acids, environmental chemistry.

Associate Professor Graham Saunders  BA(Hons), MA, DPhil Oxon, MRSC, CChem, MRSNZ
Email: g.saunders@waikato.ac.nz
Research interests: Using the properties of the carbon-fluorine bond in organometallic chemistry, for extremely water repellent surfaces, and in crystal engineering.
Earth Sciences

Contact details

earth.waikato.ac.nz

School of Science Office
Room: E.2.20
Phone: 07 838 4148
Email: sciadmin@waikato.ac.nz

Graduate Co-ordinator
Dr Julia Mullarney
Room: EF.1.01
Email: juliam@waikato.ac.nz

An understanding of Earth Sciences is essential if we are to sustainably manage the Earth’s energy, water, mineral, soil and coastal resources. The Earth Sciences are also the key to predicting and managing responses to natural hazards such as floods, earthquakes, tsunami, landslides and volcanic eruptions.

The University of Waikato is located in a major growth area of New Zealand, within which a wide range of regional activities relate directly to all areas of the Earth Sciences (eg resource exploration, extraction and management; water supply and treatment; agriculture, forestry, horticulture, urban development and land-use; geothermal and hydroelectric power).

We recognise the fundamental importance of the Earth’s physical environment and resources – landforms, rocks, sediments, soils, water, oceans and climate – for New Zealand’s development, and this philosophy is maintained as a central and integrating theme for both teaching and research.

A major objective of the subject is to provide graduates with a range of educational and vocational skills of international standing in Earth Sciences, which will permit them access to a broad range of professional opportunities, both within New Zealand and overseas.

While research activities in Earth Sciences span a wide range of topics, the subject presently focuses on five major fields of interest, each supported by the primary research interests of several academic staff. These fields are:

- Coastal marine processes and management
- Climatic and environmental change: past, present and future
- Sedimentary basins and resources
- Sustainable management of land and water resources and hazards
- Volcanic processes and hazards.

The staff members are committed to undertaking both pure and applied Earth Sciences research. Applied research is often supported by research contracts with outside organisations. A feature of many of the research projects is the development of close links with other geoscience research institutions, both in New Zealand and overseas.
Academic staff

Dr Megan Balks  BSc(Hons) Massey, PhD Waikato, FNZSSS
Email: m.balks@waikato.ac.nz
Research interests: Pedology and applied soil physics. Specifically: Effects of effluent irrigation on soil properties; Antarctic soils and permafrost; and environmental effects of human activities on soils in New Zealand and Antarctica.

Associate Professor Earl Bardsley  BSc(Hons), MSc, PhD Otago
Email: e.bardsley@waikato.ac.nz
Research interests: Applied hydrology including hydro power and optimal operation of surface and subsurface water systems; statistical analysis and data simulation; stochastic flood theory; optimisation applications; catchment modelling and hydroloclimatic forecasting.

Dr Shaun Barker  BSc(Hons) Otago, PhD Australian National University
Email: sbarker@waikato.ac.nz
Research interest: Mineral deposits and hydrothermal fluids, and how geochemistry, structural geology and minerology can be used to understand hydrothermal fluid flow in the earth. Broad interests in applied geochemistry and minerology, with applications to mineral exploration and mitigating the environmental effects of mining activities.

Associate Professor Karin Bryan  BSc(Hons) Toronto, PhD Dalhousie
Email: k.bryan@waikato.ac.nz
Research interests: Coastal oceanography and sediment transport. In particular: Wave properties; sediment-wave interactions; coastal storm hazards; surf-zone currents; turbulence induced by breaking waves; monitoring morphological change on beaches using sub-aerial video; physical controls on biological processes; and sedimentation patterns on the continental shelf and in estuaries.

Associate Professor Dave Campbell  BSc(Hons), PhD Otago
Email: d.campbell@waikato.ac.nz
Research interests: Surface water hydrology and ecohydrology, especially applied to wetland environments; surface-atmosphere processes in hydrology and climatology, including evaporation, energy and water balance studies; ecosystem carbon exchange; and micrometeorological methods.

Dr Willem de Lange  MSc, DPhil Waikato
Email: w.delange@waikato.ac.nz
Research interests: Oceanography, coastal processes and climatic hazards; tsunami and storm surge prediction and mitigation; wave-induced sediment transport on the continental shelf and within estuaries; dispersal of materials in the coastal zone; and numerical modelling.

Dr Bethany Fox  BSc(Hons) Open University, MA Cambridge, PhD Otago
Email: b.fox@waikato.ac.nz
Research interests: Reconstruction of past climate, especially temperature, precipitation and atmospheric carbon dioxide levels; past global change; palaeomagnetism; evolution of lake system; understanding past atmosphere/ocean dynamics.
Professor Peter Kamp  MSc, PhD Waikato
Email: p.kamp@waikato.ac.nz
Research interests: Sedimentary geology; sequence stratigraphy applied to New Zealand Cenozoic basins (Taranaki, Wanganui, East Coast); tectonic development of New Zealand; fission track thermochronology and U-Th/He thermochronometry applied to uplift/denudation history of New Zealand and thermal history of sedimentary basins.

Professor David J Lowe  MSc, PhD Waikato, FRSNZ, FNZSSS
Email: d.lowe@waikato.ac.nz
Research interests: Tephrochronology (correlation of tephra deposits and their application to dating geological, palaeoecological or archaeological deposits/events); pedology (origin, distribution and classification of soils) and paleopedology; and Quaternary science (palaeoenvironmental reconstruction).

Dr Vicki Moon  MSc, PhD Waikato, PEngGeol
Email: v.moon@waikato.ac.nz
Research interests: Geomechanics and engineering geology, particularly soft rocks; volcanic and pyroclastic materials; weathering; mass wasting of weathered and altered rocks; and soil erosion from development sites.

Dr Julia Mullarney  BA(Hons) Cambridge, MSc Bristol, PhD ANU
Email: juliam@waikato.ac.nz
Research interests: Physical oceanography, coastal ocean dynamics and geophysical fluid dynamics. In particular: exploring mixing and turbulence processes in coastal environments based on field observations; use of laboratory experiments to elucidate fundamental physical processes that cannot be resolved in large-scale models; and vegetation dynamics.

Dr Adrian Pittari  BSc(Hons) Melbourne, PhD Monash
Email: apittari@waikato.ac.nz
Research interests: Physical volcanology of modern and ancient volcanic deposits. In particular: Caldera dynamics; explosive conduit-vent processes; lateral and vertical process variations in pyroclastic deposits; ignimbrite emplacement processes; kimberlite volcanology; and volcaniclastic deposits in sedimentary successions.

Professor Louis Schipper  BSc, MSc, PhD Waikato, FNZSSS, FSSSA
Email: schipper@waikato.ac.nz
Research interests: Nitrogen cycling with a focus on denitrification and nitrogen storage in soil organic matter; soil quality and long-term changes in organic matter; impacts of land use change; carbon fluxes and nutrient cycling in agricultural and indigenous ecosystems, including wetlands; and microbial ecology and diversity.
Environmental Sciences

Contact details

waikato.ac.nz/study/subjects/envs.shtml

School of Science Office
Room: E.2.20
Phone: 07 838 4148
Email: sciadmin@waikato.ac.nz

Graduate Co-ordinator
Dr Megan Balks
Room: DE.1.02
Email: m.balks@waikato.ac.nz

Study of Environmental Sciences at the University of Waikato is an interdisciplinary programme that draws on papers from a wide range of disciplines including, Biological Sciences, Earth Sciences, Chemistry, as well as options from Engineering and Social Sciences.

The Master of Environmental Sciences (MEnvSci) is an interdisciplinary degree that offers practical research skills and advanced theoretical knowledge alongside the chance to study a combination of environmentally-themed science papers in the areas of Ecology, Geochemistry, Analytical Chemistry, and Earth Sciences.

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

For detailed information students should contact the Environmental Sciences Graduate Co-ordinator or go to calendar.waikato.ac.nz/regulations/masters/menvsci.html
Engineering

Contact details

eng.waikato.ac.nz

School of Engineering Office
Room: E.2.07
Phone: 07 838 4266
Email: engineering@waikato.ac.nz

Graduate Co-ordinator
Room: EF.3.01
Dr James Carson
Phone: 07 838 4206
Email: jkcarson@waikato.ac.nz

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 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 18).

Collaborative work with industry and research associations are also available.
Academic staff

Professor Janis Swan – Acting Dean  
BTech, MTech Massey, PhD Waterloo, FNZIFST, FIPENZ, MNZM
Email: j.swan@waikato.ac.nz
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  
BSc, MSc, PhD Hong Kong
Email: ckau@waikato.ac.nz
Research interests: Computation; geometric modeling; and manufacturing technology.

Dr Aydin Berenjian  
BE, ME SUT, PhD USyd
Email: aydinh@waikato.ac.nz
Research Interests: Fermentation, Functional foods, Downstream processing, Kinetics, modeling and optimization of bioprocesses.

