



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

Graduate Handbook

Science & Engineering

Te Mātauranga Pūtaiao me te Pūkaha



2012

WELCOME TO WAIKATO

Welcome to the University of Waikato. I hope you make the most of your time here and the opportunities that will present themselves during the course of your study.

You have come to an excellent university that is ranked top in 10 subjects under the Government's Performance Based Research Fund. We are also internationally connected; we have research connections and student exchanges with some of the world's top universities. I urge you to consider taking part in these while you are with us.

Here at the University of Waikato, you will be taught by lecturers who are leaders in their fields of research and who win national teaching awards. We are proud of our academic quality and the fact that we turn out sought-after graduates who go on to take up important roles in all parts of the world.

You will already have noticed our beautiful campus which is set in 68 hectares of gardens, green space and lakes. At the heart of it all is the new Student Centre, which was completed in 2011. With its accessible areas, Library services and multitude of facilities, it is a place for students to study or just gather together and we are very proud of this building.

In 2011 we celebrated 10 years of another important building, the Gallagher Academy of Performing Arts. This world-class facility was the vision of a group of driven Waikato people. It quickly became a focal point in the campus and continues to be an important venue for the performing arts community.

I encourage you to experience all our facilities during your study at Waikato. We are heading towards our 50th anniversary in 2014; you are benefitting from many years of planning, hard work and vision.

I sincerely hope you enjoy your time at the University of Waikato; I urge you to make the most of the excellent education, the beautiful setting and the top facilities and then head out into the world as alumni and ambassadors for us.

Roy Crawford

VICE-CHANCELLOR
UNIVERSITY OF WAIKATO



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. Productivity, economic growth and social well-being are driven by the application of knowledge and our capacity to develop and use knowledge depends on the skill and intellectual capacity of our people. Graduates of the Faculty of Science & Engineering are a vital part of this process.

The Faculty of Science & Engineering offers strong academic programmes in biological sciences, chemistry, Earth sciences, physics, electronic engineering, mechanical engineering, materials and process technology, and science, mathematics and technology education.

The Faculty has truly gifted staff who perform radical and innovative research while fuelling the minds of energetic and talented students. It is a prime characteristic of a University degree to have teaching informed by research and in a number of key areas of science (chemistry, ecology, molecular and cellular biology, mathematics and computer science), the University of Waikato has been independently assessed by the Tertiary Education Commission as being the national research leader. 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.

Graduates with a degree in Science or Engineering have access to a wide range of rewarding careers and the added satisfaction of knowing that what they do can make a difference to New Zealand and to the world. The qualifications of the University of Waikato are valued nationally and internationally for their flexibility and general excellence in education and training.

Professor Bruce Clarkson

DEAN
FACULTY OF SCIENCE & ENGINEERING



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Faculty Office

The Faculty Office can help you with the following:

- » Information about your papers and your degree,
- » Enrolment,
- » Entry and re-entry decisions,
- » Degree planning,
- » Student orientation,
- » Academic support for Māori and International Students, and
- » Dealing with other parts of the University and outside organisations such as StudyLink.

FACULTY OFFICE – ROOM F1.07

Office Administrator
Sophie Russo

Phone: +64 7 838 4625
Fax: +64 7 838 4218
Email: science@waikato.ac.nz

Faculty Registrar
To be advised

Phone: +64 7 838 4290
Email: science@waikato.ac.nz

Associate Dean (Postgraduate) – Postgraduate Studies Committee Representative
Professor Cam Nelson

Phone: +64 7 838 4024
Mobile: 027 474 6833
Email: c.nelson@waikato.ac.nz

Associate Dean (Teaching & Learning)
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Associate Dean (International)
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Chair of Coastal Science
Professor Chris Battershill

Phone: +64 27 445 5908
Email: cbatters@waikato.ac.nz

Māori Support Officer
Wiki Papa

Phone: +64 7 858 5043
Email: wiki@waikato.ac.nz

www.sci.waikato.ac.nz

CONTACT DETAILS

Departments and Research Units

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

Departments 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.

DEPARTMENTS & SCHOOLS

Biological Sciences

Office: E2.20
Phone: +64 7 838 4022
Email: biology@waikato.ac.nz
www.bio.waikato.ac.nz

Chemistry

Office: E3.20
Phone: +64 7 838 4027
Email: chemistry@waikato.ac.nz
www.chem.waikato.ac.nz

Earth & Ocean Sciences

Office: E2.07
Phone: +64 7 838 4024
Email: earth@waikato.ac.nz
www.earth.waikato.ac.nz

Engineering

Office: EG.04
Phone: +64 7 838 4266 / +64 7 838 4026
Email: engineering@waikato.ac.nz
www.eng.waikato.ac.nz

The School of Engineering administers programmes of study and papers in electronics, engineering, materials and processing, and physics.

RESEARCH UNITS AND CENTRES

Antarctic Research Centre

Director: Associate Professor Chris Hendy

Phone: +64 7 838 4381
Email: chendy@waikato.ac.nz

Centre for Biodiversity & Ecology Research (CBER)

Director: Professor Bruce Clarkson

Phone: +64 7 838 4237
Email: b.clarkson@waikato.ac.nz
<http://cber.bio.waikato.ac.nz/>

Centre for Science & Technology Education and Research (CSTER)

Director: Associate Professor John Williams

Phone: +64 7 838 4035
Fax: +64 7 838 4272
Email: cster@waikato.ac.nz
<http://cster.waikato.ac.nz/>

Cooperative Education Unit Director: Professor Richard Coll	Phone: +64 7 838 4100 Fax: +64 7 838 4218 Email: rcoll@waikato.ac.nz
Honey Research Unit Joint Director: Professor Peter Molan	Phone: +64 7 838 4325 Fax: +64 7 838 4324 Email: pmolan@waikato.ac.nz
Joint Director: Professor Alistair Wilkins	Phone: +64 7 838 4386 Email: a.wilkins@waikato.ac.nz www.bio.waikato.ac.nz/honey
International Centre for Terrestrial Antarctic Research Joint Director: Professor Craig Cary	Phone: +64 7 858 4593 Fax: +64 7 838 4324 Email: c.cary@waikato.ac.nz
Joint Director: Professor T. G. Allan Green	Email: greentga@waikato.ac.nz www.nztabs.ictar.aq
Thermophile & Microbial Biochemistry & Biotechnology Unit Joint Director: Professor Roy Daniel	Phone: +64 7 838 4213 Email: r.daniel@waikato.ac.nz
Joint Director: Professor Hugh Morgan	Phone: +64 7 838 4705 Email: h.morgan@waikato.ac.nz
Waikato Bio-Imaging Facility Manager: Dr Barry O'Brien	Phone: +64 7 838 4179 Email: b.obrien@waikato.ac.nz www.sci.waikato.ac.nz/microscopy
Waikato Centre for Advanced Materials (WaiCAM) Director: Professor Deliang Zhang	Phone: +64 7 838 4783 Fax: +64 7 838 4835 Email: d.zhang@waikato.ac.nz www.sci.waikato.ac.nz/waicam
Waikato DNA Sequencing Unit Director: Professor Craig Cary	Phone: +64 7 838 4705 Email: c.cary@waikato.ac.nz www.bio.waikato.ac.nz/sequence/
Waikato Electron Microscope Facility Manager: Helen Turner	Phone: +64 7858 5027 Fax: +64 7858 5027 Email: hturner@waikato.ac.nz www.sci.waikato.ac.nz/microscopy
Waikato Mass Spectrometry Facility Manager: Associate Professor Marilyn Manley-Harris	Phone: +64 7 838 4384 Email: manleyha@waikato.ac.nz www.mass-spec.co.nz
Waikato Radiocarbon Dating Laboratory Director: Dr Alan Hogg	Phone: +64 7 838 4707 Fax: +64 7 838 4192 Email: alan.hogg@waikato.ac.nz www.radiocarbon dating.com
Waikato Stable Isotope Unit Director: Associate Professor Brendon Hicks	Phone: +64 7 838 4613 Email: b.hicks@waikato.ac.nz www.bio.waikato.ac.nz/isotope

CONTACT DETAILS

POSTGRADUATE STUDIES OFFICE

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

Postgraduate Studies Office Phone: +64 7 856 2889 extn 6279
Fax: +64 7 838 4130
Email: postgrad@waikato.ac.nz
www.waikato.ac.nz/sasd/postgraduate

SCHOLARSHIPS OFFICE

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

Scholarships Office Phone: +64 7 838 4964 or +64 7 858 5195
Fax: +64 7 838 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 or a departmental office. Academic approval for your programme of study must be obtained from the relevant chairperson of department. This is done through completion of the Graduate Planner form available from departments.

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

DEGREES & 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 chairperson of department or their nominee. Prospective students should contact the chairperson 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 chairperson of the relevant department that you are academically prepared to enrol in the qualification and that an appropriate research topic can be supported by the department.

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 chairperson of the relevant department at their earliest convenience to discuss their options.

Please refer to the current 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 programme of study 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.

ME – Year 1 Options

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

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MASTER OF SCIENCE MSc

The MSc 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 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 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 study is rewarded by the level of honours attained.

Note(s): A 12 month MSc 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.

MSc Structure	
YEAR 1	500 LEVEL 120 points
YEAR 2	THESIS 120 points

Please refer to the current 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. Each 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 current 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 department to complete a Graduate Planner form before their programme may be approved and their enrolment can be finalised. This is to ensure that you and your supervisor are aware of your final submission date. This form can be obtained from the Faculty Office or a departmental office.

Candidates for MSc 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).

Full-time vs Part-time

A full-time student must complete a masters degree (MSc and MSc(Tech)) in 24 consecutive months from first enrolment to qualify for the award of Honours. The deadline for submission of a dissertation or thesis for candidates enrolling in a graduate degree in the Faculty of Science & Engineering is 4pm on the last working day of the candidate's minimum period of enrolment for the degree.

