WELCOME TO WAIKATO

In 2014, the University of Waikato celebrated 50 years of teaching and research excellence. From very modest beginnings in 1964, the University of Waikato is now one of the world’s leading universities, and the university of choice for more than 12,000 students annually.

In 2015, the University enters a new era with the appointment of our fifth Vice-Chancellor following the retirement of Professor Roy Crawford who held the position for 10 years.

Moving forward, we are constantly developing our campus to further enhance the learning environment of our students. This is evident with the construction of the new multi-million dollar Law and Management building, which will create a trio of iconic campus facilities including the Gallagher Academy of Performing Arts and the Student Centre.

Research is our lifeblood at the University and we punch above our weight in research commercialisation. The University is one of New Zealand’s major research organisations, playing a key role in the local economy and making a significant contribution to the national innovation system. We have six research institutes, and postgraduate students who are continually contributing to regional, national and global research.

Businesses and organisations today need innovative people and the University of Waikato is dedicated to graduating outstanding students who are committed to “making a difference”.

To prepare students for the job market we provide work experience while they study, and many courses have components that mirror real-life situations so they are prepared for the challenges they face in the workplace.

The University of Waikato provides a dynamic, culturally diverse and inspiring environment for our student population so that when you leave this university you will be well prepared for the challenges that lie ahead.
Welcome to Science & Engineering

Congratulations on overcoming the challenges of undergraduate study and welcome to the enriching experience that is graduate and postgraduate study.

To succeed globally, New Zealand faces the challenge of developing a high level of scientific understanding and innovation, by maximising the intellectual capacity of our people. Graduates of the Faculty of Science & Engineering are a vital part of this process.

Within the Faculty, we offer strong graduate academic programmes in biological sciences, chemistry, earth sciences, physics, electronics, engineering, mechanical engineering and materials and processing; students may also study for a masters or PhD in psychology.

These programmes are supported by truly gifted staff, including those in our interdisciplinary Environmental Research Institute. Our staff have acquired national and international reputations in their subjects and place emphasis on maintaining a fruitful balance between the growth areas of scientific endeavour and the technological applications of that knowledge, while fuelling the minds of energetic and talented students.

Graduates in science and engineering enjoy rewarding careers with the added satisfaction of knowing that what they do can make a difference to New Zealand and to the world.

Professor Bruce Clarkson
DEAN, FACULTY OF SCIENCE & ENGINEERING
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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 2015 University of Waikato Calendar takes precedence.
CONTACT DETAILS

Faculty Office

The Faculty Office can help you with the following:

» Information about your papers and your degree
» Enrolment
» 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.

FACULTY OFFICE – ROOM FG.G.04

<table>
<thead>
<tr>
<th>Position</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office Administrator</td>
<td>07 838 4625</td>
<td><a href="mailto:science@waikato.ac.nz">science@waikato.ac.nz</a></td>
</tr>
<tr>
<td>Helen Eschenbruch</td>
<td>07 838 4218</td>
<td></td>
</tr>
<tr>
<td>Faculty Registrar</td>
<td>07 838 4290</td>
<td><a href="mailto:fionaw@waikato.ac.nz">fionaw@waikato.ac.nz</a></td>
</tr>
<tr>
<td>Fiona Hurst</td>
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<tr>
<td>Associate Dean (Postgraduate) – Postgraduate Research Committee Representative</td>
<td>07 838 4404</td>
<td><a href="mailto:mucalo@waikato.ac.nz">mucalo@waikato.ac.nz</a></td>
</tr>
<tr>
<td>Dr Michael Mucalo</td>
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<tr>
<td>Associate Dean (Teaching and Learning)</td>
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<td><a href="mailto:a.campbell@waikato.ac.nz">a.campbell@waikato.ac.nz</a></td>
</tr>
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<td>Dr Alison Campbell</td>
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</tr>
<tr>
<td>Associate Dean (Engineering)</td>
<td>07 838 4049</td>
<td></td>
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<td>Professor Janis Swan</td>
<td></td>
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<td>Associate Dean (Research)</td>
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</tr>
<tr>
<td>Professor Craig Cary</td>
<td>07 838 4593</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><a href="mailto:caryc@waikato.ac.nz">caryc@waikato.ac.nz</a></td>
</tr>
<tr>
<td>Associate Dean (International)</td>
<td>07 838 4625</td>
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<tr>
<td>To be advised</td>
<td></td>
<td>科学@waikato.ac.nz</td>
</tr>
<tr>
<td>Chair of Coastal Science</td>
<td>07 557 0481</td>
<td><a href="mailto:cbatters@waikato.ac.nz">cbatters@waikato.ac.nz</a></td>
</tr>
<tr>
<td>Professor Chris Battershill</td>
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<tr>
<td>Māori Support Officer</td>
<td>07 838 8187</td>
<td><a href="mailto:keastwood@waikato.ac.nz">keastwood@waikato.ac.nz</a></td>
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<tr>
<td>Kevin Eastwood</td>
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</table>

www.sci.waikato.ac.nz
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 the Head of School and staff in their research area to formulate a research programme. Opportunities also exist for collaboration with outside organisations.

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.