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

Dr James K Carson  
BE(Hons), ME Canterbury, PhD Massey
Email: jkcarson@waikato.ac.nz
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  
BSc(Hons), PhD Canterbury, SMIEEE, MNZIP, MACPSEM
Email: m.cree@waikato.ac.nz
Research interests: Computer vision; medical physics; retinal imaging; range imaging; and image sensor technology.

Associate Professor Mike Duke  
BEng(Hons) SBankPoly, PhD South Bank, MISES, MANZSES
Email: dukemd@waikato.ac.nz
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  
BE(Hons) Strath UK, MSc Strath UK, PhD Loughborough UK
Email: graemeg@waikato.ac.nz
Professor Ilanko Sinniah  BSc(Eng)(Hons), MSc Manchester, PhD University of Western Ontario
Email: ilanko@waikato.ac.nz
Research interests: Numerical modelling; vibration and stability of mechanical/structural systems; passive vibration control; adaptive mechanisms; and engineering education.

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

Associate Professor Rainer Küninemeyer – Associate Dean, International DiplPhys, DrRerNat Hanover, SMIEEE, MIPENZ, MSPIE
Email: rainer@waikato.ac.nz
Research interests: Applied optics; optical, non-destructive sensing; spectroscopy; and optoelectronics.

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

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

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

Associate Professor Howell Round  BSc(Tech) Waikato, MSc Surrey, PhD Canterbury, FNZIP, FACPSEM, SMIEEE, MIPENZ
Email: h.round@waikato.ac.nz
Research interests: Medical physics (breathing control, isotope imaging, radiotherapy dosimetry and treatment planning) and electronics (position and velocity estimation, line scan photography).

Dr Ali Khajeh Samani  BE Amir Kabir University of Technology Tehran Iran, ME Amir Kabir University of Technology Tehran Iran, PhD UNSW Australia
Email: asamani@waikato.ac.nz
Professor Jonathan Scott  BSc, BE, MEngSc, PhD Sydney, SMIEEE, MAES, SPIE
Email: scottj@waikato.ac.nz
Research interests: Analog 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.

Associate Professor Alistair Steyn-Ross  BSc, MSc, PhD Waikato, MNZIP, MRSNZ
Email: asr@waikato.ac.nz
Research interests: Cortical modelling; anaesthetics phase-change studies; quantifying brain state; and computational physics.

Professor Moira Steyn-Ross  BSc, MSc, PhD Waikato, MNZIP
Email: msr@waikato.ac.nz
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  BSc(Tech), MSc, PhD Waikato
Email: r.torrens@waikato.ac.nz
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  BEng, MEng, PhD Pretoria, MIPENZ
Email: jverbeek@waikato.ac.nz
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.

Associate Professor Michael Walmsley  BE, PhD Auckland, MAIChE
Email: m.walmsley@waikato.ac.nz
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  BA(Hons) Cambridge, PhD Bristol, PGCert(Tertiary Teaching) Waikato, MInstP CPhys, MNZIP
Email: mtwilson@waikato.ac.nz
Research interests: Numerical modelling and analysis of the electrical behaviour of the brain; electrophysiology; many-body theory; and physics and engineering education.
Psychology

Contact details

waikato.ac.nz/fass/about/psychology

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<thead>
<tr>
<th>School of Psychology Office</th>
<th>Room:</th>
<th>K.1.14</th>
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<tbody>
<tr>
<td></td>
<td>Phone:</td>
<td>07 838 4032</td>
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<tr>
<td></td>
<td>Fax:</td>
<td>07 858 5132</td>
</tr>
<tr>
<td></td>
<td>Email:</td>
<td><a href="mailto:psychology@waikato.ac.nz">psychology@waikato.ac.nz</a></td>
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<th>School Manager</th>
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<th>K.1.14</th>
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<tbody>
<tr>
<td>Sue Carnaby</td>
<td>Phone:</td>
<td>07 838 4032</td>
</tr>
<tr>
<td></td>
<td>Email:</td>
<td><a href="mailto:carnabys@waikato.ac.nz">carnabys@waikato.ac.nz</a></td>
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<tr>
<th>School Graduate Adviser</th>
<th>Room:</th>
<th>K.1.11</th>
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<tbody>
<tr>
<td>Associate Professor</td>
<td>Phone:</td>
<td>07 837 9227</td>
</tr>
<tr>
<td>Robert Isler</td>
<td>Email:</td>
<td><a href="mailto:psyc2255@waikato.ac.nz">psyc2255@waikato.ac.nz</a></td>
</tr>
</tbody>
</table>

The School of Psychology at the University of Waikato has a strong graduate programme providing further study in many areas of psychology.

One of the School’s strengths is in applied research and it offers taught graduate papers emphasizing research methods and the application of psychological principles. These papers form the basis for several graduate qualifications including BSc(Hons), MSc, MPhil and PhD. The academic staff have a wide range of research interests including: animal behaviour and welfare, applied behaviour analysis, applied social psychology, the experimental analysis of behaviour, human experimental psychology, human factors and road safety, kaupapa Māori and psychology, and organisational psychology. The School of Psychology operates a number of research facilities, which include an animal behaviour laboratory, driving simulation and human factors/human experimental laboratories, and computer laboratories. The Māori and Psychology Research Unit (MPRU) provides a catalyst and support network for enhancing Māori focused psychological research.

The School of Psychology encourages you to get in touch (by phone, letter or email) if you are interested in graduate or postgraduate study in psychology.
## Academic staff

**Dr Carol C Barber**  
**BA Swarthmore, PhD Vanderbilt**  
Email: ccbarber@waikato.ac.nz  
Research interests: Perinatal mental health and transition to parenting; attachment theory and developmental psychopathology; and effectiveness of mental health services for children and adolescents.

**Associate Professor Samuel G Charlton**  
**BA San Jose, MA, PhD New Mexico**  
Email: samiam@waikato.ac.nz  
Research interests: Applied cognitive psychology and human factors; particularly aviation and road transport psychology, and issues of attention, perception, decision-making and performance.

**Dr Cate Curtis**  
**BA Canterbury, BSocSc(Hons), PhD Waikato**  
Email: ccurtis@waikato.ac.nz  
Research interests: Applied social and community psychology, particularly in regards to the wellbeing of youth and women, including the impacts of health and social policy, constructions of ‘risk’ and ‘resilience’ and social exclusion.

**Dr Tim Edwards**  
**BS Utah State, MA, PhD Western Michigan**  
Research interests: Analysis of the influences of environmental factors on behaviour, including investigations of Pavlovian-instrumental transfer, establishing operations, and stimulus discrimination.

**Professor T Mary Foster**  
**MSc, DipClinPsych, PhD Auckland**  
Email: psyc0182@waikato.ac.nz  
Research interests: Applied behaviour analysis and the experimental analysis of both human and animal behaviour and animal welfare.

**Dr Robert B Isler**  
**Dipl Natw. ETH, PhD ETH Zürich**  
Email: psyc2255@waikato.ac.nz  
Research interests: Safety issues and human performance; eye movement behaviour; human information processing; psycho-physiology; and psychophysics.

**Dr Bridgette Masters-Awatere**  
**BSocSc, MSocSc, PGDipPsych(Comm), PhD Waikato**  
Email: bridge@waikato.ac.nz  
Research interests: Use of applied research methods towards developing culturally-appropriate programme evaluation processes for Māori (specifically within the areas of public health – health promotion programmes).

**Dr James McEwan**  
**PhD Waikato**  
Email: jmcewan@waikato.ac.nz  
Research interests: The acquisition of new behaviours in humans and animals.
Associate Professor Linda Waimarie Nikora MSocSc(Hons) DPhil Waikato
Email: psyc2046@waikato.ac.nz
Research interests: Psychological areas that focus on or involve Māori people. Specific interests are in the field of Māori development and how psychology can make a positive contribution to this direction.

Professor Michael P O’Driscoll BSc(Hons) Western Australia, PhD Flinders, FNZPsS
Email: psyc0181@waikato.ac.nz
Research interests: Employee well-being, including stress at work; work attitudes; motivation and behaviour; work-life balance; and other topics within the field of organisational psychology.

Associate Professor John A Perrone MSc, PhD Canterbury
Email: jpnz@waikato.ac.nz

Dr Neville R Robertson BA Canterbury, MSocSc, DipPsych(Com), PhD Waikato
Email: scorpio@waikato.ac.nz
Research interests: Applied research on community issues, particularly those in which issues of social justice are at stake; programme evaluation – research which helps the development of social services and assesses their effectiveness; institutional responses to violence against women; child abuse, the prevention of family violence, crime prevention, gender and cultural justice.

Dr Maree Roche MMS, PhD Waikato
Email: mroche@waikato.ac.nz
Research interests: Leadership, positive psychology in the workplace, Māori well-being at work, and other topics within the field of organisational psychology.