A part-time student is defined as one who is enrolled in three or fewer masters papers. 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 two papers over two of the years. Part-time candidates seeking the award of Honours should consult with the faculty registrar.

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

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.

Taught vs Thesis Papers

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

ENROLMENT PATTERNS FOR MASTERS STUDENTS

Extensions for Masters Theses

Guidelines for the Approval of Extensions to the Submission Date of a Masters Thesis

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

The circumstances under which an application for an extension to this submission date may be considered by the associate dean (postgraduate) are:

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

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

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

Candidates who feel that they have been unfairly disadvantaged in their interactions with their supervisor or any other persons, should in the first instance discuss this with their supervisor. If a satisfactory resolution cannot be found, candidates may then take their concerns to the relevant chairperson 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 chairperson independently to confirm the student's version of events. Subject to these comments, the application may then be forwarded to the associate dean (postgraduate) for consideration. In making an application for an extension, the obligations of candidates are as outlined below:

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

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

Re-enrolment

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

POSTGRADUATE DIPLOMA PGDip

This qualification enables science graduates to complete a postgraduate qualification in one year without committing themselves to the two years of study required for a masters degree. The candidate's programme of study requires approval of the Academic Board.

PGDip Structure

YEAR 1	500 LEVEL 120 points
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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
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In summary the requirements are:

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

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

BACHELOR OF SCIENCE (HONOURS) BSc(Hons)

Admission to this degree is by invitation only. Students interested in undertaking the BSc(Hons) in the Faculty of Science & Engineering must first consult with the relevant chairperson of department. The degree requires the completion of 120 points at 500 Level over one year, including a substantial component of research.

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 Studies Committee oversees the academic requirements and administration of higher degrees. The Postgraduate Studies Office is the central administrative office for all higher degrees. The office provides advice to candidates, liaises with department/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 accepted.

Initial Enquiries

Initial enquiries can be made to the chairperson of the relevant department or the Postgraduate Studies Office.

HIGHER DEGREES

Application Process

Enrolment in higher degrees (MPhil and PhD) is a more involved process than that for masters. 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, NZ 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, chair of department, and Faculty Postgraduate Studies Committee representative. Applications to enrol for a higher degree are subject to approval by the Postgraduate Studies 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 Studies 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	2 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 and in writing and then approved by the supervisory panel, chair of department and Faculty Postgraduate Studies 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 Studies 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 6-monthly from the date of confirmed enrolment; and MPhil candidates must submit progress reports 6-monthly from the date of enrolment.

Progress reports require candidates to report on progress made in the previous 6 months, and to report on work that is to be achieved in the next 6 months. Reports must be endorsed by the supervisory panel, chair of department, and Faculty Postgraduate Studies Committee representative. Copies of progress reports are sent to candidates.

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, department/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, chair of department and Faculty Postgraduate Studies Committee representative. Any application for changes to conditions of enrolment must be approved by the Postgraduate Studies Committee.

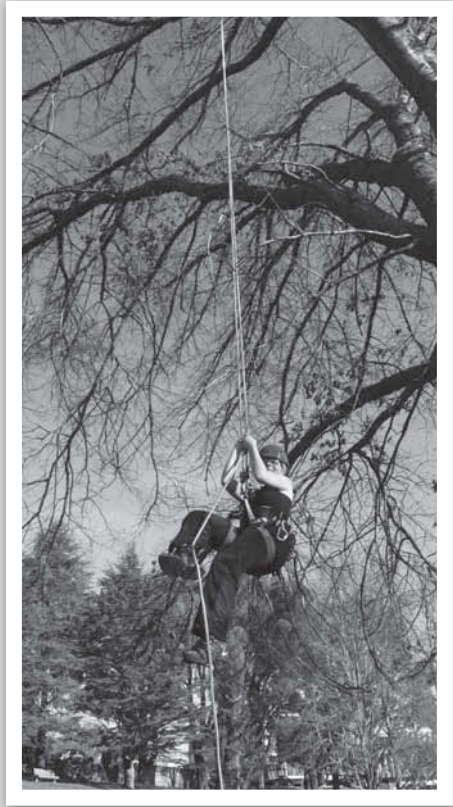
Examination

The Postgraduate Studies 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

Department of Biological Sciences
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INTRODUCTION

The Department of 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
- » Botany
- » Cellular and molecular biology
- » Freshwater ecosystems
- » Genetics
- » Marine ecosystems
- » Microbiology
- » Science education
- » Terrestrial ecosystems
- » Thermophiles
- » Zoology.

Research projects in the Department 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 the Department include the Waikato Stable Isotope Unit, the Honey Research 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).

In the Tertiary Education Commission's 2006 Performance-Based Research Fund evaluations, Waikato University was ranked first in New Zealand for the quality of its research in molecular, cellular and whole organism biology, and in ecology, evolution and behaviour.

ACADEMIC STAFF

Associate Professor Brendan Hicks – Chairperson

BSc, MSc(Hons) *Auckland*, PhD *Oregon State*

Email: b.hicks@waikato.ac.nz

Research interests: Ecology and habitats of freshwater fish; pest control; and stable isotopes in food webs.

Associate Professor Vic Arcus

BSc, MSc *Waikato*, PhD *Cambridge*

Email: varcus@waikato.ac.nz

Research interests: Molecular biology; structural biology; and protein engineering.

Dr Steven Bird

BSc(Hons), PhD *Aberdeen*

Email: s.bird@waikato.ac.nz

Research interests: Molecular immunology, genetic evolution of immune system communication in vertebrates, immune genes as markers of fish health, development of antibodies to immune genes in vertebrates.

Dr Alison Campbell

BSc(Hons), PhD *Massey*, TTC

Email: a.campbell@waikato.ac.nz

Research interests: The disparate fields of animal behaviour and science education, with a particular interest in students' understanding of the language of science; gaps in student knowledge (and how to bridge them); and attitudes to the theory of evolution.

Professor Craig Cary

BSc *Florida Tech*, MSc *San Diego State*, PhD *UC San Diego*

Email: c.cary@waikato.ac.nz

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

Professor Bruce Clarkson

BSc, MSc(Hons), DPhil *Waikato*

Email: b.clarkson@waikato.ac.nz

Research interests: Vegetation dynamics; autecology of threatened flora; and restoration ecology.

Dr Michael Clearwater

BSc, MSc(Hons) *Auckland*, PhD *Edin*

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.

Dr 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.

Professor Roy Daniel

BSc(Hons), PhD *Leicester*, FRSNZ, FNZIC
 Email: r.daniel@waikato.ac.nz

Research interests: The biochemistry, microbiology, and biotechnological applications of extremely thermophilic bacteria. Within these areas, major current topics are: a) the inter-relationship of enzyme activity, stability, and dynamics; b) the effect of temperature on enzymes; and c) properties and applications of stable enzymes, especially proteases.

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 Chris Eames

BSc, MSc, PhD *Waikato*
 Email: c.eames@waikato.ac.nz

Research interests: Environmental education; biotechnology education; learning in science and technology through cooperative education work placements; tertiary science/biology education; and science and technology human capital development.

Professor Roberta Farrell

BSc *Missouri*, MSc, PhD *Illinois*, CNZM, FRSNZ, FIAWS
 Email: r.farrell@waikato.ac.nz

Research interests: Mycology; biotechnology applications to wood, microbial and enzyme production; Antarctic fungi and historic huts deterioration.

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 Environment Bay of Plenty Chair in Lakes Management and Restoration.

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.

ACADEMIC STAFF

Dr C M King

BSc(Hons) *Liverpool*, DPhil *Oxford*, PhD *Waikato*

Email: c.king@waikato.ac.nz

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

Dr Daniel C Laughlin

BSc *Calvin College*, MSc *Penn State University*, PhD *Northern Arizona University*

Email: d.laughlin@waikato.ac.nz

Research interests: Plant community ecology; comparative plant ecology and trait-based community assembly; ecosystem ecology and restoration; and fire ecology.

Associate Professor Nick Ling

BSc, MSc(Hons), PhD *Auckland*

Email: nling@waikato.ac.nz

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

Dr Chris Lusk

Bsc, MSc *Massey*, PhD *Auckland*

Email: clusk@waikato.ac.nz

Research interests: Forest ecology; plant functional ecology; forest dynamics; plant species sorting on environmental gradients; and forest ecosystem processes.

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.

Professor Peter Molan, MBE

BSc(Hons) *Wales*, PhD *Liverpool*

Email: pmolan@waikato.ac.nz

Research interests: Antimicrobial, anti-inflammatory and antioxidant properties of honey; clinical and veterinary uses of honey; and development of honey-based wound dressing materials.

Professor Hugh Morgan

BSc(Hons) *Wales*, MSc(Hons) *Strathclyde*, PhD *Geulph*

Email: h.morgan@waikato.ac.nz

Research interests: Ecology and physiology of extremely thermophilic bacteria, and fermentations of glycolytic anaerobes; polymer hydrolysis in thermophilic environments; and Lignocellulose hydrolysis by Huhu grubs.

Dr Pawel K Olszewski

MSc *Warsaw*, PhD *Minnesota/Cracow (joint programme)*

Email: pawel@waikato.ac.nz

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

Dr Linda Peters

BSc(Hons) *Victoria*, PhD *Waikato*

Email: lpeters@waikato.ac.nz

Research interests: Human molecular genetics and bioinformatics; in particular, identifying genetic changes that contribute to common hereditary disorders in New Zealand.