SCHOOLS

School of Science

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

Office: F.1.07
Phone: 07 838 4148
Email: sciadmin@waikato.ac.nz
www.sci.waikato.ac.nz

Head of School of Science
Professor Chad Hewitt
Phone: 07 838 4386
Email: c.hewitt@waikato.ac.nz

School of Engineering

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

Office: E.G.04
Phone: 07 838 4266 / 07 838 4026
Email: engineering@waikato.ac.nz
www.eng.waikato.ac.nz

Head of School of Engineering
Professor Ilanko
Phone: 07 838 6795
Email: ilanko@waikato.ac.nz

RESEARCH UNITS AND CENTRES

Centre for Biodiversity & Ecology Research (CBER)
Director: Professor Bruce Clarkson
Phone: 07 838 4237
Email: b.clarkson@waikato.ac.nz
http://cber.bio.waikato.ac.nz

Coastal Marine Group
Director: Professor Chris Battershill
Phone: 07 838 4893
Email: c.battershill@waikato.ac.nz
www.sci.waikato.ac.nz/research/centres-and-units/cmg

Co-operative Education Unit
Director: Dr Karsten Zegwaard
Phone: 07 838 4892
Email: karsten@waikato.ac.nz
http://sci.waikato.ac.nz/study/work-placements
<table>
<thead>
<tr>
<th>Research Unit</th>
<th>Phone</th>
<th>Fax</th>
<th>Email</th>
<th>Website</th>
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<tbody>
<tr>
<td>Engineering Education Research Unit (EERU)</td>
<td>07 858 5171</td>
<td>07 838 4712</td>
<td><a href="mailto:eeuwaikato@waikato.ac.nz">eeuwaikato@waikato.ac.nz</a></td>
<td><a href="http://www.waikato.ac.nz/eeru">www.waikato.ac.nz/eeru</a></td>
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<tr>
<td>Director: Associate Professor Bronwen Cowie</td>
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<tr>
<td>Environmental Research Institute</td>
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<td>Director: Professor Bruce Clarkson</td>
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<tr>
<td>International Centre for Terrestrial Antarctic Research</td>
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<td><a href="http://www.nztabs.ictar.aq">www.nztabs.ictar.aq</a></td>
</tr>
<tr>
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<tr>
<td>Thermophile and Microbial Biochemistry and Biotechnology Unit</td>
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<td></td>
<td><a href="mailto:irmcdon@waikato.ac.nz">irmcdon@waikato.ac.nz</a></td>
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<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></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>
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<td><a href="http://www.sci.waikato.ac.nz/microscopy">www.sci.waikato.ac.nz/microscopy</a></td>
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<tr>
<td>Manager: Dr Barry O'Brien</td>
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<tr>
<td>Waikato Centre for Advanced Materials (WaiCAM)</td>
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<td><a href="http://www.sci.waikato.ac.nz/waicam">www.sci.waikato.ac.nz/waicam</a></td>
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<td>Director: Professor Brian Gabbitas</td>
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<td>Waikato DNA Sequencing Unit</td>
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<td><a href="mailto:c.cary@waikato.ac.nz">c.cary@waikato.ac.nz</a></td>
<td><a href="http://www.bio.waikato.ac.nz/sequence">www.bio.waikato.ac.nz/sequence</a></td>
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<tr>
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<td>Waikato Electron Microscope Facility</td>
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<td><a href="mailto:hturner@waikato.ac.nz">hturner@waikato.ac.nz</a></td>
<td><a href="http://www.sci.waikato.ac.nz/microscopy">www.sci.waikato.ac.nz/microscopy</a></td>
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<tr>
<td>Manager: Helen Turner</td>
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<tr>
<td>Waikato Mass Spectrometry Facility</td>
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<td><a href="mailto:manleyha@waikato.ac.nz">manleyha@waikato.ac.nz</a></td>
<td><a href="http://www.mass-spec.co.nz">www.mass-spec.co.nz</a></td>
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<tr>
<td>Manager: Associate Professor Merilyn Manley-Harris</td>
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<tr>
<td>Waikato Radiocarbon Dating Laboratory</td>
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<td><a href="http://www.radiocarbondating.com">www.radiocarbondating.com</a></td>
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<td>Director: Associate Professor Alan Hogg</td>
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<td>Waikato Stable Isotope Unit</td>
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<td><a href="mailto:b.hicks@waikato.ac.nz">b.hicks@waikato.ac.nz</a></td>
<td><a href="http://www.bio.waikato.ac.nz/isotope">www.bio.waikato.ac.nz/isotope</a></td>
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<tr>
<td>Director: Professor Brendan Hicks</td>
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</table>
CONTACT DETAILS

POSTGRADUATE STUDIES OFFICE

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

Postgraduate Studies Office
Phone: 07 856 2889 extn 6279
Fax: 07 838 4130
Email: postgrad@waikato.ac.nz
www.waikato.ac.nz/sasd/postgraduate

SCHOLARSHIPS OFFICE

The Scholarships Office administers all scholarships offered by the University, and provides support and advice to potential and enrolled students considering applying for scholarships.

Scholarships Office
Phone: 07 838 4964 or 07 858 5195
Fax: 07 838 4600
Email: scholarships@waikato.ac.nz
www.waikato.ac.nz/scholarships

HOW TO ENROL

To complete an application:

» Visit the University of Waikato website. An application to enrol may be completed online at: www.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.
# Degrees and Qualifications

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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 2015 University of Waikato Calendar online at http://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 upskill in new areas related to their work. Excellence in advanced engineering design, research and development skills are core features of the degree. The degree involves following an approved research investigation in either the Faculty of Science & Engineering or the Faculty of Computing & Mathematical Sciences. Candidates are required to complete a total of 120 points at 500 Level over 12 months full-time or the equivalent in part-time study. Entry is via a recognised four-year professional engineering bachelors degree that contains a substantial design project. Potential candidates may be asked to complete a postgraduate certificate or postgraduate diploma before enrolling in an ME.

<table>
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<tr>
<td><strong>THESIS</strong></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:

- Computer Science page 71
- Electronics page 60
- Engineering page 62
- Materials and Processing page 63
- Mathematics page 71
- Physics page 67

Please refer to the 2015 University of Waikato Calendar online at http://calendar.waikato.ac.nz for degree regulations.
**MASTER OF SCIENCE MSc**

The MSc is 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.