Dr Mohi Rua BSocSc, BSocSc(Hons), MSocSc, PGDipPsych(Com), PhD Waikato
Email: mrua@waikato.ac.nz
Research interests: The deconstruction of Māori cultural societal patterns and behaviours toward the betterment of Māori health and wellbeing. This consists of evaluating customary practices and the demystification of neo-Māori narrative about how Māori were and are today.

Dr Rebecca Sargisson BSocSc, MScocSc Waikato, PhD Otago
Email: rebeccas@waikato.ac.nz
Research interests: Behavioural psychology; animal psychology; educational psychology.

Dr Sabine Seehagen PGDipSci Otago, DipPsych Trier, PhD Sheffield
Research interests: Developmental psychology; particularly cognitive and social-emotional development in infancy and early childhood, the role of sleep for early learning and memory, relations between maternal well-being and infant development.
Associate Professor Nicola J Starkey BSc(Hons), PhD, Leeds
Email: nstarkey@waikato.ac.nz
Research interests: Neuropsychology, psychological assessment, driver behaviour, animal behaviour and welfare.

Dr Ottilie Stolte BSocSc, MSocSc, PhD Waikato
Research interests: Poverty, inequalities, homelessness, social determinants of health, unemployment, disadvantage, urban environments, migration, and the policy-community interface. A particular interest is qualitative research that seeks to understand contemporary psychological issues within the broader social, cultural and political contexts of people’s everyday lives.

Dr Armon Tamatea BSocSc, MSocSc, PGDipPsych(Clin) Waikato, PhD Massey
Email: tamatea@waikato.ac.nz
Research interests: Clinical psychology; psychotherapy and behaviour change; criminal justice and forensic psychology; personality and personality disorders (especially psychopathic personality); culture and psychology; and New Zealand gangs.

Dr Jo Thakker BA(Hons), PhD, PGDipClinPsych Canterbury
Email: jthakker@waikato.ac.nz
Research interests: Substance use and abuse; cultural psychology; sexual offending; theoretical psychology; and clinical psychology. Current research focuses on public attitudes to sexual offenders and how these influence clinical environments and ultimately treatment efficacy.

Dr Jaimie Veale BA Canterbury, MA, PhD Massey
Research interests: Public health research with transgender populations; gender roles and gender identity development; human sexuality; using technology to improve teaching and research publication processes; advanced quantitative research methods.

The School also has a number of Research Associates and Honorary Lecturers. For a full list, please refer to the following website: calendar.waikato.ac.nz/officershonoursstaff/people/fass/psychology.html
Radiocarbon Dating

Contact details
radiocarbondating.com

Waikato Radiocarbon Dating laboratory
University of Waikato
Private Bag 3105
Hamilton 3240
New Zealand

Room: C.G.01

Director
Associate Professor Alan Hogg

Phone: 07 838 4707
Fax: 07 838 4192
Email: alan.hogg@waikato.ac.nz

Since 1974 the Waikato Radiocarbon Dating Laboratory has been providing radiocarbon assays for scientists and researchers from around the world. The laboratory undertakes both standard radiometric dating and accelerator mass spectrometry dating (AMS).

Current areas of research include: development of international radiocarbon standards; improvement of background blank assessment in Radiocarbon Dating; development of the Southern Hemisphere 14C calibration curve; Palaeoclimatic implications of 14C variations over time; pretreatment and calibration of bone for Radiocarbon Dating; and the study of marine 14C reservoir effects.

Prospective PhD students with a background in Archaeology/Biology/Chemistry or Earth Sciences should contact staff to discuss research opportunities in Radiocarbon Dating.
Academic staff

Associate Professor Alan Hogg – Director MSc, PhD Waikato

Email: alan.hogg@waikato.ac.nz
Research interests: Investigation into atmospheric 14C concentrations as archived in OIS 3 subfossil kauri trees; optimisation of WallacQuantulus liquid scintillation spectrometers for obtaining finite 14C dates beyond 50ka; investigations into Oceania marine reservoir corrections; calibration of Southern Hemisphere 14C levels over the last 1,000 years by decadal, high precision analysis of New Zealand silver pine and cedar samples; development of high quality synthetic silica counting vials now routinely used in some of the world’s liquid scintillation laboratories; and assessment of the influence of freshwater dilution of 14C levels in harbour environments.

Dr Fiona Petchey – Deputy Director MA Auckland, DPhil Waikato

Email: fpetchey@waikato.ac.nz
Research interests: Pretreatment and bone for radiocarbon analysis; the influence of diet on the calibration of bone radiocarbon dates; marine reservoir corrections and the suitability of different shell species for dating; Radiocarbon Dating ceramics; and New Zealand and Pacific archaeology.
## Papers

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<td>Biological Sciences</td>
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<td>Chemistry</td>
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<td>Earth Sciences</td>
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Biological Sciences

All 500 level papers are delivered subject to demand and staff availability.

**BIOL503-17A (HAM) – Data Analysis and Experimental Design 15 points**
This paper will cover aspects of research design for experiments, and methods for analysis of ecological data using univariate and multivariate statistical techniques.

- **Convenor(s):** Dr Ian Duggan
- **Prerequisite(s):** BSc
- **Restriction(s):** BIOL501
- **Assessment:** Internal assessment/examination ratio: 1:0

**BIOL560-17A (HAM) – Freshwater Ecology 15 points**
A critical examination of issues including pollution, conservation, and utilisation, that freshwater ecosystems face and methods to mitigate potentially competing interests.

- **Convenor(s):** Associate Professor Ian Hogg
- **Prerequisite(s):** BSc, BIOL313 or equivalent
- **Restriction(s):** BIOL513
- **Assessment:** Internal assessment/examination ratio: 3:7

**BIOL561-17B (HAM) – Aquatic Ecosystem Modelling 15 points**
This paper examines the different types of models that may be applicable in aquatic ecosystem modelling, including statistical, empirical, and process-based models. The key steps to setting up a model application are covered as well as the limitations and pitfalls of each type of model. Applications of the models are demonstrated for different lake ecosystems, with students having an opportunity to apply the models to questions of relevance to aquatic ecosystem managers.

- **Convenor(s):** Professor David Hamilton
- **Prerequisite(s):** BSc, BIOL313 or equivalent third-year ecology unit
- **Assessment:** Internal assessment/examination ratio: 1:0

**BIOL562-17C (HAM) – Marine and Estuarine Ecology 15 points**
This paper focuses on a variety of contemporary issues in marine ecology and biological oceanography including: fisheries biology and management, recruitment, ecology of disturbances, benthic-pelagic coupling, aquaculture and primary production.

- **Convenor(s):** Professor Conrad Pilditch
- **Prerequisite(s):** BSc, BIOL314 or equivalent
- **Restriction(s):** BIOL514
- **Assessment:** Internal assessment/examination ratio: 3:7

**BIOL563-17B (HAM) – Aquatic Field Methods 15 points**
This paper focuses on sampling methods, as well as experimental design and data analyses related to biological field studies in marine and freshwater sciences.

- **Convenor(s):** Associate Professor Ian Hogg
- **Prerequisite(s):** BSc, BIOL313 or BIOL314 or equivalent
- **Corequisite(s):** BIOL560 or BIOL562
- **Assessment:** Internal assessment/examination ratio: 1:1
BIOL564-17B (HAM) – Restoration Ecology 15 points
Aspects of health, vitality, resilience and restoration of ecosystems. Topics covered include
restoration principles, theory and practice; lake restoration; river and stream restoration; wetland
restoration; and forest restoration.
Convener(s): TBC
Prerequisite(s): BSc, BIOL312 or BIOL325 or equivalent
Corequisite(s): BIOL570
Restriction(s): BIOL515
Assessment: Internal assessment/examination ratio: 1:1

BIOL565-17A (HAM) – Molecular Ecology 15 points
This paper is open to students interested in molecular ecology, systematics, and environmental
molecular biology. Topics covered include DNA barcoding, conservation and evolutionary genetics,
and phylogenetics.
Convener(s): Professor Craig Cary
Prerequisite(s): BSc, at least one of the following papers: BIOL310, BIOL312, BIOL313,
BIOL326, BIOL338, BIOL341 or equivalent
Restriction(s): BIOL522
Assessment: Internal assessment/examination ratio: 3:7

BIOL570-17A (HAM) – Plant Ecology 15 points
Contemporary and advanced topics in plant ecology, including the structure and functioning of plant
communities, species and community distribution theory, vegetation dynamics, vegetation surveying
and data analysis.
Convener(s): Dr Chris Lusk
Prerequisite(s): BSc, BIOL312, BIOL313 or BIOL325 or equivalent
Corequisite(s): BIOL571
Restriction(s): BIOL521
Assessment: Internal assessment/examination ratio: 1:1

BIOL571 – Plant Function 15 points
This paper will not be offered in 2017.