Dr Conrad Pilditch

BSc, MSc *Otago*, PhD *Dalhousie*

Email: c.pilditch@waikato.ac.nz

Research interests: Marine benthic ecology and oceanography, in particular how water movement affects benthic community dynamics through sediment transport, recruitment and food supply, ecology of suspension-feeders and bivalve aquaculture.

Professor Joe Waas

BSc(Hons) *Trent*, PhD *Canterbury*

Email: waasur@waikato.ac.nz

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

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

Dr Wei Ye

BEng *Tsinghua*, MSc *Chinese Academy for Preventive Medicine*, PhD *ANU*

Email: weiy@waikato.ac.nz

Research interests: Climate change impact studies; integrated computer model system development for environmental impact assessment; and hydrological modelling.

PAPERS

All 500 Level papers are delivered subject to demand.

BIOL502-12B (HAM) – Research Methods and Skills

15 Points

This paper focuses on essential research skills for the biological sciences, including literature reviews, proposal writing and seminar presentations. It is a **compulsory** paper for students enrolled in MSc and MSc(Tech) degrees in Biological Sciences.

Convenor(s): Associate Professor Ian Hogg
 Prerequisite(s): BSc
 Restriction(s): BIOL501 and EARTH501
 Assessment: Internal assessment/examination ratio: 1 : 0

BIOL503-12A (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

BIOL560-12A (HAM) – Freshwater Ecology

15 Points

A critical examination of issues eg 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

BIOL561-12B (HAM) – Modelling Aquatic Ecosystems

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

BIOL562-12A (HAM) – Marine 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): Dr Conrad Pilditch
 Prerequisite(s): BSc, BIOL314 or equivalent
 Restriction(s): BIOL514
 Assessment: Internal assessment/examination ratio: 3 : 7

BIOL563-12B (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

BIOL564-12B (HAM) – Ecosystem Sustainability*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): Professor Bruce Clarkson
Prerequisite(s): BSc, BIOL312 or BIOL325 or equivalent
Corequisite(s): BIOL570
Restriction(s): BIOL515
Assessment: Internal assessment/examination ratio: 1 : 4

BIOL565-12A (HAM) – Molecular Ecology*15 Points*

This paper is open to students interested in molecular ecology, systematics, and environmental molecular biology. Topics covered include conservation and evolutionary genetics, molecular ecology, 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

BIOL570-12A (HAM) – Plant Ecology*15 Points*

Autecology of plants and the structure and functioning of plant communities. Topics covered include ecological genetics; weed biology; population demography and regeneration dynamics; vegetation change (succession); and vegetation survey and analysis.

Convenor(s): Professor Bruce Clarkson
Prerequisite(s): BSc, BIOL312, BIOL313 or BIOL325 or equivalent
Corequisite(s): BIOL571
Restriction(s): BIOL521
Assessment: Internal assessment/examination ratio: 3 : 7

BIOL571-12B (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: 3 : 7

PAPERS

BIOL572-12B (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 Wass
 Prerequisite(s): BSc, BIOL333 or equivalent
 Restriction(s): BIOL533
 Assessment: Internal assessment/examination ratio: 2 : 3

BIOL573-12A (HAM) – Animal Biology and Conservation

15 Points

The purpose of this paper is to explore the key general principles of zoology, with special reference to the evolutionary history and conservation of animal life.

Convenor(s): Dr C. Kim King
 Prerequisite(s): BSc, BIOL201, BIOL338 or equivalent, BIOL333 would be an advantage
 Restriction(s): BIOL533
 Assessment: Internal assessment/examination ratio: 2 : 3

BIOL574-12A (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 mammalian structure and function.

Convenor(s): Associate Professor Nicholas Ling, Dr Pawel Olszewski
 Prerequisite(s): BSc, BIOL335 (or external equivalent)
 Restriction(s): BIOL535
 Assessment: Internal assessment/examination ratio: 1 : 4

BIOL575-12B (HAM) – Applied Topics in Physiology

15 Points

This paper examines selected topics in the applied physiology of mammals, especially reproduction and lactation, in association with researchers in industry. Students will develop an understanding of the application of physiological knowledge and principles to commercial and medical technologies.

Convenor(s): Associate Professor Nicholas Ling, Dr Pawel Olszewski and contributors from external organisations
 Prerequisite(s): BSc, BIOL335 (or external equivalent)
 Restriction(s): BIOL535
 Assessment: Internal assessment/examination ratio: 1 : 4

BIOL576-12A (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: 1 : 4

BIOL577-12B (HAM) – 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 and contributors from NIWA
Prerequisite(s): BSc, BIOL313 or BIOL314 (or external equivalent)
Restriction(s): BIOL538
Assessment: Internal assessment/examination ratio: 1 : 1

BIOL580-12A (HAM) – Human and Applied Microbiology*15 Points*

Lantibiotic structure and function; microbial communities in the human gut; prospects and problems with microbial biofuels.

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

BIOL581-12B (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

BIOL582-12A (HAM) – Biomolecular Structure & Function*15 Points*

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

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

BIOL583-12B (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

PAPERS

BIOL584-12A(HAM) – Molecular Genetics

15 Points

This course 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: 0 : 1*

BIOL585-12B (HAM) – Human Genetics

15 Points

This course 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 Linda Peters*
 Prerequisite(s): *BSc, BIOL310 or equivalent*
 Restriction(s): *BIOL510*
 Assessment: *Internal assessment/examination ratio: 0 : 1*

BIOL588-12A/B (HAM) – Special Topic

15 Points

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

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

BIOL590-12C/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*

COMP555-12A (HAM) – Bioinformatics

15 Points

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

Dissertations and Theses for MSc and MSc(Tech)

POINTS	CODE	TITLE
30	BIOL591-12C (HAM)	Dissertation (1 paper)
60	BIOL592-12C (HAM)	Dissertation (2 papers)
90	BIOL593-12C (HAM)	Biological Sciences Thesis (3 papers)
120	BIOL594-12C (HAM)	Biological Sciences Thesis (4 papers)
150	BIOL595-12C (HAM)	Biological Sciences Thesis (5 papers)

General Notes

Students normally complete 120 points of taught course work in their first MSc year, and thesis research worth 120 points in their second MSc year.

Completion within two years of full-time study is required to be eligible for an MSc with honours.

CHEMISTRY



CONTACT DETAILS

www.chem.waikato.ac.nz

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New Zealand

Departmental Administrator
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Email: chemistry@waikato.ac.nz

INTRODUCTION

All staff in the Department of 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
- » Electrochemistry
- » Environmental chemistry
- » Geochemistry
- » High-field NMR spectroscopy
- » Mass spectrometry
- » Natural products chemistry
- » Organometallic chemistry
- » Physical chemistry
- » Polymers in materials chemistry
- » Prodrug chemistry
- » 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. Contact the chairperson of the department who will have an overall knowledge of such opportunities for students.

In the Tertiary Education Commission's 2006 Performance-Based Research Fund evaluations, Waikato University was ranked first in New Zealand for the quality of its research in chemistry.

ACADEMIC STAFF

Associate Professor Marilyn Manley-Harris – Chairperson

BSc(Hons) *James Cook*, PhD *Montana*

Email: manleyha@waikato.ac.nz

Research interests: Carbohydrate chemistry; kinetics of reactions occurring during thermal treatments of sucrose and inulin; compositions of caramels; influence of dietary oligosaccharides upon intestinal microflora; NMR spectroscopy and mass spectrometry of carbohydrates; carbohydrates in NZ honey and honeydew; flavonoids in honey; antioxidants in wine; polysaccharides in seeds of NZ native plants; bioactive steroid derivatives; sapogenins in NZ flora; and herbicide residues.

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; and electrospray mass spectrometry.

Associate Professor Chris Hendy

MSc, PhD *Victoria*, MNZIC

Email: chendy@waikato.ac.nz

Research interests: Geochemistry and environmental chemistry of processes at the Earth's surface in New Zealand and Antarctica; palaeoclimate studies; geochronology; abundance of natural isotopes; palaeolimnology; and environmental chemistry.

Associate Professor Alan Langdon

BSc, MSc, PhD *Victoria*, FNZIC

Email: a.langdon@waikato.ac.nz

Research interests: Chemical, energy, environmental technology, and the management of technological innovation and treatment of water and wastes. Physical chemistry including aspects of colloid and surface chemistry, solid state chemistry and the physical chemistry of environmental and technological problems.

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.

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.

Professor Brian Nicholson

BSc(Hons), PhD *Otago*, FNZIC

Email: b.nicholson@waikato.ac.nz

Research interests: Organometallic and inorganic chemistry; metal carbonyl chemistry; X-ray crystallography; and electrospray mass spectrometry.

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; and chemical ecology of marine organisms.

Dr Graham Saunders

BA(Hons), MA, DPhil *Oxon*, MNZIC

Email: g.saunder@waikato.ac.nz

Research interests: Using the properties of the carbon-fluorine bond in organometallic chemistry and for highly repellent surfaces. Fluorinated ligands, especially phosphines and N-heterocycle stabilised carbenes in transition metal chemistry; catalysis; utilising C-F bond fission in synthesis; and extremely hydrophobic surfaces.

Professor Alistair Wilkins

BSc(Hons), PhD *Otago*, FNZIC

Email: a.wilkins@waikato.ac.nz

Research interests: The isolation and structural elucidation of natural products and mycotoxins, using high resolution IR, NMR, GC and GC/MS studies; organic environmental chemistry; honey chemistry; and saponin metabolism in some animal diseases.

PAPERS

CHEM511-12A (HAM) – Advanced Biological Organic Chemistry

15 Points

An advanced study of mechanisms and synthesis in carbohydrate chemistry. Protein structure and function with a particular emphasis on enzymes and enzyme catalysis.