An MSc is normally an 18 month duration 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). 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.*

<table>
<thead>
<tr>
<th>MSc Structure</th>
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<tbody>
<tr>
<td><strong>YEAR 1</strong></td>
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<tr>
<td>500 LEVEL</td>
</tr>
<tr>
<td>90 points</td>
</tr>
<tr>
<td><strong>YEAR 2</strong></td>
</tr>
<tr>
<td>THESIS</td>
</tr>
<tr>
<td>60 points</td>
</tr>
</tbody>
</table>

*Please refer to the 2015 University of Waikato Calendar online at [http://calendar.waikato.ac.nz](http://calendar.waikato.ac.nz) for degree regulations.*
MASTER OF SCIENCE (ENVIRONMENTAL SCIENCES)
MSc(EnvSci)

The MSc(EnvSci) is normally a 12-18 month environmental science-focused degree comprising 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.

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.

MSc(EnvSci) 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 focussed on the environmental sciences. Assessment is designed to ensure that students have the opportunity to demonstrate their achievement.

<table>
<thead>
<tr>
<th>MSc(EnvSci) Structure</th>
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<tr>
<td>YEAR 1</td>
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<tr>
<td>500 LEVEL</td>
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<tr>
<td>90 points</td>
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<tr>
<td>30 points</td>
</tr>
<tr>
<td>THESIS</td>
</tr>
<tr>
<td>60 points</td>
</tr>
</tbody>
</table>

Please refer to the 2015 University of Waikato Calendar online at 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.

<table>
<thead>
<tr>
<th>MSc(Research) Structure</th>
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<tr>
<td><strong>YEAR 1</strong></td>
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<td>120 points</td>
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<td><strong>YEAR 2</strong></td>
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<tr>
<td>THESIS</td>
</tr>
<tr>
<td>120 points</td>
</tr>
</tbody>
</table>

Please refer to the 2015 University of Waikato Calendar online at http://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.

<table>
<thead>
<tr>
<th>MSc(Tech) Structure</th>
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<tbody>
<tr>
<td><strong>YEAR 1</strong></td>
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<tr>
<td>500 LEVEL</td>
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<tr>
<td>90 points</td>
</tr>
<tr>
<td>ENMP585 &amp; ENMP586</td>
</tr>
<tr>
<td>30 points</td>
</tr>
<tr>
<td><strong>YEAR 2</strong></td>
</tr>
<tr>
<td>THESIS</td>
</tr>
<tr>
<td>120 points</td>
</tr>
</tbody>
</table>

Please refer to the **2015 University of Waikato Calendar** online at [http://calendar.waikato.ac.nz](http://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 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 Convenor (or nominee) approves the papers taught in graduate qualifications. This ensures the candidate is well-prepared, in terms of skills and knowledge, to undertake the thesis topic proposed. The assessment in taught papers is varied and can be assessed exclusively on coursework, examination, or a mixture of both. Candidates should be certain of their deep interest in the proposed topic, as a thesis is a demanding activity and requires a high level of academic ability, commitment and stamina.
ENROLMENT PATTERNS FOR MASTERS STUDENTS

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, and
» 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, and
» 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 Head of School 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 Head of School 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.
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.

**PGDip Structure**

<table>
<thead>
<tr>
<th>YEAR 1</th>
<th>500 LEVEL</th>
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<tbody>
<tr>
<td></td>
<td>120 points</td>
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</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.

**PGCert Structure**

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

In summary the requirements are:

» 60 points at 500 Level or above in an approved subject.

Please refer to the 2015 University of Waikato Calendar online at [http://calendar.waikato.ac.nz](http://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.

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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<tbody>
<tr>
<td><strong>YEAR 1</strong></td>
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<tr>
<td>500 LEVEL</td>
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<tr>
<td>60 points</td>
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<tr>
<td>DISSERTATION</td>
</tr>
<tr>
<td>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.
**HIGHER DEGREES**

Application Process

Enrolment in higher degrees (MPhil and PhD) is a more involved process than that for masters degrees. Please refer to [www.waikato.ac.nz/sasd/postgraduate](http://www.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, Head of School 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 six 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 and MPhil candidates must submit progress reports six-monthly from the date of confirmed 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, Head of School, 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 www.waikato.ac.nz/sasd/postgraduate
BIOLOGICAL SCIENCES

CONTACT DETAILS

www.bio.waikato.ac.nz

School of Science Office
Room: F.1.07
Phone: 07 838 4148
Email: sciadmin@waikato.ac.nz

Graduate Co-ordinator
Associate Professor Conrad Pilditch
Room: R.2.20
Email: conrad@waikato.ac.nz
INTRODUCTION

_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 and Ecology Research, the Thermophile and Microbial Biochemistry and Biotechnology 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 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 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.

Professor Bruce Clarkson  
BSc, MSc(Hons), DPhil Waikato  
Email: b.clarkson@waikato.ac.nz  
Research interests: Vegetation dynamics; autecology of threatened flora; and restoration ecology.

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.
ACADEMIC STAFF

Associate Professor Kevin Collier  
BSc Waikato, PhD Canterbury  
Email: k.collier@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 Chrissen 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: Modelling of water quality in lakes and reservoirs: sediment-water interactions, and wind resuspension of bottom sediments; and bloom forming algae, particularly cyanobacteria. Research on the Rotorua Lakes is supported through the Bay of Plenty Regional Council Chair in Lake Restoration.

Professor Chad Hewitt – Head of School of Science  
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 globalization; 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.

**Associate 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 Daniel C Laughlin**  
BSc Calvin College, MSc Penn State University, PhD Northern Arizona University  
Email: d.laughlin@waikato.ac.nz  
Research interests: Plant community ecology; comparative plant ecology and trait-based community assembly; ecosystem ecology and restoration; and fire ecology.

**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; and physiology of vertebrate muscle.

**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.
ACADEMIC STAFF

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

Associate 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.

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 and g) the ontogeny of social behaviour.
CHEMISTRY

CONTACT DETAILS

www.chem.waikato.ac.nz

School of Science Office
Room: F.1.07
Phone: 07 838 4148
Email: sciadmin@waikato.ac.nz

Graduate Co-ordinator
Associate Professor Graham Saunders
Room: CD.3.01
Email: g.saunders@waikato.ac.nz
INTRODUCTION

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
- Prodrug 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 to ask 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 MNZIC  
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 nanoporous inorganic materials for carbon dioxide capture.

