



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2016
Graduate Handbook



SCIENCE & ENGINEERING
TE MĀTAURANGA PŪTAIAO ME TE PŪKAHA

Welcome to Waikato

From 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. Professor Neil Quigley joined the University as its fifth Vice-Chancellor in 2015 and has given fresh impetus to our continued development.

The University campus is undergoing significant enhancement, with construction of the new multi-million dollar Law and Management building well underway. It will provide state-of-the-art facilities for our staff and students.

Research is the University's lifeblood and we continue to produce research and researchers who are providing genuine answers to some of the key problems being faced by industries, governments and nations. One of New Zealand's major research organisations, the University of Waikato plays a key role in the regional economy and makes significant contributions to the national innovation system. We have six research institutes which enable our postgraduate students to continually contribute to regional, national and global research. This emphasis on producing meaningful research flows through to our students, who are committed to making a real difference for their employers.

To prepare students for the increasingly competitive job market, we provide work experience while they study, and many courses have components that mirror real-life situations so students are prepared for the challenges they face in the workplace. This creates graduates who are work-ready and attractive to employers.

The University of Waikato continues to provide a dynamic, culturally diverse and inspiring environment for our student population. When you graduate from 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.

The Vice-Chancellor's changes introduced late in 2015 will create exciting opportunities that enhance the offerings of the Faculty.

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 *2016 University of Waikato Calendar* takes precedence.

Contact details

Faculty Office

The Faculty Office (Room FG.G.04) 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 Registrar

Tim O'Brien

Phone: 07 838 4290

Email: tbrien@waikato.ac.nz

Associate Dean (Postgraduate Research)

Committee Representative

Dr Michael Mucalo

Phone: 07 838 4404

Email: mucalo@waikato.ac.nz

Associate Dean (Teaching & Learning)

Dr Alison Campbell

Phone: 07 838 4582

Email: a.campbell@waikato.ac.nz

Deputy Dean

Professor Janis Swan

Phone: 07 838 4049

Email: j.swan@waikato.ac.nz

Associate Dean (Research)

Professor Craig Cary

Room: TRU.G.23

Phone: 07 838 4593

Email: caryc@waikato.ac.nz

Associate Dean (International)

Associate Professor Rainer Künemeyer

Phone: 07 838 4630

Room: E.G.04C

Email: rainer@waikato.ac.nz

Chair of Coastal Science

Professor Chris Battershill

Phone: 07 557 0481

Email: cbatters@waikato.ac.nz

Māori Support Officer

Kevin Eastwood

Phone: 07 837 9384

Email: keastwo@waikato.ac.nz

www.sci.waikato.ac.nz



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

Contact details

Schools and research units

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

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

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

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.

Head of School of Engineering
TBA

Office: E.G.04
Phone: 07 838 4266 / 07 838 4026
Email: engineering@waikato.ac.nz
www.eng.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	Phone: 07 8384893
Director: Professor Chris Battershill	Email: c.battershill@waikato.ac.nz www.sci.waikato.ac.nz/research/centres-and-units/cmgt
<hr/>	
Co-operative Education Unit	Phone: 07 838 4892
Director: Dr Karsten Zegwaard	Email: karsten@waikato.ac.nz www.sci.waikato.ac.nz/study/work-placements
<hr/>	
Engineering Education Research Unit (EERU)	
Director: Associate Professor Bronwen Cowie	Phone: 07 858 5171
	Fax: 07 838 4712
	Email: eeruwaikato@waikato.ac.nz www.waikato.ac.nz/eeru
<hr/>	
Environmental Research Institute	Phone: 07 838 4237
Director: Professor Bruce Clarkson	Fax: 07 838 4218
	Email: b.clarkson@waikato.ac.nz www.waikato.ac.nz/eri
<hr/>	
International Centre for Terrestrial Antarctic Research	
Director: Professor Craig Cary	Phone: 07 858 4593
	Fax: 07 838 4324
	Email: c.cary@waikato.ac.nz www.nztabs.ictar.aq
<hr/>	
Thermophile & Microbial Biochemistry & Biotechnology Unit	
Director: Associate Professor Ian McDonald	Phone: 07 838 5165
	Email: irmcdon@waikato.ac.nz
Director: Professor Craig Cary	Phone: 07 838 4593
	Email: caryc@waikato.ac.nz
<hr/>	
Waikato Bio-Imaging Facility	Phone: 07 838 4179
Manager: Dr Barry O'Brien	Email: b.obrien@waikato.ac.nz www.sci.waikato.ac.nz/microscopy
<hr/>	
Waikato Centre for Advanced Materials (WaiCAM)	
Contact: Professor Kim Pickering	Phone: 07 838 6753
	Fax: 07 838 4835
	Email: engineering@waikato.ac.nz www.sci.waikato.ac.nz/waicam
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Waikato DNA Sequencing Unit	Phone: 07 838 4705
Director: Professor Craig Cary	Email: c.cary@waikato.ac.nz www.bio.waikato.ac.nz/sequence
<hr/>	

Waikato Electron Microscope Facility

Manager: Helen Turner **Phone:** 07 858 5027
Fax: 07 858 5027
Email: hturner@waikato.ac.nz
www.sci.waikato.ac.nz/microscopy

Waikato Mass Spectrometry Facility

Manager: Associate Professor **Phone:** 07 838 4384
Marilyn Manley-Harris **Email:** manleyha@waikato.ac.nz
www.mass-spec.co.nz

Waikato Radiocarbon

Dating Laboratory **Phone:** 07 838 4707
Director: Associate Professor **Fax:** 07 838 4192
Alan Hogg **Email:** alan.hogg@waikato.ac.nz
www.radiocarbon dating.com

Waikato Stable Isotope Unit

Director: Professor Brendan Hicks **Phone:** 07 838 4613
Email: b.hicks@waikato.ac.nz
www.bio.waikato.ac.nz/isotope

Postgraduate Studies Office

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

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.

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.

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

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 *2016 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 up skill in new areas related to their work.

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

ME – Year 1 options		
YEAR 1	OPTION 1	
	<table border="1"><tr><td>500 LEVEL 30 points</td><td>THESIS 90 points</td></tr></table>	500 LEVEL 30 points
500 LEVEL 30 points	THESIS 90 points	
YEAR 1	OPTION 2	
	<table border="1"><tr><td>THESIS 120 points</td></tr></table>	THESIS 120 points
THESIS 120 points		

Papers for the ME Degree

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

Computer Science	page 66
Electronics	page 56
Engineering	page 58
Materials and Processing	page 59
Mathematics	page 66
Physics	page 63

Please refer to the *2016 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 full-time programme of study building on the specialisation of the undergraduate degree, which combines taught papers (normally 90 points) with a research thesis (normally 90 points). The balance of theses to taught papers may be altered subject to permission from the graduate co-ordinator in your discipline of choice. It introduces students to the frontiers of knowledge and trains them in the relevant techniques of the subject. It is at a level demonstrably in advance of undergraduate study, and requires students to engage in scholarship. Excellence in MSc study is rewarded by the level of honours attained.