BIOL572-17B (HAM) – Animal Behaviour 15 points
The purpose of this paper is to provide students with an understanding of contemporary approaches
to the study of animal behaviour, exploring recent literature on (1) the function of behaviour, (2)
the evolutionary history of behaviour, (3) the development of behaviour, and (4) the mechanisms of
behaviour. Special attention will be devoted to developing an appreciation of experimental design
and fostering an ability to think critically about ethological research questions.
Convener(s): Dr Clare Browne
Prerequisite(s): BSc, BIOL333 or equivalent
Restriction(s): BIOL533
Assessment: Internal assessment/examination ratio: 1:1

BIOL573-17A (HAM) – Conservation Biology 15 points
The purpose of this paper is to explore the general principles of conservation biology, with special
reference to threatened species, aquatic animals and plants.
Convener(s): Associate Professor Kevin Collier
Prerequisite(s): BSc and BIOL312, BIOL333, BIOL338 or equivalent
Restriction(s): BIOL533
Assessment: Internal assessment/examination ratio: 1:1
BIOL574-17A (HAM) – Mammalian Physiology 15 points
This paper examines selected topics in the physiology of humans and other mammals. Students will develop an understanding of physiological control systems and the integration of structure and function. We will discuss issues related to health and disease in the context of molecular, systems and behavioural physiology.

Convenor(s): Dr Pawel Olszewski
Prerequisite(s): BSc, BIOL335 (or external equivalent)
Restriction(s): BIOL535
Assessment: Internal assessment/examination ratio: 2:3

BIOL575-17B (HAM) – Applied Topics in Physiology 15 points
This paper examines selected topics in animal physiology with particular emphasis on applicability of physiology research in the biomedical and agricultural setting. University, hospital and industry-based lecturers contribute to this class, helping students to develop an understanding of the application of physiological knowledge and principles to commercial and medical technologies.

Convenor(s): Dr Pawel Olszewski
Prerequisite(s): BSc, BIOL335 (or external equivalent)
Restriction(s): BIOL535
Assessment: Internal assessment/examination ratio: 2:3

BIOL576-17A (HAM) – Animal Ecophysiology 15 points
This paper provides an introduction to specified topics in animal environmental physiology. Critical evaluation of selected readings from the scientific literature will provide a theoretical framework for the specified topics and an introduction to recent research in those fields. Students will develop an understanding of how animals are challenged by and adapt to challenging or extreme environments.

Convenor(s): Associate Professor Nicholas Ling
Prerequisite(s): BSc
Restriction(s): BIOL538
Assessment: Internal assessment/examination ratio: 1:1

BIOL577-17B (BLK) – Aquatic Toxicology 15 points
This paper provides an introduction to specified topics in aquatic toxicology including toxicology analysis and bioaccumulation. Critical evaluation of selected readings from the scientific literature will provide a theoretical framework for the specified topics and an introduction to recent research in those fields. Students will develop an understanding of ecological impacts of water-borne contaminants and methods for the bioassay of toxicant effects.

Convenor(s): Associate Professor Nicholas Ling
Prerequisite(s): BSc
Restriction(s): BIOL538
Assessment: Internal assessment/examination ratio: 1:1

BIOL580-17A (HAM) – Human and Applied Microbiology 15 points
This paper explores topics on human-microorganism associations and interactions from an ecological perspective and various applications of microbiological knowledge.

Convenor(s): Dr Charles Lee
Prerequisite(s): BSc, BIOL341 or equivalent
Restriction(s): BIOL541
Assessment: Internal assessment/examination ratio: 1:0
BIOL581-17B (HAM) – Microbial Ecology 15 points
Molecular microbial ecology, stable isotopes in microbial ecology, metagenomics, biogeography, and other current topics in microbial ecology.

Convenor(s): Associate Professor Ian McDonald
Prerequisite(s): BSc, BIOL341 or equivalent
Restriction(s): BIOL541
Assessment: Internal assessment/examination ratio: 1:0

BIOL582-17A (HAM) – Biomolecular Structure & Function 15 points
An in-depth examination of biomolecular structure and function using selected examples from the biochemistry literature.

Convenor(s): Professor Vic Arcus
Prerequisite(s): BSc, BIOL351, CHEM301 or equivalent
Restriction(s): BIOL551
Assessment: Internal assessment/examination ratio: 1:4

BIOL583-17B (HAM) – Molecular Biochemistry and Metabolism 15 points
An in-depth examination of molecular biochemistry and metabolism using selected examples from biochemistry literature.

Convenor(s): Dr Ryan Martinus
Prerequisite(s): BSc, BIOL351, CHEM301 or equivalent
Restriction(s): BIOL551
Assessment: Internal assessment/examination ratio: 1:4

BIOL584-17A(HAM) – Molecular Genetics 15 points
This paper explores how molecular biology and bioinformatic research contribute to our understanding of molecular genetics. Subjects covered in this course will include molecular technologies, comparative genomics and evolution, epigenetics, genetic diversity, genetic diseases, pharmacogenomics and personalised medicine.

Convenor(s): Dr Ray Cursons
Prerequisite(s): BSc, BIOL310 or equivalent
Restriction(s): BIOL510
Assessment: Internal assessment/examination ratio: 2:3

BIOL585-17B (HAM) – Human Genetics 15 points
This paper explores the genetics of human evolution, adaptation and disease. The topics will extend from classical population genetics into contemporary areas of molecular biology and bioinformatics. Particular attention will be paid to key genetic changes that occurred during hominid evolution, polymorphic variations and disease susceptibility in humans and the role of somatic mutations in cancer.

Convenor(s): Dr Ray Cursons
Prerequisite(s): BSc, BIOL310 or equivalent
Restriction(s): BIOL510
Assessment: Internal assessment/examination ratio: 2:3
BIOL588-17A/B (HAM) – Special Topic 15 points
Guided individual study on an aspect of Biological Sciences. By arrangement, and with the approval of the Graduate Convenor.

Convenor(s): Associate Professor Ian Hogg
Prerequisite(s): BSc or equivalent
Restriction(s): BIOL555
Assessment: Internal assessment/examination ratio: 1:0

BIOL590-17C/D (HAM) – Directed Study 30 points
May involve a literature review, the preparation of a proposal or a preliminary investigation. Generally a research paper will be required, but there will be no formal examination.

Convenor(s): Dr Linda Peters
Assessment: Internal assessment/examination ratio: 1:0

COMP555-17B (HAM) – Bioinformatics 15 points
For a full description, see the Faculty of Computing & Mathematical Sciences Handbook.

SCIE501-17B (HAM) – Research Methods in the Sciences 15 points
This paper will enable students to develop the necessary communication skills and familiarity with research methods to allow them to progress to the thesis component of a Masters degree in the sciences, or to extend communication and research skills in those not taking a full research degree.

Convenor(s): Associate Professor Michael Mucalo and Professor Chad Hewitt
Restriction(s): A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (eg BIOL501, ERTH501)
Assessment: Internal assessment/examination ratio: 1:0

Dissertations and theses for MSc, MSc(Research) and MSc(Tech)

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Chemistry

All 500 level papers are delivered subject to demand and staff availability.

CHEM511-17A (HAM) – Advanced Organic Chemistry (Structural Characterisation) 15 points
Use of NMR spectroscopy and mass spectrometry for structural characterisation of organic molecules. This course will have a practical section using instrumentation.

Convenor(s): Associate Professor Michèle Prinsep
Prerequisite(s): CHEM312
Restriction(s): CHEM501
Assessment: Internal assessment/examination ratio: 1:0

CHEM512-17A (HAM) – Topics in Advanced Physical Chemistry 15 points
An in-depth investigation of some topic in advanced physical chemistry.

Convenor(s): To be advised
Prerequisite(s): CHEM111 and CHEM112
Assessment: Internal assessment/examination ratio: 1:1

CHEM513-17A (HAM) – Organometallic Chemistry and Catalysis 15 points
An advanced study of organometallic chemistry.

Convenor(s): Associate Professor Graham Saunders
Prerequisite(s): CHEM311
Restriction(s): CHEM503
Assessment: Internal assessment/examination ratio: 0:1

CHEM514 – Special Topics in Chemistry A 15 points
This paper will not be offered in 2017.

CHEM516-17A (HAM) – Isotope Geochemistry 15 points
An advanced study of the theory, applications and practice of isotope geochemistry.

Convenor(s): Dr Adam Hartland
Restriction(s): CHEM561
Assessment: Internal assessment/examination ratio: 1:0

CHEM517 – Applied and Environmental Analytical Chemistry A 15 points
This paper will not be offered in 2017.

CHEM521 – Advanced Organic Chemistry 15 points
This paper will not be offered in 2017.

CHEM522 – Computational Chemistry 15 points
This paper will not be offered in 2017.