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.

Dr 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.

Dr Michéle R Prinsep  
BSc(Hons), PhD Canterbury, MNZIC  
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; and chemical ecology of marine organisms.

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

www.earth.waikato.ac.nz

School of Science Office
Room:  F.1.07
Phone:  07 838 4148
Email:  sciadmin@waikato.ac.nz

Graduate Co-ordinator
Professor David Lowe
Room:  E.2.08
Email:  dlowe@waikato.ac.nz
INTRODUCTION

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.
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 activities: Applied hydrology including groundwater resource evaluation and optimal operation of water systems; quantitative analysis; stochastic flood theory; optimisation applications, catchment; and modelling and hydrological and climatological trend analysis.

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.

Dr 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 Quaternary science (palaeoenvironmental reconstruction).

Dr Vicki Moon
MSc, PhD Waikato
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.
## ENGINEERING

### CONTACT DETAILS

**www.eng.waikato.ac.nz**

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Room: E.G.04  
Phone: 07 838 4266  
Email: engineering@waikato.ac.nz

Graduate Coordinator  
Dr James Carson  
Room: EF.3.01  
Phone: 07 838 4206  
Email: jkcarson@waikato.ac.nz
INTRODUCTION

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
» Metalics
» 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 17).

Collaborative work with industry and research associations are also available.
ACADEMIC STAFF

Head of School – Professor Ilanko Ilanko
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.

Professor Janis Swan – Associate Dean (Engineering)
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 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.

Dr Adrian Dorrington
NZCertEng AUT, MSc(Tech)(Hons), PhD Waikato, MSPIE, MIEEE
Email: a.dorrington@waikato.ac.nz
Research interests: Optoelectronics and optical measurement technologies; with a focus on Time-of-Flight 3D range imaging technologies for surface profiling and object shape, position, and size measurement.

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.
Professor Brian Gabbitas
BSc, PhD Leeds, CEng MIMMM, FIPENZ
Email: briang@waikato.ac.nz
Research interests: Failure of materials; creep and fracture in wood; and powder metallurgical processing of titanium-based alloys.

Nihal Kularatna
BSc(Eng) Ceyl, FIET, FIE, SMIEEE
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 Künnemeyer
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.

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 Sur, 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).

Professor Jonathan Scott
BSc, BE, MEngSc, PhD Sydney, SMIEEE, MAES, MSPIE
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.
ACADEMIC STAFF

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 Sadhana Talele
BE, ME Poona, GradDipT, PhD Waikato, FIETE
Email: sadhana@waikato.ac.nz
Research interests: Mathematical modelling of electroporation and other biophysical phenomenon, microbial inhibition by low intensity electric field and laser optics applications in horticultural area.

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.

Dr 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

http://psychology.waikato.ac.nz

School of Psychology Office
Room: K.1.12
Phone: 07 838 4032
Email: psychology@waikato.ac.nz

School Manager
Sue Carnaby
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Phone: 07 838 4032
Fax: 07 858 5132
Email: carnabys@waikato.ac.nz

School Graduate Adviser
To be advised
INTRODUCTION

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 focussed 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.

Dr Donald A J Cable
BBS, DipSocSci, MA Massey, PGCertPracPsyc, PhD Waikato
Email: dcable@waikato.ac.nz
Research interests: Occupational psychology generally including the psychological work contract; the processes underlying career decision-making; personnel selection; the effect on survivors of organisational restructuring; and the psychological symptoms of sick building syndrome.

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.

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.

Bridgette Masters-Awatere
BSocSc, MSocSc, PGDipPsych(Comm) 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).
ACADEMIC STAFF

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 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 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.

Mohi Rua
BSc, BSc(Hons), MSocSc, PGDipPsych(Com), 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

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 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.

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

CONTACT DETAILS

www.radiocarbondating.com

Waikato Radiocarbon Dating Laboratory
Room: C.G.01
University of Waikato
Private Bag 3105
Hamilton 3240
New Zealand

Director
Associate Professor Alan Hogg
Phone: 07 838 4707
Fax: 07 838 4192
Email: alan.hogg@waikato.ac.nz
INTRODUCTION

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 $^{14}$C calibration curve; Palaeoclimatic implications of $^{14}$C variations over time; pretreatment and calibration of bone for radiocarbon dating; and the study of marine $^{14}$C 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 $^{14}$C concentrations as archived in OIS 3 subfossil kauri trees; optimisation of WallacQuantulus liquid scintillation spectrometers for obtaining finite $^{14}$C dates beyond 50ka; investigations into Oceania marine reservoir corrections; calibration of Southern Hemisphere $^{14}$C 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 $^{14}$C 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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All 500 Level papers are delivered subject to demand and staff availability.

BIOL503-15A (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): BIOLS01
Assessment: Internal assessment/examination ratio: 1 : 0

BIOL560-15A (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): BIOLS13
Assessment: Internal assessment/examination ratio: 3 : 7

BIOL561-15B (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

BIOL562-15C (BLK) – 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): Associate Professor Conrad Pilditch
Prerequisite(s): BSc, BIOL314 or equivalent
Restriction(s): BIOLS14
Assessment: Internal assessment/examination ratio: 3 : 7

BIOL563-15B (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): BIOLS60 or BIOLS62
Assessment: Internal assessment/examination ratio: 1 : 1
BIOL564-15B (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.

Convenor(s): Dr Daniel Laughlin
Prerequisite(s): BSc, BIOL312 or BIOL325 or equivalent
Corequisite(s): BIOL570
Restriction(s): BIOL515
Assessment: Internal assessment/examination ratio: 1:1

BIOL565-15A (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.

Convenor(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

BIOL570-15A (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.