Convenor(s): Associate Professor Marilyn Manley-Harris
Prerequisite(s): CHEM301
Restriction(s): CHEM501
Assessment: Internal assessment/examination ratio: 0 : 1

CHEM512-12A (HAM) – Surface and Nano Systems

15 Points

An advanced study of surface and nano systems, their applications and the physical methods used to study them.

Convenor(s): Associate Professor Alan Langdon
Prerequisite(s): CHEM302 or equivalent
Restriction(s): CHEM502
Assessment: Internal assessment/examination ratio: 1 : 4

CHEM513-12A (HAM) – Organometallic Chemistry and Catalysis

15 Points

An advanced study of organometallic chemistry.

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

CHEM514-12A (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): Dr Graham Saunders
Prerequisite(s): Normally any 3 of CHEM301, CHEM302, CHEM303 and CHEM306
Restriction(s): CHEM504
Assessment: Internal assessment/examination ratio: 0 : 1

CHEM516-12A (HAM) – Isotope Geochemistry*15 Points*

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

Convenor(s): Associate Professor Chris Hendy
 Prerequisite(s): CHEM261
 Restriction(s): CHEM561
 Assessment: Internal assessment/examination ratio: 3 : 7

CHEM517-12A (HAM) – Applied and Environmental Analytical Chemistry A*15 Points*

With special reference to the commercial context, a critical examination of analytical methodologies for organic substances, eg pesticides.

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

CHEM521-12B (HAM) – Advanced Organic Chemistry*15 Points*

An advanced study of selected topics in organic chemistry. These topics may include mechanism, synthesis and natural product chemistry.

Convenor(s): Dr Michèle Prinsep
 Prerequisite(s): CHEM301
 Restriction(s): CHEM501
 Assessment: Internal assessment/examination ratio: 0 : 1

CHEM522-12B (HAM) – Computational Chemistry*15 Points*

A practical introduction to modern computational chemistry.

Convenor(s): Dr Joseph Lane
 Prerequisite(s): CHEM101 and CHEM102. CHEM302 is recommended but not essential.
 Restriction(s): CHEM502
 Assessment: Internal assessment/examination ratio: 1 : 0

PAPERS

CHEM523-12B (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

CHEM524-12B (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): Professor Alistair Wilkins

Prerequisite(s): Normally any 3 of CHEM301, CHEM302, CHEM303 and CHEM306

Restriction(s): CHEM504

Assessment: Internal assessment/examination ratio: 0 : 1

CHEM527-12B (HAM) – Applied and Environmental Analytical Chemistry B

15 Points

An advanced study of instrumental analytical techniques for organic and inorganic compounds and comparison of their efficacies.

Convenor(s): Professor Alistair Wilkins

Prerequisite(s): CHEM204, CHEM306, or an equivalent external course

Restriction(s): CHEM507

Assessment: Internal assessment/examination ratio: 0 : 1

CHEM590-12C/D (HAM) – Directed Study

30 Points

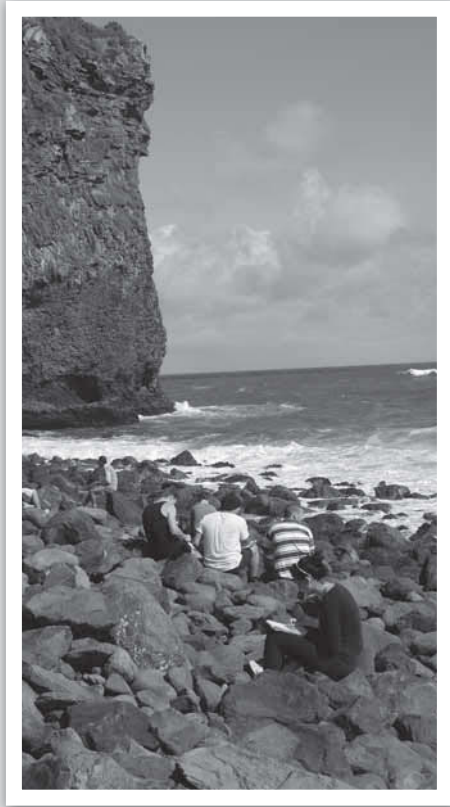
Convenor(s): To be advised

Assessment: Internal assessment/examination ratio: 1 : 0

Dissertations and Theses for MSc and MSc(Tech)

POINTS	CODE	TITLE
30	CHEM591-12C (HAM)	Dissertation (1 paper)
60	CHEM592-12C (HAM)	Dissertation (2 papers)
90	CHEM593-12C (HAM)	Chemistry Thesis (3 papers)
120	CHEM594-12C (HAM)	Chemistry Thesis (4 papers)
150	CHEM595-12C (HAM)	Chemistry Thesis (5 papers)

EARTH SCIENCES



CONTACT DETAILS

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Department of Earth & Ocean Sciences
University of Waikato
Private Bag 3105
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New Zealand

Departmental Administrator

Sydney Wright
Room: E2.07
Phone: +64 7 838 4024
Fax: +64 7 856 0115
Email: earth@waikato.ac.nz

Graduate Co-ordinator

Professor David Lowe
Room: DE1.02
Email: d.lowe@waikato.ac.nz

INTRODUCTION

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

The Department of Earth & Ocean Sciences 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 in the Department. A major objective of the Department 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 Department 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 Department of Earth & Ocean Sciences is committed to undertaking both pure and applied Earth sciences research. Applied research is often supported by research contracts with outside organisations. A feature of some of the research projects in the Department of Earth & Ocean Sciences is the development of close links with other geoscience research institutions, both in New Zealand and overseas.

ACADEMIC STAFF

Dr Dave Campbell – Chairperson

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 Megan Balks

BSc(Hons) *Massey*, PhD *Waikato*, FNZSSS

Email: m.balks@waikato.ac.nz

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

Associate Professor Earl Bardsley

BSc(Hons), MSc, PhD *Otago*

Email: e.bardsley@waikato.ac.nz

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

Associate Professor Roger Briggs

MSc, PhD *Auckland*, FAusIMM

Email: r.briggs@waikato.ac.nz

Research interests: Petrology, geochemistry and mineralogy of volcanic rocks in South Auckland/Waikato, Coromandel and Taupo volcanic zones; stratigraphy and petrology of ignimbrites; trace element and isotope geochemistry; and magmatic processes.

Dr 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 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.

Professor Peter Kamp

MSc, PhD *Waikato*

Email: p.kamp@waikato.ac.nz

Research interests: Sedimentary geology; sequence stratigraphy applied to NZ 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, ecological 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.

Professor Cam Nelson

BSc(Hons) *Wellington*, PhD *Auckland*, FRSNZ

Email: c.nelson@waikato.ac.nz

Research interests: Sedimentary and marine geology, especially the sedimentology and diagenesis of non-tropical shelf carbonate deposits, and the application of stable isotopes in paleoceanography and paleoclimatology. Basin analysis of Cenozoic sedimentary basins in North Island, New Zealand.

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.

Associate Professor Louis Schipper

BSc, MSc, PhD *Waikato*, FNZSSS, FSSSA

Email: l.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.

PAPERS

ERTH501-12B (HAM) – Research Methodology

15 Points

This paper is normally compulsory for all MSc and MSc(Tech) students enrolled in Earth Sciences. General research methodology is covered including preparation of a research proposal and presentation of results.

Convenor(s): Associate Professor Earl Bardsley
 Restriction(s): BIOL502
 Assessment: Internal assessment/examination ratio: 1 : 0

ERTH512-12A/B/C (HAM) – Special Topic

15 Points

Guided individual study on an aspect of Earth and Ocean Sciences. By arrangement, and with the approval of the Graduate Co-ordinator of Earth and Ocean Sciences.

Convenor(s): Professor David Lowe
 Restriction(s): ERTH511
 Assessment: Internal assessment/examination ratio: 1 : 0

ERTH513-12B (HAM) – Special Topic

15 Points

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

Convenor(s): Professor David Lowe
 Restriction(s): ERTH511
 Assessment: Internal assessment/examination ratio: 1 : 0

ERTH524-12A (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

ERTH525-12B (HAM) – Volcanic Petrology and Geochemistry

15 Points

A study of the petrology and geochemistry of volcanic rocks, the origin of magmas and their sources, magmatic processes, and an introduction to mineral deposits in volcanic environments and geothermal systems.

Convenor(s): To be advised
 Prerequisite(s): ERTH321
 Restriction(s): ERTH521
 Assessment: Internal assessment/examination ratio: 3 : 2

ERTH526-12B (HAM) – Field Analysis of Sedimentary Basins

15 Points

A paper teaching the application of field and some laboratory methods in the analysis of sedimentary successions basins.

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

ERTH527-12A (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): Professor Cam Nelson
Prerequisite(s): ERTH322
Restriction(s): ERTH522
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH528-12A (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.

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

ERTH533-12B (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): Associate Professor Louis Schipper
Prerequisite(s): ERTH334
Restriction(s): ERTH531
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH535-12A (HAM) – Land and Soil Evaluation*15 Points*

This paper examines how soil and land may be evaluated to provide an improved understanding of sustainable land management, taking into account productivity and environmental goals.

Convenor(s): Professor David Lowe
Prerequisite(s): ERTH333 or ERTH334 or ERTH384
Restriction(s): ERTH531
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH547-12B (HAM) – Hydrology and Water Resources*15 Points*

Optimal use of water resources is an essential part of national economic development. Hydrological science is considered with emphasis on techniques of water resource studies through hydrological model construction and simulations.

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

PAPERS

ERTH548-12A (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 the gap between hydrological, soils, ecological and climate sciences.