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

MSc Structure			
YEAR 1	<table border="1"><tr><td>500 LEVEL 90 points</td><td>THESIS 30 points</td></tr></table>	500 LEVEL 90 points	THESIS 30 points
500 LEVEL 90 points	THESIS 30 points		
YEAR 2	<table border="1"><tr><td>THESIS 60 points</td></tr></table>	THESIS 60 points	
THESIS 60 points			

Please refer to the 2016 *University of Waikato Calendar online* at <http://calendar.waikato.ac.nz> for degree regulations.

Master of Environmental Sciences MEnvSci

The MEnvSci is normally a 12-18 month tailorable 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.

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

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

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

The balance of theses to taught papers may be altered subject to permission from the graduate co-ordinator in your discipline of choice.

MEnvSci structure			
YEAR 1	<table border="1"><tr><td>500 LEVEL 90 points</td><td>THESIS 30 points</td></tr></table>	500 LEVEL 90 points	THESIS 30 points
500 LEVEL 90 points	THESIS 30 points		
YEAR 2	<table border="1"><tr><td>THESIS 60 points</td></tr></table>	THESIS 60 points	
THESIS 60 points			

Please refer to the 2016 *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.

MSc (Research) structure	
YEAR 1	500 LEVEL 120 points
YEAR 2	THESIS 120 points

Please refer to the 2016 *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.

MSc(Tech) structure			
YEAR 1	<table border="1"><tr><td>500 LEVEL 90 points</td><td>ENMP585 & ENMP586 30 points</td></tr></table>	500 LEVEL 90 points	ENMP585 & ENMP586 30 points
500 LEVEL 90 points	ENMP585 & ENMP586 30 points		
YEAR 2	<table border="1"><tr><td>THESIS 120 points</td></tr></table>	THESIS 120 points	
THESIS 120 points			

Please refer to the *2016 University of Waikato Calendar* online at <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 proposed plan of study and final submission date. This form can be obtained from the Faculty Office or a School Office.

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

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

Full-time vs part-time

A full-time student must complete a masters degree (MSc(Research) and MSc(Tech)) in 24 consecutive months from first enrolment to qualify for the award of honours.

A part-time student is defined as one who is enrolled in papers less than or equal to 90 points. To qualify for honours, part-time students must complete 240 points within four calendar years of first enrolment in the degree. Part-time students will normally enrol in a thesis with the weighting of 60 points over two of the years. Part-time candidates seeking the award of honours should consult with the Faculty Registrar.

For part-time enrolment, the deadline will be the corresponding date in the year in which the enrolment adds up to 24 months full-time (240 points). For example: An 1 August enrolment for 60 points a year will require a July submission four years from first enrolment.

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

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

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

Taught vs thesis papers

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

Extensions for masters theses

Guidelines for the approval of extensions to the submission date of a masters thesis

The commencement and submission dates are agreed to by the candidate and the Graduate Convenor through the Graduate Planner when the degree is started.

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

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

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

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

Candidates who feel that they have been unfairly disadvantaged in their interactions with their supervisor or any other persons, should in the first instance discuss this with their supervisor. If a satisfactory resolution cannot be found, candidates may then take their concerns to the relevant 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.

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

Postgraduate Diploma PGDip

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

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

PGDip structure	
YEAR 1	500 LEVEL 120 points

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	
SEMESTER 1	500 LEVEL 60 points

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> 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.

BSc(Hons) Structure			
YEAR 1	<table border="1"><tr><td>500 LEVEL 60-90 points</td><td>DISSERTATION 30-60 points</td></tr></table>	500 LEVEL 60-90 points	DISSERTATION 30-60 points
500 LEVEL 60-90 points	DISSERTATION 30-60 points		

Higher degrees

Master of Philosophy (MPhil)

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

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

Doctor of Philosophy (PhD)

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

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

Administration of higher degrees

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

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

Application and enrolment

Academic prerequisites for higher degrees

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

Initial enquiries

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

Application process

Enrolment in higher degrees (MPhil and PhD) is a more involved process than that for masters degrees. Please refer to 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

Degree	Status	Minimum	Maximum
Master of Philosophy – MPhil	Full-time	1 year	2 years
	Part-time	2 years	4 years
Doctor of Philosophy – PhD	Full-time	3 years	4 years
	Part-time	4 years	8 years

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

Conditional enrolment

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

Confirmed enrolment

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

Progress reports

Progress reports are an integral part of enrolment in a higher degree. The Postgraduate Research Committee may terminate a candidate's enrolment if progress reports are not submitted in a timely manner, or if progress is continually recorded as unsatisfactory.

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

Progress reports require candidates to report on progress made in the previous six months, and to report on work that is to be achieved in the next six months. Reports must be endorsed by the supervisory panel, 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

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

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

Dr Linda Peters

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

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

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

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

Research units and facilities within Biological Sciences include the Waikato Stable Isotope Unit, the Waikato DNA Sequencing Facility, the Centre for Biodiversity & Ecology Research, the Thermophile & Microbial Biochemistry & Biotechnology Unit, 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 Magda Bereza BSc, MSc Warsaw, Phd Friedrich-Schiller

Email: mbereza@waikato.ac.nz

Research interests: protein engineering; selection of high affinity binders – OBodies, for diagnostic and therapeutic applications; development of OBodies proprietary platform technology with use of in vitro selection methods and phage libraries; biochemical and functional profiling of selected molecules.

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 Marnie Campbell BSc(Hons), PhD

Email: mcampbel@waikato.ac.nz

Research interests: Biosecurity; ecosystem restoration; conservation; risk and risk perceptions; environmental management; marine debris; environmental generational amnesia.

Professor Craig Cary BSc Florida Tech, MSc San Diego State, PhD UC San Diego

Email: c.cary@waikato.ac.nz

Research interests: Comparative physiology; biochemistry and ecology of microbial communities, with a focus on free-living syntrophic bacterial associations in extreme environments including hydrothermal vents and Antarctic soils; the use of high through-put genomic and molecular approaches to resolve biochemical adaptations to life in these extreme geochemical environments; interfacing new bioinformatic capabilities with genomic technologies in the metagenome analysis of complex microbial communities; and thermal stability of eurythermal proteins.

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.

Associate Professor Kevin Collier BSc Waikato, PhD Canterbury

Email: kcollier@waikato.ac.nz

Research interests: Interactions between land use and stream macroinvertebrate communities; restoration of urban streams; development of indicators for monitoring aquatic ecosystem health; and the ecology of large rivers.

Dr Ray Cursons BSc(Hons), MSc, PhD Massey

Email: r.cursons@waikato.ac.nz

Research interests: Host and pathogen relationships; inflammation; innate immune markers; and mastitis.