Convenor(s): Dr Daniel Laughlin
Prerequisite(s): BSc, BIOL312, BIOL313 or BIOL325 or equivalent
Corequisite(s): BIOL571
Restriction(s): BIOL521
Assessment: Internal assessment/examination ratio: 1:1

BIOL571-15B (HAM) – Plant Function
15 Points
Contemporary topics in plant environmental physiology, with an emphasis on the functioning of plants at the physiological, whole plant and ecological level. Topics will include the acquisition of carbon and water by plants and limitations to plant productivity in natural and managed environments.

Convenor(s): Dr Mike Clearwater
Prerequisite(s): BSc, BIOL312 or BIOL325 or equivalent
Corequisite(s): BIOL570
Restriction(s): BIOL521
Assessment: Internal assessment/examination ratio: 1:1
BIOL572-15B (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.

Convenor(s): Professor Joseph Waas
Prerequisite(s): BSc, BIOL333 or equivalent
Restriction(s): BIOL533
Assessment: Internal assessment/examination ratio: 1 : 1

BIOL573-15A (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.

Convenor(s): Professor Joseph Waas
Prerequisite(s): BSc and BIOL312, BIOL333, BIOL338 or equivalent
Restriction(s): BIOL533
Assessment: Internal assessment/examination ratio: 1 : 1

BIOL574-15A (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

BIOL575-15B (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
### BIOLOGICAL SCIENCES PAPERS

**BIOL576-15A (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, BIOL335 or BIOL338 (or external equivalent)  
**Restriction(s):** BIOL538  
**Assessment:** Internal assessment/examination ratio: 2 : 3

**BIOL577-15B (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

**BIOL580-15A (HAM) – Human and Applied Microbiology**  
**15 Points**  
Microbial biology associated with human health and extreme environments.  
**Convenor(s):** To be advised  
**Prerequisite(s):** BSc, BIOL341 or equivalent  
**Restriction(s):** BIOL541  
**Assessment:** Internal assessment/examination ratio: 1 : 0

**BIOL581-15B (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

**BIOL582-15A (HAM) – Biomolecular Structure and 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
BIOL583-15B (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

BIOL584-15A(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

BIOL585-15B (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

BIOL588-15A/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
### BIOLOGICAL SCIENCES PAPERS

**BIOL590-15C/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):* To be advised

*Assessment:*

Internal assessment/examination ratio: 1 : 0

**COMP555-15B (HAM) – Bioinformatics**

*15 Points*

For a full description, see the *Faculty of Computing & Mathematical Sciences Handbook*.

**SCIE501-15B (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):* Professor David Lowe

*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 PAPERS

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

CHEM511-15A (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 Merilyn Manley-Harris
Prerequisite(s): CHEM301
Restriction(s): CHEM501
Assessment: Internal assessment/examination ratio: 1 : 1

CHEM512-15A (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. CHEM202 and CHEM302 are recommended but not essential.
Assessment: Internal assessment/examination ratio: 1 : 0

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

Convenor(s): Professor Bill Henderson
Prerequisite(s): CHEM303
Restriction(s): CHEM503
Assessment: Internal assessment/examination ratio: 0 : 1

CHEM514-15A (HAM) – Special Topics in Chemistry A
15 Points
An advanced study of topics relating to staff members’ areas of research expertise, which may include organic, inorganic, physical, analytical or environmental themes.

Convenor(s): Associate Professor Graham Saunders
Prerequisite(s): Normally any three of CHEM301, CHEM302, CHEM303 and CHEM306
Restriction(s): CHEM504
Assessment: Internal assessment/examination ratio: 0 : 1

CHEM516-15A (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
CHEMISTRY PAPERS

CHEM517-15A (HAM) – Applied and Environmental Analytical Chemistry A
15 Points
With special reference to the commercial context, a critical examination of analytical methodologies for organic substances, eg pesticides.
Convenor(s): Dr Michèle Prinsep
Prerequisite(s): CHEM204, CHEM306
Restriction(s): CHEMS07
Assessment: Internal assessment/examination ratio: 0 : 1

CHEM521-15B (HAM) – Advanced Organic Chemistry
15 Points
An advanced study of natural products chemistry and a study of structure and mechanism in carbohydrate chemistry.
Convenor(s): Dr Michèle Prinsep
Prerequisite(s): CHEM301
Restriction(s): CHEM501
Assessment: Internal assessment/examination ratio: 0 : 1

CHEM522-15B (HAM) – Computational Chemistry
15 Points
A practical introduction to computational chemistry and its increasing use in modern chemical research.
Convenor(s): Dr Joseph Lane
Prerequisite(s): CHEM111 and CHEM112. CHEM302 is recommended but not essential. CHEMS02
Restriction(s): CHEM502
Assessment: Internal assessment/examination ratio: 1 : 0

CHEM523-15B (HAM) – Inorganic Materials Chemistry
15 Points
A study of inorganic materials.
Convenor(s): Professor Bill Henderson
Prerequisite(s): CHEM303
Restriction(s): CHEMS03
Assessment: Internal assessment/examination ratio: 0 : 1

CHEM524-15B (HAM) – Special Topics in Chemistry B
15 Points
An advanced study of topics relating to staff members’ areas of research expertise, which may include organic, inorganic, physical, analytical or environmental themes.
Convenor(s): Associate Professor Graham Saunders
Prerequisite(s): Normally any 3 of CHEM301, CHEM302, CHEM303 and CHEM306
Restriction(s): CHEM504
Assessment: Internal assessment/examination ratio: 0 : 1
CHEM527 – Applied and Environmental Analytical Chemistry B
15 Points
An advanced study of instrumental analytical techniques for organic and inorganic compounds and comparison of their efficacies.

Convenor(s): To be advised
Prerequisite(s): CHEM204, CHEM306 or an equivalent course
Restriction(s): CHEM507
Assessment: Internal assessment/examination ratio: 0 : 1

CHEM589-15A/B/C/S (HAM) – Directed Study
15 points
May involve a literature review or the preparation of a proposal.

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

CHEM590-15C/D (HAM) – Directed Study
30 Points
This paper allows an indepth study of a specific topic.