CHEM523-17B (HAM) – Inorganic Materials Chemistry 15 points
This paper will not be offered in 2017.
CHEM524-17B (HAM) – Structural Characterisation Techniques 15 points
An introduction to x-ray crystallography and solid state NMR.
Convenor(s): Associate Professor Graham Saunders
Prerequisite(s): CHEM311 and CHEM312
Assessment: Internal assessment/examination ratio: 1:1

CHEM527-17C (HAM) – Applied Vibrational Spectroscopy 15 points
A basic, theoretical and practical understanding of vibrational spectroscopy and of chemometrics for quantitative and qualitative applications.
Convenor(s): Associate Professor Michèle Prinsep
Prerequisite(s): CHEM311
Restriction(s): CHEM507
Assessment: Internal assessment/examination ratio: 3:7

CHEM589-17A/B/C/S (HAM) – Directed Study 15 points
May involve a literature review or the preparation of a proposal.
Convenor(s): Associate Professor Michèle Prinsep
Assessment: Internal assessment/examination ratio: 1:0

CHEM590-17C/D (HAM) – Directed Study 30 points
This paper allows an in-depth study of a specific topic.
Convenor(s): Associate Professor Michèle Prinsep
Assessment: Internal assessment/examination ratio: 1:0

SCIE501-17B (HAM) – Research Methods in the Sciences 15 points
This paper will enable students to develop the necessary communication skills and familiarity with research methods to allow them to progress to the thesis component of a Masters degree in the sciences, or to extend communication and research skills in those not taking a full research degree.
Convenor(s): Associate Professor Michael Mucalo and Professor Chad Hewitt
Restriction(s): A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (eg BIOL501, ERTH501)
Assessment: Internal assessment/examination ratio: 1:0

Dissertations and theses for MSc, MSc(Research) and MSc(Tech)

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Earth Sciences

All 500 level papers are delivered subject to demand and staff availability.

**ENVS524-17A (HAM) – Environmental Evaluation 15 points**
Explores the interface between science and environmental planning. Insight into the resource consent process and the role of science in supporting sustainable resource management under the RMA is developed.

*Convenor(s): Dr Megan Balks*

*Restriction(s): ENVS521*

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

**ERTH512-17A/B/C (HAM) – Special Topic 15 points**
Guided individual study on an aspect of Earth Sciences. By arrangement, and with the approval of the graduate co-ordinator of Earth Sciences.

*Convenor(s): Dr Julia Mullarney*

*Restriction(s): ERTH511*

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

**ERTH513-17A/B/C (HAM) – Special Topic 15 points**
Guided individual study on an aspect of Earth Sciences. By arrangement, and with the approval of the graduate co-ordinator of Earth Sciences.

*Convenor(s): Dr Julia Mullarney*

*Restriction(s): ERTH511*

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

**ERTH524-17A (HAM) – Volcanic Processes and Hazards 15 points**
A study of volcanic landforms, physical characteristics of volcanic deposits, processes associated with the eruption, transport and deposition of volcanic products, tephrochronology, and volcanic hazards in active volcanic regions.

*Convenor(s): Dr Adrian Pittari*

*Prerequisite(s): ERTH321*

*Restriction(s): ERTH521*

*Assessment: Internal assessment/examination ratio: 3:2*

**ERTH525-17B (HAM) – Hydrothermal Mineral and Energy Systems in New Zealand 15 points**
A study of geochemical approaches and methods to solve various problems in the Earth Sciences including volcanic environments, with particular attention to hydrothermal systems, geothermal energy, and the formation of hydrothermal ore deposits.

*Convenor(s): Dr Shaun Barker and guest lecturers*

*Prerequisite(s): Either ERTH321 or ERTH322*

*Restriction(s): ERTH521*

*Assessment: Internal assessment/examination ratio: 1:0*
ETR526 – Field Analysis of Sedimentary Basins 15 points
This paper will not be offered in 2017.

ETR527-17A (HAM) – Sedimentary and Petroleum Geology 15 points
A paper documenting the application of sedimentary geological and geophysical principles in the exploration and analysis of petroleum systems of New Zealand and other sedimentary basins.
Convenor(s): Dr Beth Fox
Prerequisite(s): ERT322
Restriction(s): ERT522
Assessment: Internal assessment/examination ratio: 3:2

ETR528-17A (HAM) – Quaternary: Past Environments 15 points
This paper examines environmental change during the Quaternary – the last 2.6 million years – and analyses some important methods and evidence used in reconstructing past environments using a stratigraphic framework and geochronology. The paper usually includes a two-day workshop in mid May, held at the GNS Science National Isotope Centre, Lower Hutt.
Convenor(s): Professor David Lowe
Prerequisite(s): 40 points at 300 level in Earth Sciences. ERT321 and ERT322 are highly recommended.
Restriction(s): ERT523
Assessment: Internal assessment/examination ratio: 3:2

ETR533-17B (HAM) – Soil and Greenhouse Gases 15 points
This paper examines the role that soils and their management play in the production and consumption of the greenhouse gases including a specific focus on the importance of soil carbon.
Convenor(s): Professor Louis Schipper
Prerequisite(s): ERT334
Restriction(s): ERT531
Assessment: Internal assessment/examination ratio: 3:2

ETR535-17A (HAM) – Land and Soil Evaluation 15 points
This paper examines how soil and land may be evaluated to provide an improved understanding of sustainable land management, taking into account productivity and environmental goals.
Convenor(s): Professor David Lowe
Prerequisite(s): ERT333 or ERT334 or ERT384
Restriction(s): ERT531
Assessment: Internal assessment/examination ratio: 3:2
ERTH547-17B (HAM) – Introduction to Hydrological Modelling 15 points
This course comprises a directed research project specific to each student. A given project will cover some aspect of hydrological modelling, which might be themed on groundwater modelling, simulating water resource systems, analysis of hydrological time series, model formulation, optimal water resource usage, or hydrological forecasting.

Convenor(s): Associate Professor Earl Bardsley
Prerequisite(s): ERTH345 or ERTH346
Restriction(s): ERTH541
Assessment: Internal assessment/examination ratio: 1:0

ERTH548-17A (HAM) – Ecohydrology 15 points
Ecohydrology is the interdisciplinary study of the interactions between water and ecosystems. It views water, carbon and energy as essential ingredients for living systems, and recognises that ecosystems may modify the hydrological systems of which they are a part. This paper bridges hydrology, soil science, ecology, and climate science.

Convenor(s): Associate Professor David Campbell
Prerequisite(s): ERTH345 or ERTH346
Restriction(s): ERTH541
Assessment: Internal assessment/examination ratio: 3:2

ERTH552-17B (HAM) – Rock Slope Engineering 15 points
This paper considers rock mechanics within engineering geology, including the strength of intact rocks and rock joints; engineering geological hazards; slope stability modelling; and an applied site investigation project.

Convenor(s): Dr Vicki Moon
Prerequisite(s): ERTH352
Restriction(s): ERTH551
Assessment: Internal assessment/examination ratio: 3:2

ERTH562-17A (HAM) – Coastal Sedimentation 15 points
This paper addresses modern contentious issues of coastal sedimentation and sedimentary processes within a range of sedimentary environments. Both fundamental and applied contexts are examined.

Convenor(s): Dr Willem de Lange
Prerequisite(s): ERTH343
Restriction(s): ERTH543
Assessment: Internal assessment/examination ratio: 3:2

ERTH563-17A (HAM) – Coastal and Estuarine Processes 15 points
This paper provides an understanding of processes controlling movement of water in the ocean, including longwaves, baroclinic and barotropic circulation, wind-driven processes, surf-zone waves and currents, and nearbed currents in the coastal ocean.

Convenor(s): Associate Professor Karin Bryan and Dr Julia Mullarney
Prerequisite(s): ERTH344
Restriction(s): ERTH546
Assessment: Internal assessment/examination ratio: 3:2
ERTH564-17C (HAM) – Coastal and Freshwater Modelling: Physical Approaches 15 points
This paper examines the use of conceptual, empirical and numerical models of coastal systems.

Convenor(s): Dr Julia Mullarney
Prerequisite(s): ERTH344
Restriction(s): ERTH543 and ERTH546
Assessment: Internal assessment/examination ratio: 1:0

ERTH565 – Time Series Analysis for Environmental Scientists 15 points
This paper will not be offered in 2017.

ERTH590-17A/B/Y (HAM) – Directed Study 30 points
This paper allows in-depth study and research of a specific topic.

Convenor(s): Dr Julia Mullarney
Assessment: Internal assessment/examination ratio: 1:0

SCIE501-17B (HAM) – Research Methods in the Sciences 15 points
This paper will enable students to develop the necessary communication skills and familiarity with research methods to allow them to progress to the thesis component of a Masters degree in the sciences, or to extend communication and research skills in those not taking a full research degree.

Convenor(s): Associate Professor Michael Mucalo and Professor Chad Hewitt
Restriction(s): A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (eg BIOL501, ERTH501)
Assessment: Internal assessment/examination ratio: 1:0

Dissertations and theses for MSc, MEnvSci, MSc(Research) and MSc(Tech)

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Electronics

ENEL501-17A/B/Y (HAM) – Special Topics in Electronics 30 points
This paper involves directed reading, project work and paper presentation in a defined area of electronics.