Dr Ian Duggan BSc, MSc, PhD Waikato

Email: i.duggan@waikato.ac.nz

Research interests: Invasion biology and zooplankton ecology, particularly the exploration of biological invasion vectors responsible for transportation of species at global or finer scales. Such investigations are useful for prediction and prevention of invasions of non-indigenous species.

Dr 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 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 Anica Klockars MSc Örebro, PhD Uppsala

Email: aklockar@waikato.ac.nz

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

Dr 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.

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

Email: mlehmann@waikato.ac.nz

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

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

Email: nling@waikato.ac.nz

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

Dr Chris Lusk PhD in Botany, Auckland

Email: clusk@waikato.ac.nz

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

Dr Ryan Martinus BSc, MSc Waikato, PhD Massey

Email: r.martinus@waikato.ac.nz

Research interests: Understanding relationships between mitochondrial stress and cellular inflammation in a) brain (ageing and neurodegeneration), b) pancreatic islet cells (diabetes) and c) reproductive processes (male fertility).

Associate Professor Ian McDonald BSc(Hons) Ulster, PhD Liverpool

Email: i.mcdonald@waikato.ac.nz

Research interests: Microbiology, molecular biology and biochemistry of atmospheric trace gas degrading bacteria; microbial ecology of methane, methyl halide and carbon monoxide utilising bacteria; and microbial ecology in extreme environments, including the Antarctic and New Zealand geothermal environments.

Dr Pawel K Olszewski MSc Warsaw, PhD Minnesota/Cracow (joint programme)

Email: pawel@waikato.ac.nz

Research interests: Regulation of appetite and body weight; brain circuits that control hunger, satiety and feeding reward; and pharmacological agents that modify food intake.

Dr Aroon Parshotam MSc(Hons) Auckland, MPhil(Dist) Massey, PhD Massey

Email: aroonp@waikato.ac.nz

Research Interests: Mathematical modelling, catchment and lake modelling, in particular how catchment models may be used to determine the source and extent of water quality problems in a catchment and subsequently, a lake.

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.

Dr Phil Ross BSc, MSc Auckland, PhD Waikato

Email: rossp@waikato.ac.nz

Research interests: Temperate soft sediment and rocky reef ecosystems; marine community ecology and molecular ecology; disturbance, dispersal, recruitment and recovery in marine ecosystems. My recent research has focused on connectivity among fragmented populations of New Zealand's coastal benthos (primarily marine invertebrates) with the broad aims of a) better understanding the process of larval dispersal, and b) generating knowledge that can be used to improve the way in which New Zealand's marine biological resources are managed.

Professor Joe Waas BSc(Hons) Trent, PhD Canterbury

Email: waasur@waikato.ac.nz

Research interests: Behaviour and ecology of birds, fish and mammals including studies of:

- a) animal communication
- b) the biology of aggression
- c) animal welfare
- d) social factors influencing reproductive physiology
- e) conservation biology
- f) social recognition systems
- g) the ontogeny of social behaviour.

Chemistry

Contact details

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	Room:	E.3.06
Dr Michèle Prinsep	Email:	michele@waikato.ac.nz

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

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

Areas of research include:

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

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

Academic staff

Dr Adam Hartland BSc(Hons), PhD Birmingham

Email: ahrtland@waikato.ac.nz

Research interests: All aspects of trace element and isotope biogeochemistry. In particular: Interactions between dissolved organic matter, nanoparticles and trace metals and feedbacks with the terrestrial carbon cycle.

Professor Bill Henderson BSc(Hons), PhD Leicester, FNZIC

Email: w.henderson@waikato.ac.nz

Research interests: Co-ordination and organometallic chemistry of platinum metals and gold; synthesis and applications of new organophosphorus compounds; electrospray mass spectrometry.

Dr Joseph Lane BSc(Hons), PhD Otago 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 Marilyn 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 Michèle 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; chemical ecology of marine organisms; secondary metabolites of terrestrial and marine fungi.

Dr David Richens BSc, MSc, PhD University of Manchester. CChem, MRSC

Email: drichens@waikato.ac.nz

Research interests: Chemical reactivity under nanoscopic confinement, reaction kinetics and mechanisms, catalysis of C=C and C-H bond oxidation, oxygen and hydrogen peroxide activation.

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	Room:	EF.1.01
Dr Julia Mullarney	Email:	juliam@waikato.ac.nz

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

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

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

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

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

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

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

Academic staff

Dr Megan Balks BSc(Hons) Massey, PhD Waikato, FNZSSS

Email: m.balks@waikato.ac.nz

Research interests: Pedology and applied soil physics. Specifically: Effects of effluent irrigation on soil properties; Antarctic soils and permafrost; and environmental effects of human activities on soils in New Zealand and Antarctica.

Associate Professor Earl Bardsley BSc(Hons), MSc, PhD Otago

Email: e.bardsley@waikato.ac.nz

Research interests: Applied hydrology including hydro power and optimal operation of surface and subsurface water systems; statistical analysis and data simulation; stochastic flood theory; optimisation applications; catchment modelling and hydroclimatic forecasting.

Dr Shaun Barker BSc(Hons) Otago, PhD Australian National University

Email: sbarker@waikato.ac.nz

Research interest: Mineral deposits and hydrothermal fluids, and how geochemistry, structural geology and mineralogy can be used to understand hydrothermal fluid flow in the earth. Broad interests in applied geochemistry and mineralogy, 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 volcanoclastic deposits in sedimentary successions.

Dr Susanna Rutledge MSc Wageningen, PhD Waikato

Email: s.rutledge@waikato.ac.nz

Research interests: Biosphere-atmosphere exchange of energy, water and greenhouse gases, in particular how ecosystems respond to changes in weather, climate and management. Current research focusses on ecosystem exchange of CO₂ and soil organic matter dynamics of dairy farms, and aims to aid the development of sustainable farming techniques.

Professor Louis Schipper BSc, MSc, PhD Waikato, FNZSSS, FSSSA

Email: schipper@waikato.ac.nz

Research interests: Nitrogen cycling with a focus on denitrification and nitrogen storage in soil organic matter; soil quality and long-term changes in organic matter; impacts of land use change; carbon fluxes and nutrient cycling in agricultural and indigenous ecosystems, including wetlands; and microbial ecology and diversity.

Environmental Sciences

Contact details

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

School of Science Office

Room: F.1.07

Phone: 07 838 4148

Email: sciadmin@waikato.ac.nz

Graduate Co-ordinator

Room: DE.1.02

Dr Megan Balks

Email: m.balks@waikato.ac.nz

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

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

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

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

Engineering

Contact details

www.eng.waikato.ac.nz

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

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

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

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

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

- Applied optics and opto-electronics
- Bioprocess engineering
- Biotechnology
- Electronics
- Engineering
- Environmental technology
- Fermentation engineering
- Food engineering
- Imaging
- Materials engineering
- Mechanical developments and design
- Mechanical technology
- 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 18).