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

SCIE501-15B (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): Professor David Lowe
Restriction(s): A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (eg BIOLS01, ERTH001)
Assessment: Internal assessment/examination ratio: 1 : 0

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

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EARTH SCIENCES PAPERS

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

ENV5524-15A (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): ENVS5521
Assessment: Internal assessment/examination ratio: 1 : 0

ERTH512-15A/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): Professor David Lowe
Restriction(s): ERTH511
Assessment: Internal assessment/examination ratio: 1 : 0

ERTH513-15A/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): Professor David Lowe
Restriction(s): ERTH511
Assessment: Internal assessment/examination ratio: 1 : 0

ERTH524-15A (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

ERTH525-15B (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
ERTH526-15C (HAM) – Field Analysis of Sedimentary Basins
15 Points
A paper teaching the application of field methods in the analysis of sedimentary successions and basins. This paper includes a compulsory field trip in the week after B Semester exams in November (week 46). There is an essay due before the field trip and a report due Monday 14 December 2015. Subject co-ordinator approval required.

Convenor(s): Professor Peter Kamp and Dr Beth Fox
Prerequisite(s): ERTH322
Restriction(s): ERTH522
Assessment: Internal assessment/examination ratio: 1 : 0

ERTH527-15A (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): ERTH322
Restriction(s): ERTH522
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH528-15A (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.

Convenor(s): Professor David Lowe
Prerequisite(s): 40 points at 300 level in Earth Sciences. ERTH321 and ERTH322 are highly recommended.
Restriction(s): ERTH523
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH533-15B (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): ERTH334
Restriction(s): ERTH531
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH535-15A (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): ERTH333 or ERTH334 or ERTH384
Restriction(s): ERTH531
Assessment: Internal assessment/examination ratio: 3 : 2
ERTH547-15B (HAM) – Introduction to Hydrological Modelling
15 Points
Optimal use of water resources is an essential part of national economic development. Hydrological science is overviewed, with emphasis on techniques of water resource studies through hydrological model construction and simulations.

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

ERTH548-15A (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): Dr David Campbell
Prerequisite(s): ERTH345 or ERTH346
Restriction(s): ERTH541
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH552-15B (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

ERTH562-15A (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

ERTH563-15A (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
ERTH564-15B (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 and Dr Willem de Lange
Prerequisite(s): ERTH344
Restriction(s): ERTH543 and ERTH546
Assessment: Internal assessment/examination ratio: 1 : 0

ERTH565-15B (HAM) – Time Series Analysis for Environmental Scientists
15 Points
This paper explores the use of timeseries to provide a deeper understanding of processes in Earth and environmental sciences. It assumes only a basic knowledge of statistics, but a more advanced knowledge of processes in the ocean, atmosphere, lakes or rivers.

Convenor(s): Associate Professor Karin Bryan
Prerequisite(s): Any of ERTH344, ERTH343, ERTH345, ERTH346, ERTH384
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH590-15A/B/Y (HAM) – Directed Study
30 Points
This paper allows in-depth study and research of a specific topic.

Convenor(s): Professor David Lowe
Assessment: Internal assessment/examination ratio: 1 : 0

SCIE501-15B (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): Professor David Lowe
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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ELECTRONICS PAPERS

ENEL501-15A/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

ENEL504-15B (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

ENEL505-15A (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): Nihal Kularatna
Prerequisite(s): ENEL205
Assessment: Internal assessment/examination ratio: 1 : 0

ENEL506-15B (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): Nihal Kularatna
Prerequisite(s): ENEL205
Assessment: Internal assessment/examination ratio: 1 : 0

ENEL517-15A (HAM) – Mechatronics
30 Points
This paper covers embedded micro-programming, feedback control, interface to electro-mechanical systems involving gears, motors, belt drivers, actuators, and sensors: the enabling technologies of robotics. A series of projects require students to integrate software, control, mechanical and electromotive skills to achieve 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
ENEL522-15B (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% is required to receive a passing grade. Laboratories are compulsory.

Convenor(s): Associate Professor Rainer Kün nemeyer
Prerequisite(s): ENEL324
Restriction(s): ENEL322 and ENEL423
Required Book(s): To be advised
Assessment: Internal assessment/examination ratio: 1 : 1

ENEL585-15B (HAM) – Power Electronics
30 Points
This paper covers the theory and practice of power semiconductors, power converters, power management, protection, and variable speed drives.

Convenor(s): Nihal Kularatna
Prerequisite(s): ENEL205
Restriction(s): ENEL385 and ENEL485
Required Book(s): To be advised
Assessment: Internal assessment/examination ratio: 1 : 1

ENEL590-15C/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 PAPERS

ENGG501-15A(HAM) – Control Theory and Image Processing
30 points
This paper deals with PID feedback control of linear systems using classical as well as state
spacemethods. It is highly computer and project based.

Convenor(s):  Associate Professor Howell Round
Prerequisite(s):  One of ENEL317 or ENME352
Restriction(s):  ENGG401
Required Book(s):  Franklin et al. Feedback Control of Dynamic Systems 5th ed (Prentice Hall)
Assessment:  Internal assessment/examination ratio: 1 : 0

ENME540-15A (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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<tr>
<td>90</td>
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<td>ENGG594-15C (HAM)</td>
<td>Engineering Thesis</td>
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MATERIALS AND PROCESSING PAPERS

ENMP502-15A/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

ENMP503-15A (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

ENMP504-15B/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

ENMP505-15B (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

ENMP513-15A (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

ENMP514-15A (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): To be advised
Prerequisite(s): ENMP211 or equivalent
Restriction(s): ENMP411, ENMP512
Assessment: Internal assessment/examination ratio: 1 : 4
MATERIALS AND PROCESSING PAPERS

ENMP515-15A (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

ENMP516-15B (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): Professor Brian Gabbitas
Prerequisite(s): ENMP211 or equivalent
Assessment: Internal assessment/examination ratio: 1 : 4

ENMP542-15C (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

ENMP543-15A (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 : 4

ENMP544-15B (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 : 4
ENMP561 – Bioprocessing 1
15 Points
This paper will not be offered in 2015.