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

ERTH552-12B (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*

ERTH562-12A (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*

ERTH563-12A (HAM) – Coastal Oceanography

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): *Dr Karin Bryan and Dr Julia Mullarney*
 Prerequisite(s): *ERTH344*
 Restriction(s): *ERTH546*
 Assessment: *Internal assessment/examination ratio: 3 : 2*

ERTH564-12B (HAM) – Modelling for Coastal Engineering

15 Points

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

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

ERTH565-12B (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): Dr Karin Bryan

Prerequisite(s): Any of ERTH344, ERTH343, ERTH345, ERTH346, ERTH384
and a basic knowledge of 1st year statistics.

Assessment: Internal assessment/examination ratio: 3 : 2

ERTH590-12A/B/Y (HAM) – Directed Study*30 Points*

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

Convenor(s): To be advised

Assessment: Internal assessment/examination ratio: 1 : 0

ENV524-12A (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): ENV521

Assessment: Internal assessment/examination ratio: 1 : 0

Note(s): Not all courses listed may necessarily be offered, and may depend on staff availability and numbers of students.

Dissertations and Theses for MSc and MSc(Tech)

POINTS	CODE	TITLE
30	ERTH591-12C (HAM)	Dissertation
60	ERTH592-12C (HAM)	Dissertation
90	ERTH593-12C (HAM)	Earth Sciences Thesis
120	ERTH594-12C (HAM)	Earth Sciences Thesis

ENGINEERING



CONTACT DETAILS

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School Administrators
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Phone: +64 7 838 4266
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Fax: +64 7 838 4835
Email: engineering@waikato.ac.nz

Associate Dean (Engineering)
Professor Janis Swan
Room: EG.04C
Phone: +64 7 838 4049
Email: j.swan@waikato.ac.nz

INTRODUCTION

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

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

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

- » Applied optics and opto-electronics
- » Bioprocess engineering
- » Electronics
- » Engineering
- » Environmental technology
- » Fermentation engineering
- » Food engineering
- » Imaging
- » Materials engineering
- » Mechanical developments and design
- » Mechanical technology
- » Metalics
- » Numerical modeling
- » Physics
- » Power symptoms and control
- » Process engineering
- » Technology innovation.

Students may undertake the following specialisations with the relevant Graduate Diploma:

- » Agriculture and Biosystems – Graduate Diploma in Materials and Processing, and
- » Technology Teaching – Graduate Diploma in Engineering (Technology Teaching).

Collaborative work with industry and research associations are also available.

ACADEMIC STAFF

Associate Professor Brian Gabbitas – Chairperson

BSc, PhD *Leeds*, CEng MIMMM, FIPENZ

Email: briang@waikato.ac.nz

Research interests: Failure of materials; creep and fracture in wood; and powder metallurgical processing of titanium-based alloys.

Professor Janis Swan – Associate Dean (Engineering)

BTech, MTech *Massey*, PhD *Waterloo*, FNZIFST, FIPENZ, MNZM

Email: j.swan@waikato.ac.nz

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

Dr Chi Kit Au

BSc, MSc, PhD *Hong Kong*

Email: ckau@waikato.ac.nz

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

Dr James K Carson

BE(Hons) *Canterbury*, 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: adrian@waikato.ac.nz

Research interests: Optoelectronics and optical measurement technologies; 3D imaging for object shape (surface profiling), position, and size measurement; range imaging sensor technology; and optical velocimetry.

Dr 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; vibrations and dynamics.

Associate Professor Ilanko

BSc(Eng)(Hons), MSc *Manc*, PhD *W.Ont*

Email: ilanko@waikato.ac.nz

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

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; smart sensor systems; and telecommunications policy and technology developments.

Associate Professor Rainer Künnemeyer

DiplPhys *Hannover*, DrRerNat *Hannover*, SMIEEE, MIPENZ, MSPIE

Email: rainer@waikato.ac.nz

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

Associate Professor Alan Langdon

BSc, MSc, PhD *Wellington*, FNZIC

Email: a.langdon@waikato.ac.nz

Research interests: Environmental technology; zeolites and mesoporous solids; treatment of water and wastewater; anaerobic digestion and harvesting; and beneficial use of nuisance biomass.

Dr Mark Lay

BSc, MSc, PhD *Waikato*

Email: mclay@waikato.ac.nz

Research interests: Biotechnology and process chromatography; chromatographic modelling; science education research; and cooperative education.

Dr Giridhar Nair

BSc *Kerala*, BSc(Eng) *Cochin*, MTech, PhD IIT *Delhi*

Email: g.nair@waikato.ac.nz

Research interests: Fermentation engineering; modelling and optimising biotechnological processes; biotransformation using enzymes and whole cells; and value addition to agricultural and food processing residues.

Associate Professor Kim Pickering

BSc(Eng)(Hons) *London*, PhD *Surrey*, FIPENZ, IntPENZ, CPEng, MIMMM

Email: klp@waikato.ac.nz

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

ACADEMIC STAFF

Dr Howell Round

BSc(Tech) *Waikato*, MSc *Sur*, PhD *Canterbury*, FNZIP, FACPSEM, SMIEEE, MIPENZ

Email: h.round@waikato.ac.nz

Research interests: Medical physics (breathing control, isotope imaging, radiotherapy dosimetry and treatment planning) and electronics (position and velocity estimation, line scan photography).

Professor Jonathan Scott

BSc, BE, MEngSc, PhD *Sydney*, SMIEEE, MAES, MSPIE

Email: scottj@waikato.ac.nz

Research interests: Analog and digital electronics; microwave and millimetre-wave components; instrumentation and metrology; audio; linearity and distortion; vector correction; III-V and wide-bandgap devices and device models; embedded microcontrollers; electric traction; RF amplifiers; and microwave systems.

Associate Professor Alistair Steyn-Ross

BSc, MSc, PhD *Waikato*, MNZIP, MRSNZ

Email: asr@waikato.ac.nz

Research interests: Cortical modelling; anaesthetics phase-change studies; quantifying brain state; and computational physics.

Professor Moira Steyn-Ross

BSc, MSc, PhD *Waikato*, MNZIP

Email: msr@waikato.ac.nz

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

Dr Sadhana Talele

BE, ME *Poona*, GradDipT, PhD *Waikato*, FIETE

Email: sadhana@waikato.ac.nz

Research interests: Mathematical modelling of electroporation and other biophysical phenomenon.

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.

Dr 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*, MInstP CPhys, MNZIP

Email: m.wilson@waikato.ac.nz

Research interests: Computer and mathematical modelling and analysis of the meso-scale electrical behaviour of the brain. Infra-red physics and signature control (stealth); and using quantum Monte Carlo methods to study electron-electron interactions in solids.

Professor Deliang Zhang

BE *North East Uni Technology*, DPhil *Oxford*, MTMS, MRSNZ

Email: d.zhang@waikato.ac.nz

Research interests: Processing and consolidation of titanium alloy and other metallic, intermetallic and metal-ceramic composite powders; processing, microstructure and mechanical properties of titanium alloys, titanium aluminides, aluminium and magnesium alloys; ultrafine structured and nanostructured metallic materials and nanocomposites; mechanical alloying and high energy mechanical milling; and casting and heat treatment of aluminium and magnesium alloys.

SPECIALISATIONS

Agricultural and Biosystems

This specialisation can be taken with a Graduate Diploma in Materials and Processing.

The Agriculture and Biosystems specialisation provides an agricultural technology, research and design focus for students who have majored in an undergraduate subject in the BSc, BSc(Tech), BCMS or BMS degrees and who have completed any prerequisite papers. It will enhance students attractiveness for careers in agritechology companies and organisations.

Requirements:

120 points, with at least 80 points in Materials and Processing papers chosen from those listed below (coded ENGG or ENMP).

Papers are worth 20 points unless specified.

- » AGRI202B Sustainable Agriculture
- » AGRI301C – Agribusiness in New Zealand
- » ENMP301A/B/S/Y – Special Topics in Technology (Topic in Agritechology)

and 60 points chosen from:

- » ENMP222B – Biotechnology: Food and Bio-Resources
- » ENMP322B – Biotechnology
- » ENMP321B – Engineering Process and Design
- » ENMP381B – Technological Innovation and its Management
- » ENGG381A – Engineering Statistics

Details on ENMP and ENGG Level 200 and Level 300 papers can be found in the **2012 Science & Engineering Undergraduate Handbook** and in the **University Calendar**.

Please refer to the **Waikato Management School Handbook** for details of AGRI202 and AGRI301.

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.

PAPERS

Electronics Papers

ENEL501-12A/B/Y (HAM) – Special Topics in Electronics

30 Points

This paper involves directed reading, project work and paper presentation in a defined topic area of electronics.

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

ENEL502-12A (HAM) – Signal and Image Processing

30 Points

This paper considers the theory and application of digital processing. Emphasis is placed on the z-transform, discrete Fourier transform and the discrete time Fourier transform. Various digital filter design techniques are discussed. Assignments are primarily computer based.

Convenor(s): Dr Howell Round
 Prerequisite(s): (ENGG283 or MATH253) and (ENGG285 or MATH251)
 Assessment: Internal assessment/examination ratio: 1 : 0

ENEL503 – Computational Electromagnetics

This paper will not be offered in 2012.

ENEL504-12B (HAM) – Analog Filter Design

15 Points

This paper introduces the student to the design of electronic filters to process analog signals.

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

ENEL505-12A (HAM) – Rechargeable Batteries and their Management

15 Points

This course presents the essential characteristics of rechargeable batteries including techniques and semiconductor components used for managing batteries for optimal run time and cycle life.

Convenor(s): Nihal Kularatna
 Prerequisite(s): ENEL205 and ENEL211
 Assessment: Internal assessment/examination ratio: 1 : 0

PAPERS

ENEL506-12B (HAM) – Surge Protection of Electronic Systems

15 Points

This course presents the fundamentals and techniques for protecting electronic systems against transients and surges, the statistical nature of the surge occurrence, and the international standards applicable.