Collaborative work with industry and research associations are also available.

Academic staff

Professor Janis Swan – Deputy Dean BTech, MTech Massey, PhD Waterloo, FNZIFST, FIPENZ, MNZM

Email: j.swan@waikato.ac.nz

Research interests: Developing processes to add value to biological products; functional properties of meat used in manufacturing; meat product yield and quality; extracting high-value biochemicals from animal glands; product development of foods for niche markets; bioseparations; and engineering education.

Dr Chi Kit Au BSc, MSc, PhD Hong Kong

Email: ckau@waikato.ac.nz

Research interests: Computation; geometric modeling; and manufacturing technology.

Dr Aydin Berenjian BE, ME SUT, PhD USyd

Email: aydinb@waikato.ac.nz

Research Interests: Fermentation, Functional foods, Downstream processing, Kinetics, modeling and optimization of bioprocesses.

Dr Leandro Bolzoni BMechEng Polytechnic of Turin, MMatSci Carlos III de Madrid, PhD Carlos III de Madrid

Email: leandro@waikato.ac.nz

Research interests: Development, processing and characterisation of novel lightweight metals and composites via near-net-shape manufacturing techniques.

Dr James K Carson BE(Hons), ME Canterbury, PhD Massey

Email: jkcarson@waikato.ac.nz

Research interests: Measuring and predicting thermo-physical and transport properties; mathematical modelling of thermal processes; refrigeration; food engineering; heat transfer; and thermodynamics in general.

Dr Michael Cree BSc(Hons), PhD Canterbury, SMIEEE, MNZIP, MACPSEM

Email: m.cree@waikato.ac.nz

Research interests: Computer vision; medical physics; retinal imaging; range imaging; and image sensor technology.

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.

Dr Graeme Glasgow BE(Hons) Strath UK, MSc Strath UK, PhD Loughborough UK

Email: graemeg@waikato.ac.nz

Research interests: water treatment, wastewater treatment

Professor Ilanko Sinniah BSc(Eng)(Hons), MSc Manchester, PhD University of Western Ontario

Email: ilanko@waikato.ac.nz

Research interests: Numerical modelling; vibration and stability of mechanical/structural systems; passive vibration control; adaptive mechanisms; and engineering education.

Dr 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 Künne Meyer – Associate Dean, International DiplPhys, DrRerNat Hanover, SMIEEE, MIPENZ, MSPIE

Email: rainer@waikato.ac.nz

Research interests: Applied optics; optical, non-destructive sensing; spectroscopy; and optoelectronics.

Dr Mark Lay BSc, MSc, PhD Waikato

Email: mclay@waikato.ac.nz

Research interests: Biotechnology and process chromatography; chromatographic modelling; science education research; and co-operative education.

Dr Shen Hin Lim BE(Hons) UNSW Australia, PhD UNSW Australia

Email: hlim@waikato.ac.nz

Research interests: Agricultural engineering, autonomous systems, Magnetorheological (MR) fluids and dampers, composites materials and structures modelling and applications.

Professor Kim Pickering BSc(Eng)(Hons) London, PhD Surrey, FIPENZ, MIMMM

Email: klp@waikato.ac.nz

Research interests: Natural and synthetic composite materials; optimising advanced composite properties; and failure mechanisms of composite materials.

Associate Professor Howell Round BSc(Tech) Waikato, MSc 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).

Dr Ali Khajeh Samani BE Amir Kabir University of Technology Tehran Iran, ME Amir Kabir University of Technology Tehran Iran, PhD UNSW Australia

Email: asamani@waikato.ac.nz

Research interests: Behaviour of high strength concrete materials, ductility of reinforced concrete columns, plasticity in concrete, size effect of concrete material, self-healing concrete.

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.

Professor Moira Steyn-Ross BSc, MSc, PhD Waikato, MNZIP

Email: msr@waikato.ac.nz

Research interests: Cortical modelling; theoretical modelling of bulk electrodynamics of the human brain; EEG simulation; and modelling of sleep, anaesthesia and cognition.

Dr Rob Torrens BSc(Tech), MSc, PhD Waikato

Email: r.torrens@waikato.ac.nz

Research interests: Preparing ceramic powders by chemical methods; processing, consolidation, characterisation and properties of advanced ceramic materials; ceramic oxygen ion conductors; and biomaterials.

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

www.waikato.ac.nz/fass/about/psychology

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

School Manager Sue Carnaby	Room:	K.1.14
	Phone:	07 838 4032
	Fax:	07 858 5132
	Email:	carnabys@waikato.ac.nz

School Graduate Adviser

To be advised

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: cbarber@waikato.ac.nz

Research interests: Perinatal mental health and transition to parenting; attachment theory and developmental psychopathology; and effectiveness of mental health services for children and adolescents.

Associate Professor Samuel G Charlton BA San Jose, MA, PhD New Mexico

Email: samiam@waikato.ac.nz

Research interests: Applied cognitive psychology and human factors; particularly aviation and road transport psychology, and issues of attention, perception, decision-making and performance.

Dr Cate Curtis BA Canterbury, BSocSc(Hons), PhD Waikato

Email: ccurtis@waikato.ac.nz

Research interests: Applied social and community psychology, particularly in regards to the wellbeing of youth and women, including the impacts of health and social policy, constructions of 'risk' and 'resilience' and social exclusion.

Dr Tim Edwards BS Utah State, MA, PhD Western Michigan

Research interests: Analysis of the influences of environmental factors on behaviour, including investigations of Pavlovian-instrumental transfer, establishing operations, and stimulus discrimination.

Professor T Mary Foster MSc, DipClinPsych, PhD Auckland

Email: psyc0182@waikato.ac.nz

Research interests: Applied behaviour analysis and the experimental analysis of both human and animal behaviour and animal welfare.

Dr Robert B Isler Dipl Natw. ETH, PhD ETH Zürich

Email: psyc2255@waikato.ac.nz

Research interests: Safety issues and human performance; eye movement behaviour; human information processing; psycho-physiology; and psychophysics.

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).

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

Research interests: Computational modelling of visual-motion processing mechanisms in the primate brain. Psychophysical testing of human motion perception (self-motion estimation and the role of eye movements).

Dr Neville R Robertson BA Canterbury, MSocSc, DipPsych(Com), PhD Waikato

Email: scorpio@waikato.ac.nz

Research interests: Applied research on community issues, particularly those in which issues of social justice are at stake; programme evaluation – research which helps the development of social services and assesses their effectiveness; institutional responses to violence against women; child abuse, the prevention of family violence, crime prevention, gender and cultural justice.