ENMP562 - 15A(HAM) – Bioprocessing 2
15 points
Aspects of processing biological materials such as fermentation, membrane separations and large-scale processing.
Convenor(s): To be advised
Restriction(s): ENMP523
Assessment: Internal assessment/examination ratio: 1 : 0

ENMP563-15A (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

ENMP564-15B (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

ENMP568-15B (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

ENMP569-15A (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
MATERIALS AND PROCESSING PAPERS

ENMP585-15A (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): To be advised
Prerequisite(s): ENMP381 or equivalent
Restriction(s): ENMP581
Assessment: Internal assessment/examination ratio: 1 : 0

ENMP586-15B (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

ENMP590-15C/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>150</td>
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</table>
PHYS506 – Advanced Quantum Theory
30 Points
This paper will not be offered in 2015.

PHYS511 – 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 and 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

PHYS516-15A (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 – 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 2015.
PHYSICS PAPERS

PHYS560-15A/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 : 1

PHYS561-15A/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 : 1

PHYS590-15A/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)

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PSYCHOLOGY PAPERS

**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.

PSYC511-15A (HAM) – Evaluation Research Design
15 Points

PSYC513 -15B (BLK) – Evaluation Research Analysis
30 Points

PSYC517 – The Social Psychology of Anti-Social Behaviour*
15 Points
*This paper will not be offered in 2015 (alternates with PSYC518).

PSYC518-15B (HAM) – Family Violence: Research and Interventions
15 Points

PSYC538-15B (HAM) (NET) – Applications of Behaviour Analysis
15 Points

PSYC539-15A (HAM) – Graduate Research Methods in Psychology
15 Points

PSYC556-15A (HAM) – Advanced Topics in Abnormal Adult Psychology
15 Points

PSYC559-15B (HAM) (NET) – Animal Behaviour and Welfare Research
15 Points

PSYC560-15A (HAM) (NET) – Applied Behaviour Analysis: Theory and Issues
15 Points

PSYC561-15A (HAM) (NET) – Behaviour Analysis Research and Theory
15 Points

PSYC562-15B (HAM) – Theories of Psychotherapy
15 Points

PSYC564-15B (HAM) – Developmental Psychopathology
15 Points

PSYC568-15A (HAM) – Techniques in Applied Psychology
15 Points

PSYC571-15B (HAM) – Psychology of Careers
15 Points

PSYC572-15A (HAM) – Personnel Selection
15 Points
**PSYCHOLOGY PAPERS**

PSYC573-15A (HAM) – Personnel Training and Development  
15 Points

PSYC575-15A (HAM) – Psychological Applications and the Treaty of Waitangi*  
15 Points

PSYC577-15B (HAM) (NET) – Recent Research in Behaviour Analysis  
15 Points

PSYC579-15B (HAM) – Advances in Organisational Psychology  
15 Points

PSYC580-15B (HAM) – The Psychology of Criminal Conduct  
15 Points

PSYC581-15A (HAM) – Psychological Assessment*  
15 Points

PSYC582-15B (BLK) – Community Health Psychology*  
15 Points

PSYC583-15A (BLK) – Foundations of Community Psychology*  
15 Points

PSYC585-15B (HAM) – Positive Organisation Development  
15 Points

PSYC587-15Y (HAM) (NET) – Behaviour Analysis Practicum  
15 Points

PSYC588-15A/B/S (HAM) – Directed Study  
15 Points

PSYC589-15A/B/S (HAM) – Directed Study  
15 Points

PSYC590-15A/B/S/Y (HAM) – Directed Study  
30 Points

PSYC591-15Y (HAM) – Honours Dissertation  
30 Points

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**Dissertations and Theses for MSc, MSc(Research)**

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COMPUTING & MATHEMATICAL SCIENCES PAPERS

For details of the following papers please refer to the Computing & Mathematical Sciences Handbook or the 2015 University of Waikato Calendar.

Computer Science Papers

Papers are worth 15 points unless specified.

» COMP501-15A – Topics in Operating Systems
» COMP513-15A – Topics in Computer Networks
» COMP514-15B – Carrier and ISP Networks
» COMP521-15A – Machine Learning Algorithms
» COMP535 – Image Processing†
» COMP536-15B – Advanced Graphics and Computer Games
» COMP537 – User Interfaces for Information Retrieval†
» COMP538 – Topics in Human-Computer Interaction†
» COMP539-15A – Usability Engineering
» COMP543-15B – Information Management
» COMP552-15A – Model Checking
» COMP553-15A – Extremely Parallel Programming
» COMP554 – Specification Languages and Models†
» COMP555-15B – Bioinformatics
» COMP560-15A/C – Turing Topics in Computer Science

†Not offered in 2015.

Mathematics Papers

» MATH501 – Metric Spaces†
» MATH505 – Topics in Analysis and Topology†
» MATH509 – Number Theory†
» MATH511-15A – Semigroups and Universal Algebra
» MATH512-15B – Continuous Groups
» MATH513 – Finite Groups†
» MATH515-15A – Analytical Number Theory
» MATH516 – Topics in Discrete Mathematics†
» MATH541-15B – Classical Partial Differential Equations
» MATH542-15B – Advanced Partial Differential Equations
» MATH581-15A/B – Special Topic in Mathematics 1
» MATH582-15A/B – Special Topic in Mathematics 2

†Not offered in 2015.
## 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.

Phone: 07 838 4489 or 07 858 5195
Fax: 07 838 4600
Email: scholarships@waikato.ac.nz
www.waikato.ac.nz/scholarships

Brian Perry Charitable Trust Graduate Scholarship

This Scholarship is open to applicants who intend to enrol in the first year of a Masters degree in the Faculty of Science and Engineering in the year of tenure. The scholarship Selection Panel will give preference to applicants of high academic calibre who have also shown leadership potential, involvement in team situations, sporting interests and activities, and community involvement. The Scholarship has a value of $5000.