Convenor(s): Associate Professor Rainer Künnemeyer
Assessment: Internal assessment/examination ratio: 1:0

ENEL504-17B (HAM) – Analog Filter Design 15 points
This paper introduces the student to the design of electronic filters to process analog signals.

Note(s): This paper will only be offered with sufficient student interest.

Convenor(s): Professor Jonathan Scott
Prerequisite(s): ENEL205, ENEL312 and (ENGG285 or MATH251)
Assessment: Internal assessment/examination ratio: 1:0

ENEL505-17A (HAM) – Rechargeable Batteries and their Management 15 points
This paper presents the essential characteristics of rechargeable batteries including techniques and semiconductor components used for managing batteries for optimal run time and cycle life.

Convenor(s): Associate Professor Nihal Kularatna
Prerequisite(s): ENEL205
Assessment: Internal assessment/examination ratio: 1:0

ENEL506-17B (HAM) – Surge Protection of Electronic Systems 15 points
This course presents the fundamentals and techniques for protecting electronic systems against transients and surges, the statistical nature of the surge occurrence, and the international standards applicable.

Convenor(s): Associate Professor Nihal Kularatna
Prerequisite(s): ENEL205
Assessment: Internal assessment/examination ratio: 1:0

ENEL517-17A (HAM) – Mechatronics 30 points
This paper covers the design of electromechanical systems combining sensors and actuators interfaced to microcontrollers for feedback control: the enabling technologies of robotics. A series of projects require students to integrate hardware and firmware to achieve specific practical goals.

Note(s): This paper will only be offered with sufficient student interest.

Convenor(s): Professor Jonathan Scott
Prerequisite(s): ENEL317
Assessment: Internal assessment/examination ratio: 1:0
ENEL522-17B (HAM) – Electro-optical Instrumentation 30 points
Theoretical and practical aspects of advanced electro-optical 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.

Note(s): This paper will only be offered with sufficient student interest. A minimum mark of 40% in the examination is required to receive a passing grade. Laboratories are compulsory.

Convenor(s): Associate Professor Rainer Künemeyer
Prerequisite(s): ENEL324
Restriction(s): ENEL322 and ENEL423
Assessment: Internal assessment/examination ratio: 1:1

ENEL585-17B (HAM) – Power Electronics 30 points
This paper covers the theory and practice of power semiconductors, power converters, power management, protection, and energy storage devices.

Convenor(s): Associate Professor Nihal Kularatna
Prerequisite(s): ENEL205
Restriction(s): ENEL385 and ENEL485
Assessment: Internal assessment/examination ratio: 1:1

ENEL590-17C/D (HAM) – Directed Study 30 points
Students have the opportunity to pursue a topic of their own interest under the guidance of academic staff.

Assessment: Internal assessment/examination ratio: 1:0

Dissertations and theses for MSc, MSc(Research) and MSc(Tech)

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Engineering

ENGG501-17A(HAM) – Control Theory and Image Processing 30 points
This paper deals with PID feedback control of linear systems using classical as well as state space methods. It also deals with signal processing with special attention to image processing. It is highly computer and project based.

Convenor(s): Associate Professor Howell Round
Prerequisite(s): One of ENEL317 or ENME352
Restriction(s): ENGG401
Recommended Book(s): Franklin et al. Feedback Control of Dynamic Systems 7th ed (Prentice Hall)
Assessment: Internal assessment/examination ratio: 1:0

ENME540-17A(HAM) – Finite Element Analysis and Application 30 points
This paper explains a general computational strategy to determine the response of a physical system to loads or other stimuli, in which the system is first divided into a large number of small finite elements of regular shape whose behaviour can be numerically modelled by solving the equations governed by the relevant laws of physics. Applications include finding the stresses and displacements due to loading in a structure, or the temperature distribution in a heat exchanger due to heat input. Practical application of the theory includes computer laboratory exercises where students will develop their own computer programs for simple problems and the use of commercial software to solve more complicated problems.

Note(s): This paper will only be offered with sufficient student interest.

Convenor(s): Professor Ilanko
Prerequisite(s): ENGG285 or MATH251, and ENGG284 or MATH255, and ENMP313
Restriction(s): ENME440
Assessment: Internal assessment/examination ratio: 1:0

Theses for ME

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Materials and Processing

ENMP502-17A/C (HAM) – Special Topics in Engineering 1 15 points
This paper involves directed reading, project work and paper presentation in a defined topic area of technology or engineering.

Convenor(s): Dr James Carson
Assessment: Internal assessment/examination ratio: 1:0

ENMP503-17A (HAM) – Special Topics in Engineering 2 15 points
This paper involves directed reading, project work and paper presentation in a defined topic area of technology or engineering.

Convenor(s): Dr James Carson
Assessment: Internal assessment/examination ratio: 1:0

ENMP504-17B/C (HAM) – Special Topics in Engineering 3 15 points
This paper involves directed reading, project work and paper presentation in a defined topic area of technology or engineering.

Convenor(s): Dr James Carson
Assessment: Internal assessment/examination ratio: 1:0

ENMP505-17B (HAM) – Special Topics in Engineering 4 15 points
This paper involves directed reading, project work and paper presentation in a defined topic area of technology or engineering.

Convenor(s): Dr James Carson
Assessment: Internal assessment/examination ratio: 1:0

ENMP513-17A (HAM) – Advanced Material Properties and Performance 15 points
This paper builds on the materials science and engineering courses taught at undergraduate level and develops the following aspects of materials performance: microstructural/property relationships, fracture mechanics, performance modelling and other aspects of metals, polymers, ceramics and composites.

Note(s): This paper will only be offered with sufficient student interest.

Convenor(s): Professor Kim Pickering
Prerequisite(s): ENMP211 or equivalent
Restriction(s): ENMP511
Assessment: Internal assessment/examination ratio: 1:4

ENMP514-17A (HAM) – Advanced Materials Processing 15 points
This paper investigates the relationships between processing conditions and microstructure of different materials. Topics include: Solidification processing, powder metallurgy, ceramic processing and processing composites. This paper also examines how materials are processed into serviceable products.

Convenor(s): Dr Leandro Bolzoni
Prerequisite(s): ENMP211 or equivalent
Restriction(s): ENMP411, ENMP512
Assessment: Internal assessment/examination ratio: 1:4
ENMP515-17A (HAM) – CAD/CAM for Engineering 15 points
This paper will cover the fundamental theories and basic concepts underlying today’s technologies in computer-aided design (CAD) and computer-aided manufacturing (CAM). A thorough fundamental theoretical training and mastery of CAD/CAM software will make a student better equipped and more confident to solve difficult problems in design and manufacturing.

Convenor(s): Dr Chi Kit Au
Assessment: Internal assessment/examination ratio: 1:4

ENMP516-17B (HAM) – Materials Characterisation 15 points
This paper covers the use of advanced analytical techniques used in materials characterisation. These include optical microscopy, x-ray diffraction, transmission electron microscopy, scanning electron microscopy and differential thermal analysis. This paper explains the theory behind these techniques.

Convenor(s): Dr Leandro Bolzoni
Prerequisite(s): ENMP211 or equivalent
Assessment: Internal assessment/examination ratio: 1:4

ENMP542-17C (HAM) – Design for Energy and the Environment 30 points
This interdisciplinary course focuses on the important aspects of science and technology related to new and existing energy resources and energy efficiency. Topics covered reflect the trend of current development in energy technology.

Note(s): This paper will be taught subject to staff availability.

Convenor(s): Associate Professor Michael Walmsley
Assessment: Internal assessment/examination ratio: 1:0

ENMP543-17A (HAM) – Environmental Technology Water and Wastewater 1 15 points
This is an inter-disciplinary course covering topics selected from water resources and their management, environmental chemistry, ground water hydrology, water and wastewater engineering, chemical and microbial aspects of water quality, water pollution, remediation, ecotoxicity and ecological engineering. This paper should preferably be taken with ENMP544.

Convenor(s): Dr Mark Lay
Prerequisite(s): ENMP341 or equivalent
Restriction(s): ENMP541
Assessment: Internal assessment/examination ratio: 1:0

ENMP544-17B (HAM) – Environmental Technology Water and Wastewater 2 15 points
This is an inter-disciplinary course covering topics selected from water resources and their management, environmental chemistry, ground water hydrology, water and wastewater engineering, chemical and microbial aspects of water quality, water pollution, remediation, ecotoxicity and ecological engineering. This paper should preferably be taken with ENMP543.

Convenor(s): Dr Mark Lay
Prerequisite(s): ENMP341 or equivalent
Restriction(s): ENMP541
Assessment: Internal assessment/examination ratio: 1:0

ENMP561 – Bioprocessing 1 15 points
This paper will not be offered in 2017.
ENMP562-17A (HAM) – Bioprocessing 2 15 points
Aspects of processing biological materials such as fermentation, membrane separations and large-scale processing.