Dr Maree Roche MMS, PhD Waikato

Email: mroche@waikato.ac.nz

Research interests: Leadership, positive psychology in the workplace, Māori well-being at work, and other topics within the field of organisational psychology.

Dr Mohi Rua BSocSc, BSocSc(Hons), MSocSc ,PGDipPsych(Com), 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, MSocSc Waikato, PhD Otago

Email: rebeccas@waikato.ac.nz

Research interests: Behavioural psychology; animal psychology; educational psychology.

Dr Sabine Seehagen PGDipSci Otago, DipPsych Trier, PhD Sheffield

Research interests: Developmental psychology; particularly cognitive and social-emotional development in infancy and early childhood, the role of sleep for early learning and memory, relations between maternal well-being and infant development.

Associate Professor Nicola J Starkey BSc(Hons), PhD, Leeds

Email: nstarkey@waikato.ac.nz

Research interests: Neuropsychology, psychological assessment, driver behaviour, animal behaviour and welfare.

Dr Otilie Stolte BSocSc, MSocSc, PhD Waikato

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

Dr Armon Tamatea BSocSc, MSocSc, PGDipPsych(Clin) Waikato, PhD Massey

Email: tamatea@waikato.ac.nz

Research interests: Clinical psychology; psychotherapy and behaviour change; criminal justice and forensic psychology; personality and personality disorders (especially psychopathic personality); culture and psychology; and New Zealand gangs.

Dr Jo Thakker BA(Hons), PhD, PGDipClinPsych Canterbury

Email: jthakker@waikato.ac.nz

Research interests: Substance use and abuse; cultural psychology; sexual offending; theoretical psychology; and clinical psychology. Current research focuses on public attitudes to sexual offenders and how these influence clinical environments and ultimately treatment efficacy.

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>

Dr Jaimie Veale BA Canterbury, MA, PhD Massey

Research interests: Public health research with transgender populations; gender roles and gender identity development; human sexuality; using technology to improve teaching and research publication processes; advanced quantitative research methods.

Radiocarbon Dating

Contact details

www.radiocarbon dating.com

Waikato Radiocarbon Dating laboratory

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

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

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

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

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

Academic staff

Associate Professor Alan Hogg – Director MSc, PhD Waikato

Email: alan.hogg@waikato.ac.nz

Research interests: Investigation into atmospheric ^{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

Biological Sciences	44
Chemistry	49
Earth Sciences	52
Electronics	56
Engineering	58
Materials and Processing	59
Physics	63
Psychology	65
Computing and Mathematical Sciences	66

Biological Sciences

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

BIOL503-16A (HAM) – Data Analysis and Experimental Design 15 points

This paper will cover aspects of research design for experiments, and methods for analysis of ecological data using univariate and multivariate statistical techniques.

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

BIOL560-16A (HAM) – Freshwater Ecology 15 points

A critical examination of issues including pollution, conservation, and utilisation, that freshwater ecosystems face and methods to mitigate potentially competing interests.

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

BIOL561-16B (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

BIOL562-16A (HAM) – Marine and Estuarine Ecology 15 points

This paper focuses on a variety of contemporary issues in marine ecology and biological oceanography including: fisheries biology and management, recruitment, ecology of disturbances, benthic-pelagic coupling, aquaculture and primary production.

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

BIOL563-16B (HAM) – Aquatic Field Methods 15 points

This paper focuses on sampling methods, as well as experimental design and data analyses related to biological field studies in marine and freshwater sciences.

Convenor(s): Associate Professor Ian Hogg
Prerequisite(s): BSc, BIOL313 or BIOL314 or equivalent
Corequisite(s): BIOL560 or BIOL562
Assessment: Internal assessment/examination ratio: 1:1

BIOL564-16B (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

BIOL565-16A (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

BIOL570-16A (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

BIOL571-16B (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

BIOL572-16B (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

BIOL573-16A (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): Associate Professor Kevin Collier
Prerequisite(s): BSc and BIOL312, BIOL333, BIOL338 or equivalent
Restriction(s): BIOL533
Assessment: Internal assessment/examination ratio: 1:1

BIOL574-16A (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

BIOL575-16B (HAM) – Applied Topics in Physiology 15 points

This paper examines selected topics in animal physiology with particular emphasis on applicability of physiology research in the biomedical and agricultural setting. University, hospital and industry-based lecturers contribute to this class, helping students to develop an understanding of the application of physiological knowledge and principles to commercial and medical technologies.

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

BIOL576-16A (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

BIOL577-16B (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

BIOL580-16A (HAM) – Human and Applied Microbiology 15 points

This paper explores topics on human-microorganism associations and interactions from an ecological perspective and various applications of microbiological knowledge.

Convenor(s): Dr Charles Lee
Prerequisite(s): BSc, BIOL341 or equivalent
Restriction(s): BIOL541
Assessment: Internal assessment/examination ratio: 1:0

BIOL581-16B (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

BIOL582-16A (HAM) – Biomolecular Structure & Function 15 points

An in-depth examination of biomolecular structure and function using selected examples from the biochemistry literature.

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

BIOL583-16B (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

BIOL584-16A (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

BIOL585-16B (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

BIOL588-16A/B (HAM) – Special Topic 15 points

Guided individual study on an aspect of Biological Sciences. By arrangement, and with the approval of the Graduate Convenor.

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

BIOL590-16C/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

COMP555-16B (HAM) – Bioinformatics 15 points

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

SCIE501-16B (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 Chad Hewitt
Restriction(s): A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (eg BIOL501, ERT501)
Assessment: Internal assessment/examination ratio: 1:0

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

Points	Code	Title
30	BIOL591-16C (HAM)	Dissertation
60	BIOL592-16C (HAM)	Dissertation
90	BIOL593-16C (HAM)	Biological Sciences Thesis
120	BIOL594-16C (HAM)	Biological Sciences Thesis
150	BIOL595-16C (HAM)	Biological Sciences Thesis

Chemistry

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

CHEM511-16A (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): Dr Michèle Prinsep
Prerequisite(s): CHEM301
Restriction(s): CHEM501
Assessment: Internal assessment/examination ratio: 1:1

CHEM512-16A (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): CHEM101 and CHEM102. CHEM202 and CHEM302 are recommended but not essential.
Assessment: Internal assessment/examination ratio: 1:4

CHEM513-16A (HAM) – Organometallic Chemistry and Catalysis 15 points

An advanced study of organometallic chemistry.

Convenor(s): Associate Professor Graham Saunders
Prerequisite(s): CHEM303
Restriction(s): CHEM503
Assessment: Internal assessment/examination ratio: 0:1

CHEM514-16A (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

CHEM516-16A (HAM) – Isotope Geochemistry 15 points

An advanced study of the theory, applications and practice of isotope geochemistry.

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

CHEM517-16A (HAM) – Applied and Environmental Analytical Chemistry A 15 points

A critical examination of modern instrumental methodologies employed for organic and inorganic analyses.