Broad Memorial Award

This award was established in 1983 as a result of a donation by Mrs Margaret Broad. The fund is in memory of Dr John Broad and Philippa Broad who died in the Mount Erebus air disaster. Philippa had intended to start an Master of Science in Earth sciences at the time of the disaster. The fund is used to assist enrolled students who are undertaking research towards a masterate or doctoral thesis in Earth sciences and who are engaged in Antarctic research or in a research topic of current interest in Earth sciences.

Dr Stella Frances Memorial Scholarship

The Department of Conservation and the Waikato Regional Council offer a scholarship for students in the final year of a masters degree at the University of Waikato to the value of $5,000 per year. It is available to students studying environmental issues in the Waikato region.

Fisher & Paykel Healthcare Graduate Scholarship in Biophysics

This scholarship aims to encourage graduate-level study in biophysics at Waikato University. Recipients will receive up to $5,000 per annum for a maximum of two years of MSc study.

Golden Plover Wetland Research Award

This scholarship is intended to support a student who is conducting original research into any aspect of the ecology or management of wetland at masters level at any university in New Zealand.

Hilary Jolly Memorial Scholarship

The scholarship shall be awarded for full-time study in the field of freshwater ecology at masters or doctoral level at the University of Waikato.
SCHOLARSHIPS AND FINANCIAL ASSISTANCE

Lucy Cranwell Student Grant for Botanical Research
The commemorative grant of $2000 is awarded annually by the Auckland Botanical Society to a student completing botanical field research.

NZ National Agricultural Fieldays Sir Don Llewellyn Scholarship
This scholarship was established by the New Zealand National Fieldays Society to assist students to undertake research, at the University of Waikato, with a specific focus on the agricultural sector. The Scholarship is open to candidates enrolling/enrolled, at master’s or doctoral level, in the year of application for this scholarship. The award has a value of up to $22,000.

Science & Engineering Masters Fees Awards
A total of 15 awards valued at $2,000 each are available for new MSc, MSc(Tech) or ME students enrolled in the Faculty of Science & Engineering. The award is intended for full-time students but maybe awarded to part-time applicants on a pro-rata basis.

Terry Healy Memorial Award
This award was established in 2011 as the result of donations from family, colleagues, friends and students of the late Professor Terry Robin Healy. The fund commemorates the major contributions Professor Healy made to Earth and ocean sciences during his 38-year career at the University of Waikato. This scholarship is open to students enrolled or intending to enrol in a masters or doctoral degree in Earth Sciences. Several awards will normally be made each year.

Tess Embling Memorial Scholarship
This scholarship was established to commemorate the spirited life and achievements of Tess Embling. The scholarship is open to students enrolled or intending to enrol in the first year of a masters degree in the Faculty of Science & Engineering at the University of Waikato. Preference will be given to students studying in the fields of biological or environmental science.

University of Waikato Taught Postgraduate Fees Scholarship
These fees scholarships support part- and full-time domestic and international students studying at the University of Waikato. These awards support coursework rather than research papers. The Scholarship provides up to $3,000 for part-time students and up to $6,000 for full-time students, applied to the recipient’s tuition fees for the relevant qualification, in the year of tenure.

University of Waikato Doctoral Scholarship
This scholarship provides three years of funding for students undertaking a full-time doctoral degree at the University of Waikato. The scholarship is awarded on academic merit with a minimum average grade of A- required for eligibility.

University of Waikato Masters Research Scholarship
This scholarship provides one year of funding for students commencing the final year of a full-time masters degree at the University of Waikato. The scholarship is awarded on academic merit with minimum average grade of A- expected.

Whanganui River Enhancement Trust Scholarship
The scholarship is open to students who are enrolled as a full-time student undertaking research towards a masters thesis, honours degree or postgraduate diploma. Each scholarship is awarded for a period of one year and has the value of $5,000 for honours and postgraduate students.
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

[www.waikato.ac.nz/library](http://www.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:

**Earth Sciences Subject Librarian**
Jenny McGhee
Phone: 07 838 4466 extn 6511
Email: jmmcghee@waikato.ac.nz

**Science Librarian**
Cheryl Ward
Phone: 07 838 4466 extn 6513
Email: cward@waikato.ac.nz
Cheryl is also available for tours and tutorials.
FACILITIES FOR GRADUATES

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 www.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 www.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 www.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 www.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 www.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 STUDENTS

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: FG.G.04 |
| To be advised | Phone: 07 838 4625 |
| | Email: science@waikato.ac.nz |

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 Head of School. 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 Science & Engineering buildings.
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 (http://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 (http://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.
SAFETY, SECURITY AND RESPONSIBILITIES POLICY

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:

Faculty Manager
Shelley Catlin Phone: 07 838 4292

OTHER CONTACTS:

Faculty Chemical Safety Officer
John Little Phone: 07 838 4103

Faculty Field Trip Health and Safety Officer
Annie Barker Phone 07 838 4392

Evacuation Officer
Ivan Bell Phone: 07 838 4117

Radiation Subcommittee Chairperson
Dr Johan Verbeek Phone: 07 838 4947

Laser Safety Officer
Associate Professor
Rainer Künneveyer

Health and Safety Officer
Andrew Alston Phone: 07 838 4493

Sources of Health and Safety information in the Faculty can be found on our info.sci website: http://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: http://phonebook.waikato.ac.nz

CONTACTS FOR EMERGENCY USE ARE:

Chemical Emergencies Phone: 07 838 2889 extn 8888 or 027 629 1802
University Security Phone: 07 838 4444
Emergency Services Phone: 111
AT THE UNIVERSITY OF WAIKATO, THE POSSIBILITIES ARE ENDLESS.
TŌ TE WHARE WĀNANGA O WAIKATO, HE KURA TOI E KORE E MIMITĪ.