Convenor(s): Dr Mark Lay
Restriction(s): ENMP523
Assessment: Internal assessment/examination ratio: 1:0

ENMP563-17A (HAM) – Food Technology 1 15 points
This interdisciplinary course is tailored to the food technology interests of the students enrolled. It covers advanced aspects of food science, technology and engineering applications relevant to the food sector in New Zealand and/or selected countries.

Convenor(s): Dr James Carson
Restriction(s): ENMP527
Assessment: Internal assessment/examination ratio: 1:0

ENMP564-17B (HAM) – Food Technology 2 15 points
This interdisciplinary course is tailored to the food technology interests of the students involved. It covers advanced aspects of food science, technology and engineering applications relevant to the food sector in New Zealand and/or selected countries.

Convenor(s): Dr James Carson
Prerequisite(s): Level 300 process engineering or biological science
Restriction(s): ENMP527
Assessment: Internal assessment/examination ratio: 1:0

ENMP568-17B (HAM) – Engineering Applied Practice 1 15 points
An intensive practical training with some aspect of engineering or technology.

Convenor(s): Dr Mark Lay and Dr Rob Torrens
Assessment: Internal assessment/examination ratio: 1:0

ENMP569-17A (HAM) – Engineering Applied Practice 2 15 points
An intensive practical training with some aspect of engineering or technology.

Convenor(s): Dr Mark Lay and Dr Rob Torrens
Assessment: Internal assessment/examination ratio: 1:0

ENMP585-17A (HAM) – Industrial Technology and Innovation 1 15 points
An interdisciplinary course designed for MSc, MSc(Research) and MSc(Tech) students to develop their ability to use scientific, management and personal skills to plan and implement programmes that maximise competitive advantage in industry through technological innovation, entrepreneurship and application or new knowledge generated by research. Case studies, readings, individual and group presentations form an important part of this course. This paper should preferably be taken with ENMP586.

Convenor(s): Dr Mark Lay
Prerequisite(s): ENMP381 or equivalent
Restriction(s): ENMP581
Assessment: Internal assessment/examination ratio: 1:0
ENMP586-17B (HAM) – Industrial Technology and Innovation 2 15 points
An interdisciplinary course designed for MSc, MSc(Research) and MSc(Tech) students to develop their
ability to use scientific, management and personal skills to plan and implement programmes that
maximise competitive advantage in industry through technological innovation, entrepreneurship and
application or new knowledge generated by research. Case studies, readings, individual and group
presentations form an important part of this course.
Convenor(s): Dr Mark Lay
Prerequisite(s): ENMP381 or equivalent
Restriction(s): ENMP581
Assessment: Internal assessment/examination ratio: 1:0

ENMP590-17C/D (HAM) – Directed Study 30 points
This paper allows in depth study and research of a specific technological or engineering topic.
Convenor(s): Dr James Carson
Assessment: Internal assessment/examination ratio: 1:0

Dissertations and theses for MSc, MSc(Research) and MSc(Tech)

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<td>Materials and Processing Thesis</td>
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<tr>
<td>150</td>
<td>ENMP595-17C (HAM)</td>
<td>Materials and Processing Thesis</td>
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</tbody>
</table>
Physics

PHYS506 – Advanced Quantum Theory **30 points**
This paper will not be offered in 2017.

PHYS511-17A (HAM) – Particles and Fields **30 points**
This paper covers relativistic kinematics and wave equations, Diracs equation and applications, elementary particles and symmetries, Langrangian field theory and quantum fields, models of strong, weak electromagnetic interactions and the inclusion of gravity.

**Note(s):** This paper will only be offered with sufficient student interest.

Convenor(s): Dr Michael Cree
Restriction(s): MATH471, MATH571 and PHYS313
Assessment: Internal assessment/examination ratio: 1:2

PHYS516-17A (HAM) – Computational Biophysics **30 points**
This is a lecture and computer-laboratory course on the computational methods used in neuroscience and biophysics. Topics covered include linear and non-linear differential equations, Euler and Runge-Kutta integration methods, limit cycles, action potential generation, hysteresis and memory in simple neural systems, stability, noise simulation, and root finding. The programming language used is MATLAB.

**Note(s):** This paper will only be offered with sufficient student interest.

Convenor(s): Associate Professor Alistair Steyn-Ross
Prerequisite(s): Any one of PHYS201, PHYS202, ENEL284 or ENEL285; and any two of MATH251, MATH253, MATH255, ENGG283, ENGG284, ENGG285, ENGG287
Restriction(s): PHYS315
Assessment: Internal assessment/examination ratio: 1:0

PHYS551-17A (HAM) – Methods in Theoretical Physics 1 **15 points**
This paper introduces common methods in theoretical physics, for example, use of Fourier Transforms and other integral transforms, complex functions, and maximisation/minimisation methods.

**Note(s):** This paper will only be offered with sufficient student interest.

Convenor(s): Dr Marcus Wilson
Prerequisite(s): MATH251 and one of MATH252, MATH253, MATH255
Assessment: Internal assessment/examination ratio: 1:1

PHYS552 – Methods in Theoretical Physics 2 **15 points**
This paper will not be offered in 2017.

PHYS560-17A/B/Y (HAM) – Special Topics in Physics 1 **15 points**
This paper involves directed reading, project work and paper presentation in a defined topic area of physics.

Convenor(s): Professor Moira Steyn-Ross
Prerequisite(s): Topic dependent
Assessment: Internal assessment/examination ratio: 1:0
PHYS561-17A/B/Y (HAM) – Special Topics in Physics 2 15 points
This paper involves directed reading, project work and paper presentation in a defined topic area of physics.

Convenor(s):
Professor Moira Steyn-Ross

Prerequisite(s):
Topic dependent

Assessment:
Internal assessment/examination ratio: 1:0

PHYS590-17A/B/Y (HAM) – Directed Study 30 points
Convenor(s):
Dr James Carson

Assessment:
Internal assessment/examination ratio: 1:0

Dissertations and theses for MSc, MSc(Research) and MSc(Tech)

<table>
<thead>
<tr>
<th>Points</th>
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<tr>
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<td>Physics Thesis</td>
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</table>
Psychology

Note(s): For full descriptions of these papers, please see the Psychology Graduate Handbook, available from the Psychology Office, or the Faculty of Arts & Social Sciences Graduate Handbook. Papers marked * do not count towards a Psychology qualification in Science, but may be taken as papers outside the field of the degree.

PSYC511-17A (HAM) – Evaluation Research Design* 15 points
PSYC513-17C (BLK) – Evaluation Research Analysis* 30 points
PSYC517 – The Social Psychology of Anti-Social Behaviour 15 points
This paper will not be offered in 2017 (alternates with PSYC518).

PSYC518-17B (BLK) – Family Violence: Research and Interventions* 15 points
PSYC538-17B (HAM) (NET) – Applications of Behaviour Analysis 15 points
PSYC539-17A (HAM) – Graduate Research Methods in Psychology 15 points
PSYC556-17A (HAM) – Advanced Topics in Abnormal Adult Psychology 15 points
PSYC559-17B (NET) – Animal Behaviour and Welfare Research 15 points
PSYC560-17A (HAM) (NET) – Applied Behaviour Analysis: Theory and Issues 15 points
PSYC561-17A (HAM) (NET) – Behaviour Analysis Research and Theory 15 points
PSYC562-17B (HAM) – Theories of Psychotherapy 15 points
PSYC564-17B (HAM) – Developmental Psychopathology 15 points
PSYC568-17A (HAM) – Techniques in Applied Psychology 15 points
PSYC571-17B (HAM) – Psychology of Careers 15 points
PSYC572-17A (HAM) – Personnel Selection 15 points
PSYC573-17A (HAM) – Training and Development 15 points
PSYC575-17A (HAM) – Indigenous Psychologies* 15 points
PSYC577-17B (HAM) (NET) – Recent Research in Behaviour Analysis 15 points
PSYC579-17B (HAM) – Advances in Organisational Psychology 15 points
PSYC580 – The Psychology of Criminal Conduct 15 points
This paper will not be offered in 2017

PSYC581-17A (HAM) – Psychological Assessment* 15 points
PSYC582-17B (BLK) – Community Health Psychology* 15 points
PSYC583-17A (BLK) – Foundations of Community Psychology* 15 points
PSYC585-17B (HAM) – Leading Organisation Development 15 points
PSYC587-17Y (HAM) (NET) – Behaviour Analysis Practicum 15 points
PSYC588-17A/B/S (HAM) – Directed Study 15 points
PSYC589-17A/B/S (HAM) – Directed Study 15 points
PSYC590-17A/B/S/Y (HAM) – Directed Study 30 points
PSYC591-17Y (HAM) – Honours Dissertation 30 points

Dissertations and theses for MSc, MSc(Research)

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<th>Points</th>
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<td>PSYC592-17C (HAM)</td>
<td>Dissertation</td>
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General information

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Scholarships and financial assistance

School and external funding

Each School may have funding or scholarships available for graduate support. External funding is also often available for specific research projects. Students should initially consult with the Graduate Convenor or the director of the centre about scholarships or external funding opportunities.