Convenor(s): Dr Michèle Prinsep
Prerequisite(s): CHEM204, CHEM306
Restriction(s): CHEM507
Assessment: Internal assessment/examination ratio: 0:1

CHEM521-16B (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*

CHEM522-16B (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.*
Restriction(s): *CHEM502*
Assessment: *Internal assessment/examination ratio: 1:0*

CHEM523-16B (HAM) – Inorganic Materials Chemistry 15 points

A study of inorganic materials.

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

CHEM524-16B (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 three 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

This paper will not be offered in 2016.

CHEM589-15 A/B/C/S (HAM) – Directed Study 15 points

May involve a literature review or the preparation of a proposal.

Convenor(s): *Dr Michèle Prinsep*
Assessment: *Internal assessment/examination ratio: 1:0*

CHEM590-16C/D (HAM) – Directed Study 30 points

This paper allows an in-depth study of a specific topic.

Convenor(s): *Dr Michèle Prinsep*
Assessment: *Internal assessment/examination ratio: 1:0*

SCIE501-16B (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 Chad Hewitt

Restriction(s): A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (eg BIOL501, EARTH501)

Assessment: Internal assessment/examination ratio: 1:0

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

Points	Code	Title
30	CHEM591-16C (HAM)	Dissertation
60	CHEM592-16C (HAM)	Dissertation
90	CHEM593-16C (HAM)	Chemistry Thesis
120	CHEM594-16C (HAM)	Chemistry Thesis
150	CHEM595-16C (HAM)	Chemistry Thesis

Earth Sciences

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

ENVS524-16A (HAM) – Environmental Evaluation 15 points

Explores the interface between science and environmental planning. Insight into the resource consent process and the role of science in supporting sustainable resource management under the RMA is developed.

Convenor(s): Dr Megan Balks
Restriction(s): ENVS521
Assessment: Internal assessment/examination ratio: 1:0

ERTH512-16A/B/C (HAM) – Special Topic 15 points

Guided individual study on an aspect of Earth Sciences. By arrangement, and with the approval of the graduate co-ordinator of Earth Sciences.

Convenor(s): Dr Julia Mullarney
Restriction(s): ERTH511
Assessment: Internal assessment/examination ratio: 1:0

ERTH513-16A/B/C (HAM) – Special Topic 15 points

Guided individual study on an aspect of Earth Sciences. By arrangement, and with the approval of the graduate co-ordinator of Earth Sciences.

Convenor(s): Dr Julia Mullarney
Restriction(s): ERTH511
Assessment: Internal assessment/examination ratio: 1:0

ERTH524-16A (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

ERTH525-16B (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

ERTH526-16C (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 in early December (to be confirmed). Subject co-ordinator approval required.

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

ERTH527-16A (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

ERTH528-16A (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

ERTH533-16B (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

ERTH535-16A (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
Required Book(s): I.H. Lynn et al. *Land Use Capability Survey Handbook 3rd ed (AgResearch, Landcare Research, GNS Science)*
Assessment: Internal assessment/examination ratio: 3:2

ERTH547-16B (HAM) – Introduction to Hydrological Modelling 15 points

This course comprises a directed research project specific to each student. A given project will cover some aspect of hydrological modelling, which might be themed on groundwater modelling, simulating water resource systems, analysis of hydrological time series, model formulation, optimal water resource usage, or hydrological forecasting.

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

ERTH548-16A (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

ERTH552-16B (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

ERTH562-16A (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

ERTH563-16A (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

ERTH564-16B (HAM) – Coastal and Freshwater Modelling: Physical Approaches 15 points

This paper examines the use of conceptual, empirical and numerical models of coastal systems.

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

ERTH565-16B (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 and a basic knowledge of first-year statistics.
Assessment: Internal assessment/examination ratio: 3:2

ERTH590-16A/B/Y (HAM) – Directed Study 30 points

This paper allows in-depth study and research of a specific topic.

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

SCIE501-16B (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 Chad Hewitt
Restriction(s): A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (eg BIOL501, ERTH501)
Assessment: Internal assessment/examination ratio: 1:0

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

Points	Code	Title
30	ERTH591-16C (HAM)	Dissertation
60	ERTH592-16C (HAM)	Dissertation
90	ERTH593-16C (HAM)	Earth Sciences Thesis
120	ERTH594-16C (HAM)	Earth Sciences Thesis

Electronics

ENEL501-16A/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

ENEL504-16B (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

ENEL505-16A (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): Dr Nihal Kularatna
Prerequisite(s): ENEL205
Assessment: Internal assessment/examination ratio: 1:0

ENEL506-16B (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): Dr Nihal Kularatna
Prerequisite(s): ENEL205
Assessment: Internal assessment/examination ratio: 1:0

ENEL517-16A (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

ENEL522-16B (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 Künнемeyer

Prerequisite(s): ENEL324

Restriction(s): ENEL322 and ENEL423

Required Book(s): *To be advised*

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

ENEL585-16B (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): Dr Nihal Kularatna

Prerequisite(s): ENEL205

Restriction(s): ENEL385 and ENEL485

Required Book(s): *To be advised*

Recommended Book(s): *Kularatna DC Power Supplies, Power Management and Surge Protection for Power Electronic Systems (CRC Press) 2012*

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

ENEL590-16C/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)

Points	Code	Title
30	ENEL591-16C (HAM)	Dissertation
60	ENEL592-16C (HAM)	Dissertation
90	ENEL593-16C (HAM)	Electronics Thesis
120	ENEL594-16C (HAM)	Electronics Thesis
150	ENEL595-16C (HAM)	Electronics Thesis

Engineering

ENGG501-16A(HAM) – Control Theory and Image Processing 30 points

This paper deals with PID feedback control of linear systems using classical as well as state space methods. It 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

ENME540-16A (HAM) – Finite Element Analysis and Application 30 points

This paper will not be offered in 2016.

Theses for ME

Points	Code	Title
90	ENGG593-16C (HAM)	Engineering Thesis
120	ENGG594-16C (HAM)	Engineering Thesis

Materials and Processing

ENMP502-16A/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*

ENMP503-16A (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*

ENMP504-16B/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*

ENMP505-16B (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*

ENMP513-16A (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*

ENMP514-16A (HAM) – Advanced Materials Processing 15 points

This paper investigates the relationships between processing conditions and microstructure of different materials. Topics include: Solidification processing, powder metallurgy, ceramic processing and processing composites. This paper also examines how materials are processed into serviceable products.

Convenor(s): *Dr Leandro Bolzoni*

Prerequisite(s): *ENMP211 or equivalent*

Restriction(s): *ENMP411, ENMP512*

Assessment: *Internal assessment/examination ratio: 1:4*

ENMP515-16A (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

ENMP516-16B (HAM) – Materials Characterisation 15 points

This paper covers the use of advanced analytical techniques used in materials characterisation. These include optical microscopy, x-ray diffraction, transmission electron microscopy, scanning electron microscopy and differential thermal analysis. This paper explains the theory behind these techniques.