Convenor(s): *Nihal Kularatna*
 Prerequisite(s): *ENEL205 and ENEL211*
 Assessment: *Internal assessment/examination ratio: 1 : 0*

ENEL517-12A (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.

Convenor(s): *Professor Jonathan Scott*
 Prerequisite(s): *ENEL317*
 Assessment: *Internal assessment/examination ratio: 1 : 0*

ENEL522-12B (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): *A minimum mark of 40% is required to receive a passing grade. Laboratories are compulsory.*

Convenor(s): *Associate Professor Rainer Künnemeyer*
 Prerequisite(s): *ENEL324*
 Restriction(s): *ENEL322 and ENEL423*
 Required Book(s): *Donati **Electro-Optical Instrumentation** (Prentice Hall)*
 Assessment: *Internal assessment/examination ratio: 1 : 1*

ENEL585-12B (HAM) – Power Electronics

30 Points

This paper covers the theory and practice of power semiconductors, power converters, power management, protection, and variable speed drives.

Convenor(s): *Nihal Kularatna*
 Prerequisite(s): *ENEL205 and ENEL211*
 Restriction(s): *ENEL385 and ENEL485*
 Required Book(s): *To be advised*
 Assessment: *Internal assessment/examination ratio: 1 : 1*

ENEL590-12C/D (HAM) – Directed Study

30 Points

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

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

Engineering Papers

ENGG501 – System Control Theory

This paper will not be offered in 2012.

ENME540-12A (HAM) – Computer Aided Engineering

30 Points

This paper covers the application of variational principles, approximate methods such as Galerkin's Method to solve partial differential equations, and the Finite Element Analysis (FEA) to solve mechanical engineering problems, with particular emphasis on stress analysis and vibration. Students will be expected to develop their own FEA programmes in MATLAB to solve simple problems and using and use commercial FEA software to solve more complicated practical problems.

<i>Convenor(s):</i>	<i>Associate Professor Ilanko</i>
<i>Equivalent:</i>	<i>ENSC540; ENGG540</i>
<i>Prerequisite(s):</i>	<i>ENGG285 or MATH285, and MATH255, and ENMP313</i>
<i>Restriction(s):</i>	<i>ENGG340, ENSC340, ENGG440, ENGG540 and ENSC440</i>
<i>Assessment:</i>	<i>Internal assessment/examination ratio: 1 : 0</i>

PAPERS

Materials & Processing Papers

ENMP502-12A/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): *Professor Janis Swan*

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

ENMP503-12A (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): *Professor Janis Swan*

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

ENMP504-12B/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): *Professor Janis Swan*

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

ENMP505-12B (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): *Professor Janis Swan*

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

ENMP513-12A (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.

Convenor(s): *Associate Professor Kim Pickering*

Prerequisite(s): *ENMP211 or equivalent*

Restriction(s): *ENMP511*

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

ENMP514-12A (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): Professor Deliang Zhang
Prerequisite(s): ENMP211 or equivalent
Restriction(s): ENMP411, ENMP512
Assessment: Internal assessment/examination ratio: 1 : 4

ENMP515-12A (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

ENMP516-12B (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): Associate Professor Brian Gabbitas
Prerequisite(s): ENMP211 or equivalent
Assessment: Internal assessment/examination ratio: 1 : 4

ENMP542-12C (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): To be advised
Assessment: Internal assessment/examination ratio: 1 : 0

ENMP543-12A (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): Associate Professor Alan Langdon
Prerequisite(s): ENMP341 or equivalent
Restriction(s): ENMP541
Assessment: Internal assessment/examination ratio: 1 : 4

PAPERS

ENMP544-12B (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):	To be advised
Prerequisite(s):	ENMP341 or equivalent
Restriction(s):	ENMP541
Assessment:	Internal assessment/examination ratio: 1 : 4

ENMP561-12A – 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
Restriction(s):	ENMP522
Assessment:	Internal assessment/examination ratio: 1 : 4

ENMP562 – Bioprocessing 2

15 Points

This paper will not be offered in 2012.

ENMP563-12A (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 Giridhar Nair
Restriction(s):	ENMP527
Assessment:	Internal assessment/examination ratio: 1 : 0

ENMP564-12B (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):	Professor Janis Swan
Prerequisite(s):	Level 300 process engineering or biological science
Restriction(s):	ENMP527
Assessment:	Internal assessment/examination ratio: 1 : 0

ENMP568-12B (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***ENMP569-12A (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***ENMP585-12A (HAM) – Industrial Technology and Innovation 1***15 Points*

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

*Prerequisite(s): ENMP381 or equivalent**Restriction(s): ENMP581**Convenor(s): Associate Professor Alan Langdon**Assessment: Internal assessment/examination ratio: 1 : 0***ENMP586-12B (HAM) – Industrial Technology and Innovation 2***15 Points*

An interdisciplinary course designed for MSc 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.

*Prerequisite(s): ENMP381 or equivalent**Restriction(s): ENMP581**Convenor(s): TBA**Assessment: Internal assessment/examination ratio: 1 : 0***ENMP590-12C/D (HAM) – Directed Study***30 Points*

This paper allows in depth study and research of a specific technological or engineering topic.

*Convenor(s): Professor Janis Swan**Assessment: Internal assessment/examination ratio: 1 : 0*

PAPERS

Physics Papers

PHYS506-12A (HAM) – 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*

PHYS509-12B (HAM) – Medical Physics

30 Points

This paper reviews the application of physics in many areas of medicine. It does not require a background in anatomy or biology. Areas studied include cardiology, respiratory medicine, radiotherapy, medical imaging, etc.

Prerequisite(s): *MATH253, MATH255, PHYS201, PHYS202, and PHYS204*

Convenor(s): *Dr Howell Round*

Restriction(s): *PHYS301*

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

PHYS511 – Particles and Fields

This paper will not be offered in 2012.

PHYS516-12A (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 and stochastic resonance, random numbers and noise simulation, root finding, curve fitting, and Fourier analysis. The programming language used is MATLAB.

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

This paper will not be offered in 2012.

PHYS552-12B (HAM) – 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 if there is sufficient student interest.*

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

PHYS560-12A/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*

PHYS561-12A/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*

PHYS590-12A/B/Y (HAM) – Directed Study*30 Points*

Convenor(s): *Professor Janis Swan*
 Assessment: *Internal assessment/examination ratio: 1 : 0*

Papers for the ME Degree

Up to 30 points of the ME can be taught papers. Please refer to the following subjects:

- » Computer Science page 64
- » Electronics page 55
- » Engineering page 57
- » Materials & Processing page 58
- » Mathematics page 64
- » Physics page 62

Candidates may be permitted to replace a maximum of 30 points with papers at 500 Level from other subjects.

PAPERS

Computer Science

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

Papers are worth 15 points unless specified.

- » COMP501-12B – Topics in Operating Systems
- » COMP513-12A – Computer Networks
- » COMP514-12B – Advanced Communications
- » COMP521-12A – Machine Learning Algorithms
- » COMP535 – Image Analysis and Classification[†]
- » COMP536-12B – Advanced Graphics and Computer Games
- » COMP537-12B – User Interfaces for Information Retrieval
- » COMP538 – Topics in Human-Computer Interaction[†]
- » COMP539-12B – Usability Engineering
- » COMP542-12A – Web Search: Technical and Social Issues
- » COMP543-12B – Knowledge and Information Management
- » COMP552-12A – Model Checking
- » COMP553-12A – Extremely Parallel Programming
- » COMP554-12B – Specification Languages and Models
- » COMP555-12A – Bioinformatics
- » COMP560-12A/C – Turing Topics in Computer Science
- » COMP561-12A/C – Von Neumann Topics in Computer Science (30 points)
- » COMP562-12A/C – Grace Hopper Topics in Computer Science

[†]*Not offered in 2012.*

Mathematics

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

- » MATH501-12B – Metric Spaces
- » MATH505 – Topics in Analysis and Topology[†]
- » MATH509 – Number Theory[†]
- » MATH511-12A – Advanced Algebra
- » MATH512 – Continuous Groups[†]
- » MATH513-12A – Finite Groups
- » MATH515-12B – Topics in Number Theory
- » MATH516-12B – Topics in Discrete Mathematics
- » MATH541-12A – Partial Differential Equations 1
- » MATH542-12B – Partial Differential Equations 2
- » MATH581-12A/B – Special Topic in Mathematics 1
- » MATH582-12A/B – Special Topic in Mathematics 2

[†]*Not offered in 2012.*

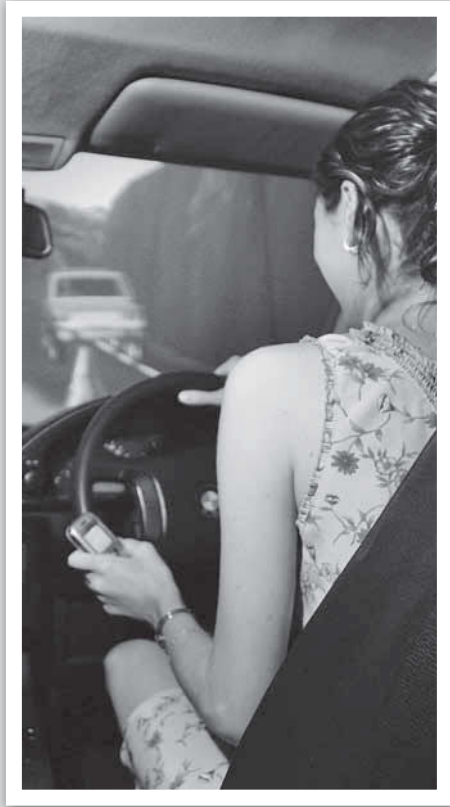
Theses for ME

POINTS	CODE	TITLE
90	ENGG593-12C (HAM)	Engineering Thesis
120	ENGG594-12C (HAM)	Engineering Thesis