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

Scholarships

Information and advice on scholarships can be obtained from the Scholarships Office.

<table>
<thead>
<tr>
<th>Scholarships Office</th>
<th>Phone:</th>
<th>07 838 4489 or 07 858 5195</th>
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<tr>
<td></td>
<td>Fax:</td>
<td>07 838 4600</td>
</tr>
<tr>
<td></td>
<td>Email:</td>
<td><a href="mailto:scholarships@waikato.ac.nz">scholarships@waikato.ac.nz</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>waikato.ac.nz/scholarships</td>
</tr>
</tbody>
</table>

Postgraduate Studies

Contact

The Postgraduate Studies Office can provide comprehensive information on higher degrees (Master of Philosophy and Doctor of Philosophy).

<table>
<thead>
<tr>
<th>Postgraduate Studies Office</th>
<th>Phone:</th>
<th>07 856 2889 extn 6279</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Fax:</td>
<td>07 838 4130</td>
</tr>
<tr>
<td></td>
<td>Email:</td>
<td><a href="mailto:postgrad@waikato.ac.nz">postgrad@waikato.ac.nz</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>waikato.ac.nz/sasd/postgraduate</td>
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Facilities for graduates

Computer 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. 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 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. The order of priority for using R.1.22 is the same as that for F.1.14. 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. 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.

For queries and advice regarding computing facilities within the Faculty, please email: fsen_csg@waikato.ac.nz or contact extn 5006.

In addition, students may approach the ITS Service Desk for computing related queries. The ITS Service Desk may be contacted on extn 4008. Information Technology Service (ITS) is a service division that provides IT services to the University community.

Note(s): 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.
The University library

waikato.ac.nz/library

The library is a modern and constantly growing facility that is capable of meeting the needs of most areas of research. It has electronic information sourcing and also an extensive interloan scheme, both accessible via the campus network and the internet.

For any queries, help or information contact:

<table>
<thead>
<tr>
<th>Science Librarian</th>
<th>Phone: 07 838 4466 extn 6513</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheryl Ward</td>
<td>Email: <a href="mailto:cward@waikato.ac.nz">cward@waikato.ac.nz</a></td>
</tr>
<tr>
<td></td>
<td><em>Cheryl is also available for tours and tutorials.</em></td>
</tr>
</tbody>
</table>

Your space

Each School has its own method for allocation of office and laboratory space. In most cases, graduate students are allocated a desk and lab space as well as computer accounts. Access to reagents or other materials or equipment essential for research is by negotiation with the chief supervisor and Graduate Convenor.

Social interaction

Regular social functions are held in each School. There are also special social functions for international students. In addition, Māori students are involved in two hui per semester to discuss matters of concern to them.

Students with disabilities

The Faculty of Science & Engineering is committed to providing equity in education and welcomes students with disabilities. If you have a disability and would like to discuss your support needs, contact the Faculty Registrar. Alternatively you could contact the Disabilities Co-ordinator for the University, phone: 07 838 4719 or email: disability@waikato.ac.nz. It is important to make contact before your classes begin to ensure that appropriate support provisions are in place for you.

Academic support

Your main source of support in this area will be your supervisor and your school and faculty staff members. Student Learning Support can also provide assistance in the following areas:

1. Workshops in ‘Research – getting started and finished’ and ‘Writing and Research.’
2. Help with the process of identifying and clarifying research questions.
3. Assistance with the preparation of a research proposal, literature review, abstract, conference paper or presentation.
4. Advice on establishing and maintaining a good working relationship with your supervisor.
5. Help with many aspects of research writing.
6. Help to overcome ‘writer’s block’.

Visit: waikato.ac.nz/pathways/student-learning
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. These are:

**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 the New Zealand Ministry of Education website at [minedu.govt.nz/international](http://minedu.govt.nz/international)

**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](http://immigration.govt.nz)

**Eligibility for health services**

Most international students are not entitled to publicly funded health services while in New Zealand. If you receive medical treatment during your visit, you may be liable for the full costs of that treatment. Full details on entitlements to publicly funded health services are available through the Ministry of Health, and can be viewed on their website at: [moh.govt.nz](http://moh.govt.nz)

**Accident insurance**

The Accident Compensation Corporation provides accident insurance for all New Zealand citizens, residents and temporary visitors to New Zealand, but you may still be liable for all other medical and related costs. Further information can be viewed on the ACC website at: [acc.co.nz](http://acc.co.nz)

**Medical and travel insurance**

International students (including group students) must have appropriate and current medical and travel insurance while in New Zealand.
International student support

International graduate and postgraduate students should make contact with both the Graduate Convenor, and with the Associate Dean for international students in the Faculty, who can help with any problems or issues outside of the School.

| Associate Dean (International) | Room:       | CD.3.03 |
|                                | Phone:      | 07 838 4630 |
| Associate Professor            | Email:      | rainer@waikato.ac.nz |
| Rainer Künnemeyer             |             |          |

There is also an international student support person in each School, and students may obtain their names from School administrators. International student support persons are able to give guidance to students about academic and general matters and refer students on as appropriate for further advice, tutoring or counselling.

English language requirements

All applicants to the Faculty of Science & Engineering whose admission is on the basis of study completed overseas where the medium of instruction is not English, are expected to provide evidence of competence in the use of English language. The following test scores are considered to be evidence of such competence. Other evidence may be considered on a case-by-case basis. Applicants for graduate study may need to demonstrate a higher level of competence.

The following apply for entry to all graduate and postgraduate qualifications in the Faculty of Science & Engineering:

- An IELTS overall score of at least 6.5 overall (including at least 6.0 or better in the Writing band), or
- An iBT (internet Based TOEFL) score of 90 with a Writing score of 22, or
- A B grade or better at level 8 in the Certificate of Attainment in English Language.

The English language proficiency requirements for admission to particular qualifications are at the discretion of the Dean concerned.
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 Science or the Dean of Engineering. Unresolved complaints should then be referred to the Associate Dean (Postgraduate). 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.

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.
- Acknowledgement 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 acknowledgement 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.
Safety, security and responsibilities policy

All graduates must read, understand and acknowledge the booklet *Introduction to Health and Safety in the FSE* 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 all 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 unlabelled 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.
## Occupational safety and health 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 is:

<table>
<thead>
<tr>
<th>Role</th>
<th>Phone</th>
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</thead>
<tbody>
<tr>
<td>Faculty Manager</td>
<td>07 838 4292</td>
</tr>
<tr>
<td>Shelley Catlin</td>
<td></td>
</tr>
</tbody>
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Other contacts:

<table>
<thead>
<tr>
<th>Role</th>
<th>Phone</th>
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</thead>
<tbody>
<tr>
<td>Faculty Chemical Safety Officer</td>
<td>07 838 4103</td>
</tr>
<tr>
<td>John Little</td>
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</tbody>
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<tr>
<th>Role</th>
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<tbody>
<tr>
<td>Faculty Field Trip Health and Safety Officer</td>
<td>07 838 4392</td>
</tr>
<tr>
<td>Annie Barker</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Role</th>
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<tbody>
<tr>
<td>Evacuation Officer</td>
<td>07 838 4117</td>
</tr>
<tr>
<td>Ivan Bell</td>
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<tbody>
<tr>
<td>Radiation Subcommittee Chairperson</td>
<td>07 838 4947</td>
</tr>
<tr>
<td>Associate Professor</td>
<td></td>
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<tr>
<td>Johan Verbeek</td>
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<table>
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<tr>
<td>Laser Safety Officer</td>
<td>07 838 4630</td>
</tr>
<tr>
<td>Associate Professor</td>
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<tr>
<td>Rainer Künnemeyer</td>
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<tr>
<td>Health and Safety Officer</td>
<td>07 838 4493</td>
</tr>
<tr>
<td>Andrew Alston</td>
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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:

<table>
<thead>
<tr>
<th>Role</th>
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<tbody>
<tr>
<td>Chemical Emergencies</td>
<td>07 838 2889 extn 8888 or 027 629 1802</td>
</tr>
<tr>
<td>University Security</td>
<td>07 838 4444</td>
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# Teaching and assessment periods 2017

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<thead>
<tr>
<th>NZ Secondary School Dates</th>
<th>Week</th>
<th>Starting Date</th>
<th>University Teaching Periods</th>
<th>Holidays and Other Important Dates</th>
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<tr>
<td></td>
<td>1</td>
<td>2-Jan-17</td>
<td>Summer School (S)</td>
<td>2-3 January New Year’s Day (Observed)</td>
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<td>30 January</td>
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<td>25-26 December Christmas Day/Boxing Day</td>
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WHERE THE WORLD IS GOING
TE AHUNGA O TE AO