Convenor(s): Dr Leandro Bolzoni

Prerequisite(s): ENMP211 or equivalent

Assessment: Internal assessment/examination ratio: 1:4

ENMP542-16C (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

ENMP543-16A (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

ENMP544-16B (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

Theory of protein purification and selected large-scale bioprocesses.

Convenor(s): Dr Mark Lay

Prerequisite(s): BIOL251 and either BIOL362 or ENMP322

Restrictions(s): ENMP522

Assessment: Internal assessment/examination ratio: 1:4

ENMP562- 16A(HAM) – Bioprocessing 2 15 points

This paper will not be offered in 2016.

ENMP563-16A (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

ENMP564-16B (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

ENMP568-16B (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

ENMP569-16A (HAM) – Engineering Applied Practice 2 15 points

An intensive practical training with some aspect of engineering or technology.

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

ENMP585-16A (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 of new knowledge generated by research. Case studies, readings, individual and group presentations form an important part of this course. This paper should preferably be taken with ENMP586.

Convenor(s): Dr Mark Lay
Prerequisite(s): ENMP381 or equivalent
Restriction(s): ENMP581
Assessment: Internal assessment/examination ratio: 1:0

ENMP586-16B (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*

ENMP590-16C/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)

Points	Code	Title
30	ENMP591-16C (HAM)	Dissertation
60	ENMP592-16C (HAM)	Dissertation
90	ENMP593-16C (HAM)	Materials and Processing Thesis
120	ENMP594-16C (HAM)	Materials and Processing Thesis
150	ENMP595-16C (HAM)	Materials and Processing Thesis

Physics

PHYS506 – Advanced Quantum Theory 30 points

This paper covers the foundations of quantum mechanics and develops advanced applications.

Convenor(s): Dr Michael Cree
Assessment: Internal assessment/examination ratio: 1:0

PHYS511 – Particles and Fields 30 points

This paper will not be offered in 2016.

PHYS516-16A (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 will not be offered in 2016.

PHYS552 – Methods in Theoretical Physics 2 15 points

This paper introduces geometric methods applied to physics. It covers simple application of group theory to simplify problems with symmetry, and an introduction to geometric algebra.

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

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

PHYS560-16A/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

PHYS561-16A/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*

PHYS590-16A/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)

Points	Code	Title
30	PHYS591-16C (HAM)	Dissertation
60	PHYS592-16C (HAM)	Dissertation
90	PHYS593-16C (HAM)	Physics Thesis
120	PHYS594-16C (HAM)	Physics Thesis

Psychology

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

- PSYC511-16A (HAM) – Evaluation Research Design 15 points
- PSYC513 -16B (BLK) – Evaluation Research Analysis 30 points
- PSYC517-16B (HAM) – The Social Psychology of Anti-Social Behaviour 15 points
- PSYC518-Family Violence: Research and Interventions* 15 points
This paper will not be offered in 2016 (alternates with PSYC517)
- PSYC538-16B (HAM) (NET) – Applications of Behaviour Analysis 15 points
- PSYC539-16A (HAM) – Graduate Research Methods in Psychology 15 points
- PSYC556-16A (HAM) – Advanced Topics in Abnormal Adult Psychology 15 points
- PSYC559-16B (HAM) (NET) – Animal Behaviour and Welfare Research 15 points
- PSYC560-16A (HAM) (NET) – Applied Behaviour Analysis: Theory and Issues 15 points
- PSYC561-16A (HAM) (NET) – Behaviour Analysis Research and Theory 15 points
- PSYC562-16B (HAM) – Theories of Psychotherapy 15 points
- PSYC564-16B (HAM) – Developmental Psychopathology 15 points
- PSYC568-16A (HAM) – Techniques in Applied Psychology 15 points
- PSYC571-16B (HAM) – Psychology of Careers 15 points
- PSYC572-16A (HAM) – Personnel Selection 15 points
- PSYC573-16A (HAM) – Training and Development 15 points
- PSYC575-16A (HAM) – Indigenous Psychologies 15 points
- PSYC577-16B (HAM) (NET) – Recent Research in Behaviour Analysis 15 points
- PSYC579-16B (HAM) – Advances in Organisational Psychology 15 points
- PSYC580-16B (HAM) – The Psychology of Criminal Conduct 15 points
- PSYC581-16A (HAM) – Psychological Assessment* 15 points
- PSYC582-16B (BLK) – Community Health Psychology* 15 points
- PSYC583-16A (BLK) – Foundations of Community Psychology* 15 points
- PSYC585-16B (HAM) – Leading Organisation Development 15 points
- PSYC587-16Y (HAM) (NET) – Behaviour Analysis Practicum 15 points
- PSYC588-16A/B/S (HAM) – Directed Study 15 points
- PSYC589-16A/B/S (HAM) – Directed Study 15 points
- PSYC590-16A/B/S/Y (HAM) – Directed Study 30 points
- PSYC591-16Y (HAM) – Honours Dissertation 30 points

Dissertations and theses for MSc, MSc(Research)

Points	Code	Title
60	PSYC592-16C (HAM)	Dissertation
90	PSYC593-16C (HAM)	Psychology Thesis
120	PSYC594-16C (HAM)	Psychology Thesis

Computer and Mathematical Sciences

For details of the following papers please refer to the *Computing & Mathematical Sciences Handbook* or the *2016 University of Waikato Calendar*.

Computer Science

Papers are worth 15 points unless specified.

- COMP501-16A – Topics in Operating Systems
- COMP513-16A – Topics in Computer Networks
- COMP514-16B – Carrier and ISP Networks
- COMP521-16A – Machine Learning Algorithms
- COMP535 – Image Processing†
- COMP536-16B – Advanced Graphics and Computer Games
- COMP537 – User Interfaces for Information Retrieval†
- COMP538 – Topics in Human-Computer Interaction†
- COMP539-16A – Usability Engineering
- COMP542-16A – Web Search: Technical and Social Issues
- COMP543-16B – Information Management
- COMP552-16A – Model Checking
- COMP553-16A – Extremely Parallel Programming
- COMP554 – Specification Languages and Models
- COMP555-16B – Bioinformatics
- COMP560-16A/C – Turing Topics in Computer Science

†Not offered in 2016.

Mathematics

- MATH501 – Metric Spaces†
- MATH505 – Topics in Analysis and Topology†
- MATH509 – Number Theory
- MATH511-16A – Semigroups and Universal Algebra
- MATH512-16B – Continuous Groups
- MATH513 – Finite Groups†
- MATH515-16A – Analytical Number Theory
- MATH516 – Topics in Discrete Mathematics
- MATH541-16B – Classical Partial Differential Equations
- MATH542-16B – Advanced Partial Differential Equations
- MATH581-16A/B – Special Topic in Mathematics 1
- MATH582-16A/B – Special Topic in Mathematics 2

†Not offered in 2016.