Dissertations and Theses for MSc and MSc(Tech)

POINTS	CODE	TITLE
30	ENEL591-12C (HAM)	Dissertation
60	ENEL592-12C (HAM)	Dissertation
90	ENEL593-12C (HAM)	Electronics Thesis (3 papers)
120	ENEL594-12C (HAM)	Electronics Thesis (4 papers)
150	ENEL595-12C (HAM)	Electronics Thesis (5 papers)
30	ENMP591-12C (HAM)	Dissertation
60	ENMP592-12C (HAM)	Dissertation
90	ENMP593-12C (HAM)	Materials and Processing Thesis
120	ENMP594-12C (HAM)	Materials and Processing Thesis
150	ENMP595-12C (HAM)	Materials and Processing Thesis
30	PHYS591-12C (HAM)	Dissertation (1 paper)
60	PHYS592-12C (HAM)	Dissertation (2 papers)
90	PHYS593-12C (HAM)	Physics Thesis (3 papers)
120	PHYS594-12C (HAM)	Physics Thesis (4 papers)

PSYCHOLOGY



CONTACT DETAILS

<http://psychology.waikato.ac.nz>

School of Psychology
University of Waikato
Private Bag 3105
Hamilton 3240
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School Manager

Sue Carnaby
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Phone: +64 7 838 4032
Fax: +64 7 858 5132
Email: carnabys@waikato.ac.nz

School Graduate Adviser

Associate Professor Samuel Charlton
Room: K1.09
Phone: +64 7 838 4466 extn 6534
Email: samiam@waikato.ac.nz

INTRODUCTION

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

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

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

ACADEMIC STAFF

Dr Neville R Robertson – Chairperson

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 Carol C Barber

BA *Swarthmore*, PhD *Vanderbilt*

Email: ccarber@waikato.ac.nz

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

Dr Lewis Bizo

BSc, PGDipSci, PhD *Otago*

Email: lbizo@waikato.ac.nz

Research interests: Experimental and applied analysis of behaviour (animal and human); stimulus generalisation and discrimination; internal clock models and time perception; self-control and addiction.

Associate Professor Douglas P Boer

BSc, MSc, PhD *Alberta*

Email: drdoug@waikato.ac.nz

Research interests: Clinical psychology, particularly experimental psychopathology; group and individual treatment of offenders, and the design of culturally-appropriate risk assessment methods for Aboriginal offenders; violent offenders; and intellectually disabled clients.

Dr Donald A J Cable

BBS, DipSocSci, MA *Massey*, PGCertPracPsyc, PhD *Waikato*

Email: dcable@waikato.ac.nz

Research interests: Occupational psychology generally including the psychological work contract; the processes underlying career decision making; personnel selection; the effect on survivors of organisational restructuring; and the psychological symptoms of sick building syndrome.

Associate Professor Samuel G Charlton

BA *San Jose*, MA, PhD *New Mexico*

Email: samiam@waikato.ac.nz

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

Dr Cate Curtis

BA *Canterbury*, BSocSc(Hons), PhD *Waikato*

Email: ccurtis@waikato.ac.nz

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

Professor T Mary Foster

MSc, DipClinPsych, PhD *Auckland*

Email: psyc0182@waikato.ac.nz

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

Professor Darrin J Hodgetts

BA, GradDipSocSc, PhD *Massey*

Email: dhdgetts@waikato.ac.nz

Research interests: Application of societal psychology, media and communications, and public health to understanding and addressing social and health concerns. Key topic areas include health inequalities, homelessness, poverty, social inclusion, culture and place.

Dr Robert B Isler

Dipl Natw. ETH, PhD ETH *Zürich*

Email: psyc2255@waikato.ac.nz

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

Dr James McEwan

PhD *Waikato*

Email: jmcewan@waikato.ac.nz

Research interests: The acquisition of new behaviours in humans and animals.

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).

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 – Convenor of Organisational Psychology programme

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.

ACADEMIC STAFF

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).

Mohi Rua – Research Officer, Māori and Psychology Research Unit

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 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*

Email: ottilie@waikato.ac.nz

Research interests: Using applied social psychological and human geographical perspectives to study and support community-orientated responses to contemporary social and environmental issues. Key topic areas include community development, un(der)employment, poverty, disadvantage, homelessness, the policy-community interface and the not-for-profit sector.

Dr Jo Thakker

BA(Hons), PhD, PGDipClinPsych *Canterbury*

Email: jthakker@waikato.ac.nz

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

Dr Tess Moeke-Maxwell

BSocSc(Hons), PhD *Waikato*

Email: tessmm@waikato.ac.nz

Research interests: Māori palliative care and end of life journeys; and Māori identity and diversity. Lead investigator on *Kia Ngawari: Investigating Palliative Care of Māori and their Whānau* research study (2009-2012). This study investigates Māori experiences of dying, death and bereavement in Waikato and South Auckland.

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/officershonourstaff/people/fass/psychology.html>

PAPERS

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

PSYC511-12A (HAM) – Evaluation Research Design
15 Points

PSYC512-12B (BLK) – Evaluation Research Analysis
15 Points

PSYC517-12B (HAM) – The Social Psychology of Anti-Social Behaviour*
15 Points
This paper will be offered in 2012, but will not be offered in 2013 (alternates with PSYC518).

PSYC518 – Family Violence: Research and Interventions
15 Points
This paper will not be offered in 2012.

PSYC538-12B (HAM) – Applications of Behaviour Analysis
15 Points

PSYC539-12A (HAM) – Graduate Research Methods in Psychology
15 Points

PSYC556-12A (HAM) – Advanced Topics in Abnormal Adult Psychology
15 Points

PSYC557-12A (HAM) – Human Performance Research: Theories and Practice
15 Points

PSYC559-12A (HAM) – Animal Behaviour and Welfare Research
15 Points

PSYC560-12A (HAM) – Applied Behaviour Analysis: Theory and Issues
15 Points

PSYC561-12A (HAM) – Behaviour Analysis Research and Theory
15 Points

PSYC562-12B (HAM) – Theories of Clinical Psychology
15 Points

PSYC564-12B (HAM) – Child Psychopathology
15 Points

PSYC568-12A (HAM) – Human Factors Psychology
15 Points

PSYC572-12A (HAM) – Personnel Selection
15 Points

PSYC573-12A (HAM) – Personnel Training and Development
15 Points

PAPERS

PSYC574 – Principles and Theories of Cognitive/Behaviour Therapy

15 Points

This paper will not be offered in 2012.

PSYC575-12A (HAM) – Psychological Applications and the Treaty of Waitangi*

15 Points

PSYC577-12B (HAM) – Recent Research in Behaviour Analysis

15 Points

PSYC578-12B (HAM) – Vision and the Brain

15 Points

PSYC579-12B (HAM) – Advances in Organisational Psychology

15 Points

PSYC580-12B (HAM) – The Psychology of Criminal Conduct

15 Points

PSYC581-12A (HAM) – Psychological Assessment*

15 Points

PSYC582-12B (BLK) – Community Health Psychology*

15 Points

PSYC583-12A (BLK) – Foundations of Community Psychology*

15 Points

PSYC585-12B (HAM) – Organisation Change and Development

15 Points

PSYC587-12C (HAM) – Behaviour Analysis Practicum

15 Points

PSYC588-12A/B/S (HAM) – Directed Study

15 Points

PSYC589-12A/B/S (HAM) – Directed Study

15 Points

PSYC590-12A/B/S/Y (HAM) – Directed Study

30 Points

PSYC591-12Y (HAM) – Honours Dissertation

30 Points

PAPERS

Dissertations and Thesis for MSc

POINTS	CODE	TITLE
60	PSYC592-12C (HAM)	Dissertation
90	PSYC593-12C (HAM)	Psychology Thesis
120	PSYC594-12C (HAM)	Psychology Thesis

RADIOCARBON DATING



CONTACT DETAILS

www.radiocarbon dating.com

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

Director

Dr Alan Hogg
Phone: +64 7 838 4707
Fax: +64 7 838 4192
Email: alan.hogg@waikato.ac.nz

INTRODUCTION

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

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

Prospective PhD students with a background in archaeology/biology/chemistry or Earth sciences should contact staff to discuss research opportunities in radiocarbon dating.

ACADEMIC STAFF

Dr 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 1000 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.

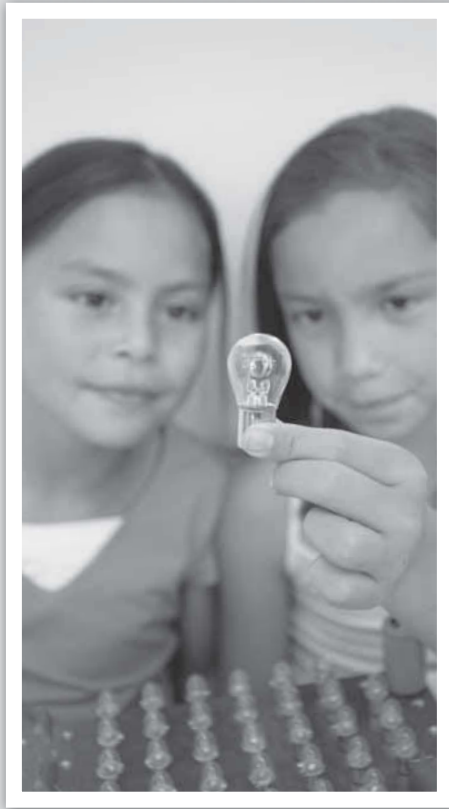
Dr Fiona Petchey – Deputy Director

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.