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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.

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

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 enrolled in a masters or doctoral degree in Earth Sciences.

Dr Stella Frances Memorial Scholarship

This scholarship is open to students who are enrolled or are intending to enrol in the final year of a masters degree and who are studying environmental issues in the Waikato region. The scholarship will have a value of \$5,000 and is intended to defray research expenses.

Fisher & Paykel Healthcare Graduate Scholarship in Biophysics

This scholarship is open to students who are enrolled full-time in an MSc or PhD, with a thesis topic in Biophysics or Cortical Modelling. The scholarship will have a value of up to \$5,000 for one year.

Golden Plover Wetland Research Award

This scholarship is open to students who are enrolled or intending to enrol part-time or full-time in an honours or masters degree at any New Zealand University and are conducting original research into any aspect of the ecology or management of wetland at masters level at any university in New Zealand. The scholarship will have a value of up to \$1,000.

Hilary Jolly Memorial Scholarship

The scholarship is open to students who are enrolled or are intending to enrol full-time in a masters or doctoral degree programme at the University of Waikato and are undertaking research in the field of freshwater ecology.

Lucy Cranwell Student Grant for Botanical Research

The commemorative grant of \$2,000 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 masters 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 may be 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 enrolling or enrolled 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

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:

Science Librarian

Phone: 07 838 4466 extn 6513

Cheryl Ward

Email: cward@waikato.ac.nz

Cheryl is also available for tours and tutorials.

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 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.

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
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Other contacts:

Faculty Chemical Safety Officer John Little	Phone: 07 838 4103
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Faculty Field Trip Health and Safety Officer Annie Barker	Phone: 07 838 4392
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Evacuation Officer Ivan Bell	Phone: 07 838 4117
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Radiation Subcommittee Chairperson Dr Johan Verbeek	Phone: 07 838 4947
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Laser Safety Officer Associate Professor Rainer Künнемeyer	Phone: 07 838 4630
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Health and Safety Officer Andrew Alston	Phone: 07 838 4493
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Sources of Health and Safety information in the Faculty can be found on our info.sci website:

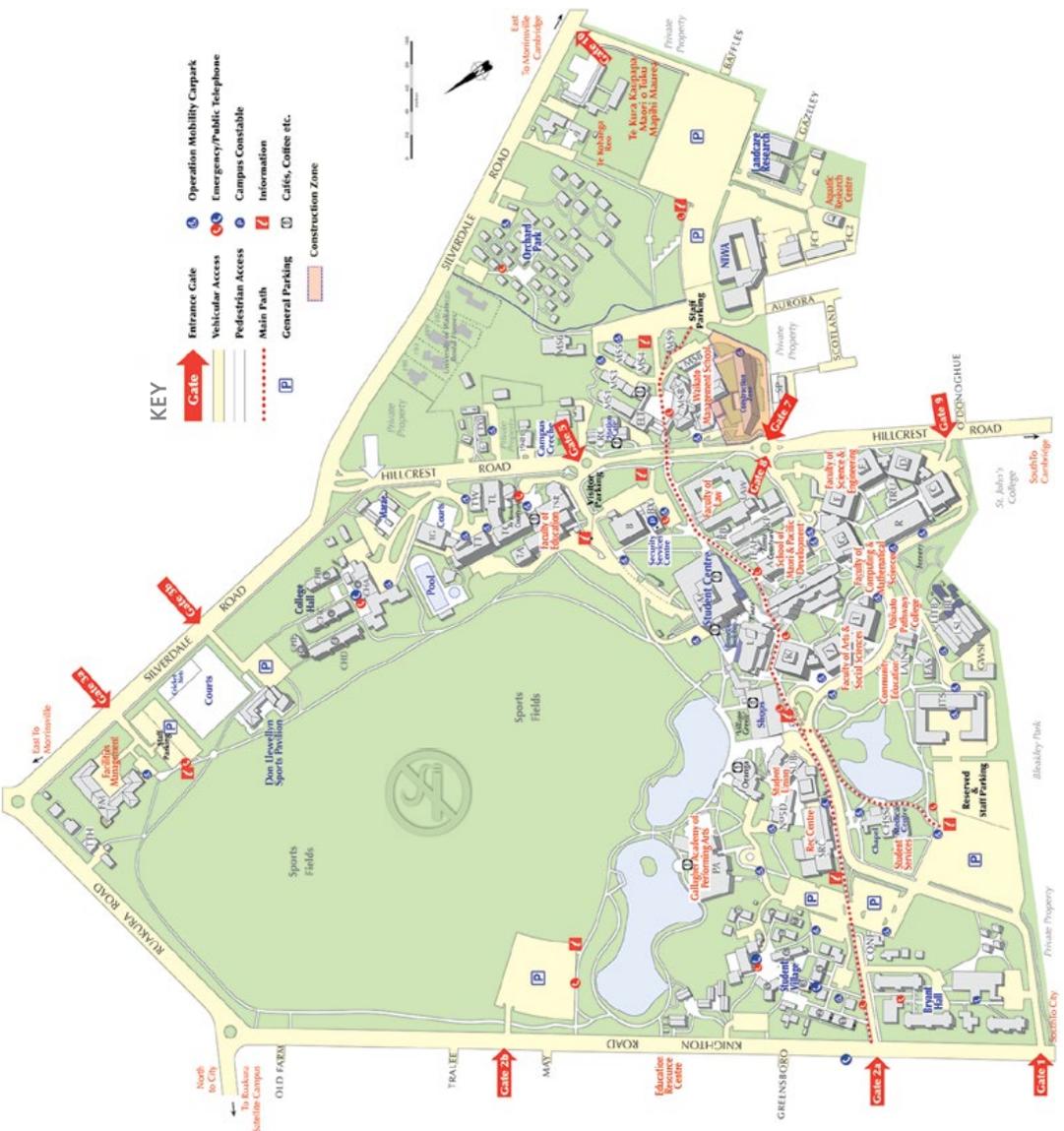
http://info.sci.waikato.ac.nz/health_safety/has_intro.shtml and the Health and Safety notice board in the Faculty of Science & Engineering Tearoom.

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

- KEY**
- Gate
 - Entrance Gate
 - Operation Mobility Carpark
 - Emergency/Public Telephone
 - Campus Constable
 - Pedestrian Access
 - Information
 - Main Path
 - General Parking
 - Construction Zone
 - Vehicular Access
 - Cafes, Coffee etc.





THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

WHERE THE WORLD IS GOING
TE AHUNGA O TE AO

The University of Waikato

Private Bag 3105

Hamilton 3240

New Zealand

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Faculty of Science & Engineering

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