SCIENCE & TECHNOLOGY EDUCATION



CONTACT DETAILS

<http://cster.waikato.ac.nz/>

Centre for Science & Technology
Education Research
University of Waikato
Private Bag 3105
Hamilton 3240
New Zealand

Departmental Administrator

Raewyn Oulton
Room: KPG.29
Phone: +64 7 838 4035
Fax: +64 7 838 4272
Email: r.oulton@waikato.ac.nz

INTRODUCTION

The Centre for Science & Technology Education Research (CSTER) is an interdisciplinary centre jointly administered by the Faculty of Science & Engineering and the Faculty of Education. It is known throughout New Zealand and internationally for its research and scholarship, and for the use of its research in the development of policy, practice, curriculum, resources, assessment and professional development.

The Centre offers opportunities for professional growth for people working in science, technology, environmental and computing education. Our students include practicing teachers, teacher educators and curriculum developers in New Zealand and from a range of countries in the Pacific Islands and Asia. Most are graduates seeking mid-career professional development through advanced study for higher qualifications. Staff and students work together as colleagues in a co-operative and friendly way.

The academic programmes we offer are flexible. Full-time and part-time options are available. They allow students to specialise in their particular area of interest, to undertake interdisciplinary study, and to learn to conduct research. Excellent facilities are available in the Centre and at the University. Most courses are available online, such that you could complete a qualification at your own location.

CSTER ACADEMIC STAFF

Associate Professor P. John Williams – Director

MA, PhD *Andrews University, USA*, Dip Sec Teaching *Waikato*

Email: pj.williams@waikato.ac.nz

Research interests: Mentoring beginning teachers and electronic assessment of performance.

Dr Chris Eames

BSc, MSc, PhD *Waikato*

Email: c.eames@waikato.ac.nz

Research interests: Environmental education; biotechnology education; learning in science and technology through cooperative education work placements; tertiary science/biology education; and science and technology human capital development.

Dr Mike Forret

BSc *Aberdeen*, DPhil *Waikato*, DipT

Email: m.forret@waikato.ac.nz

Research interests: Involved in pre-service training of both primary and secondary teachers, teaching curriculum classes in science, technology and physics. Development of effective learning environments for technology and science education through a clearer understanding of the ways learners engage with learning situations.

Dr Kathrin Otrell-Cass

Mag.rer.nat. *Salzburg*, PhD *Waikato*

Email: kathrino@waikato.ac.nz

Research interests: Geo-science education and environmental education, and learning environments that support conceptual changes (ICT, LEOTC).

ASSOCIATE STAFF

Professor Richard K Coll

BSc *Canterbury*, MSc, PhD *Canterbury*

Email: rcoll@waikato.ac.nz

Research interests: Learners' mental models for scientific conceptions along with aspects of cooperative education including assessment and improving learning for students on work placements.

Beverly Cooper

BSc, MSc *Waikato*, DipT *Waikato*

Email: bcooper@waikato.ac.nz

Research interests: Science education, chemistry education, teacher education and assessment for learning.

Dr Bronwen Cowie

MSc, PhD *Waikato*

Email: bcowie@waikato.ac.nz

Research interests: Classroom interactions, assessment (particularly formative assessment), teacher professional development, and student views of assessment, teaching and learning.

Dr Garry Falloon

AdDipT *Christchurch College of Ed*, MEd *Massey*, EdD *Curtin*

Email: falloong@waikato.ac.nz

Research interests: Technology-supported school-scientist partnerships, the use of synchronous virtual classrooms in supporting postgraduate students, online learning environment design, and the design and use of digital learning objects in schools.

Dr Anne Hume

BSc *Auckland*, DipT, MEd *Waikato*

Email: annehume@waikato.ac.nz

Research interests: Science and chemistry education, teacher reflection and development of teacher pedagogical content knowledge.

Professor Alister Jones – Deputy Vice- Chancellor, University of Waikato

MSc(Hons), DPhil *Waikato*, DipT

Email: a.jones@waikato.ac.nz

Research interests: Aspects of science and technology education, including teacher development in science and technology education, teaching and learning of physics and curriculum development. Assessment in technology education.

ASSOCIATE STAFF

Dr Elaine Khoo

BEd (Hons), MA *Vanderbilt*, PhD *Waikato*

Email: ekhoo@waikato.ac.nz

Research interests: Pedagogical strategies in technology-based and technology-supported learning environments.

John Lockley

BSc, MSc *Waikato*, DipT *Hamilton Teachers College*

Email: johnl@waikato.ac.nz

Research interests: Design education; knowledge in technology and education for sustainability; and curriculum and pedagogy development.

Dr Kathy Saunders

BSc, DipT *Auckland*, MSc *Curtin*, Sci EdD *Curtin*

Email: kathy@waikato.ac.nz

Research interests: Teaching and learning about controversial science issues, bioethics, and nature of science understandings.

Dr Karsten Zegwaard

BSc, MSc(Tech)(Hons) PhD *Waikato*

Email: karsten@waikato.ac.nz

Research interests: Work-integrated learning, graduate competencies, student development of professional self-identity, workplace value systems and ethics, preparation for the professional workplace, and student learning of the nature of science.

CSTER PAPERS

DSOE557-12A (HAM), 12B (NET) & 12C(HAM) Educational Research Methods

30 Points

This paper introduces students to the major educational research paradigms, methodologies appropriate to collecting data in schools (including interviews, observations, surveys, case studies), action research, literature reviews, critiquing research, and report writing. It includes consideration of ethical issues in research.

Assessment: Internal assessment

Required text(s): C. Mutch. *Doing Educational Research: A Practitioner's Guide to Getting Started* (NZCER Press), L. Cohen, L. Manion and K. Morrison *Research Methods in Education* 6th edition (Routledge/Falmer)

Co-ordinator(s): Associate Professor Lise Claiborne

Time(s): 12A (HAM), 12B online, 12C (HAM) – Various times of the year

Note (s): DSOE557-12C (HAM) is taught partially online. Enrolment in DSOE557-12C (HAM) should be completed two weeks prior to the paper commencing.

STER508-12A (NET) – Science Education

30 Points

This paper aims to provide an overview of current research and development in learning, teaching and assessment in science education in New Zealand and internationally. The synthesis of research findings with classroom practice is a goal of the paper and so it is expected that students will participate in debate and discussion. The modules within the course examine current purposes and aims for science education, views of the nature of science, views of learning in science education, the nature of effective pedagogies for science education and current issues in science education.

Topics include:

- » **Purposes of Science Education**
The paper will begin by considering past and present purposes for science education in New Zealand and internationally.
- » **The Nature of Science and Science Education**
This module focuses on debates about the nature of science itself through an introduction to the work of past and current philosophers of science, such as, Bacon, Popper, Kuhn and Feyerabend with a view to considering how their perspectives are reflected in science education. The use of material from the history of science for teaching will be discussed.
- » **Views of Learning Informing Science Education**
This module builds from the notion that students come to class with their own ideas about the natural world to explore current theories about how they might go about learning science.
- » **Effective Pedagogies in Science Education**
This module examines the ways in which students may be helped to more effectively learn science, to learn about the nature of science and to develop scientific skills and attitudes. It also examines the merits of a variety of ways in which that learning can be assessed.
- » **Current Issues in Science Education**
This module focuses on current issues in science education. Examples include the use of ICT, informal science education, culture and gender in science and science education.

Assessment: The course is fully internally assessed by means of three assignments

Required text(s): Students will be provided with references and extensive course material

Co-ordinator(s): Dr Kathrin Otrell-Cass (Room: KPG.25; Phone: +64 7838 4512)

Time(s): Online in Semester A

STER511-12A (NET) – Technology Education*30 Points*

This paper aims to provide an understanding of the current issues in technology education research and development. The course consists of three modules:

Module 1: The nature of technology and technology education. The history and philosophy of technology will be considered in relation to technology education. Different views of technology and technology education will be examined, including teacher and student perceptions. The aims and goals of technology education will also be considered.

Module 2: Learning and curriculum in technology education. Learning theories and their implications for learning in technology education will be considered. The interaction of knowledge, processes and skills will be explored related to research on technological awareness and knowledge, and problem solving in technology education. The social construction of knowledge and its relationship with learning in technology will be emphasised. Current curriculum discussions about technology education in New Zealand and internationally will be related to a historical perspective of curriculum development, as well as recent technology curriculum innovations.

Module 3: Issues in technology education. The implications of technology education will be considered in terms of implementation, management at department and school level educational settings, inclusiveness, and teacher development. Included in this will be issues related to subcultures and innovation. Issues related to assessment in technology education are considered.

Assessment: The course is fully internally assessed by means of three assignments
Required text(s): Students will be provided with references and extensive course material
Co-ordinator(s): Associate Professor John Williams (Room: KPG.26; Phone: +64 7 838 4357)
Time: Online in Semester A

STER512-12B (NET) – Innovations in Science, Technology or Environmental Education*30 Points*

This paper aims to help teachers of science, technology or environmental education to develop their knowledge of science, technology or the environment and to consider how this knowledge might be integrated into educational activities. Students will develop an understanding of the wider issues of curriculum and assessment innovation.

The paper is taught online by a combination of set readings, online discussions and assignment completions.

This paper consists of three parts:

- » Whole class exploration of current ideas about educational innovation, particularly in regard to curriculum and assessment. This will involve reading set texts and participating in online discussion with the tutors and classmates.
- » Individual independent research on a topic of your choice in a knowledge area in science, technology or environment/sustainability. You will be assigned a tutor to work one on one with through this part.
- » Individual work to design an educational innovation using your new found knowledge in your topic area. This part will again be mentored by your individual tutor.

Assessment: The course is fully internally assessed by means of assignments
Required text(s): Students will be provided with references and extensive course material
Co-ordinator(s): Associate Professor John Williams (Room: KPG.26; Phone: +64 7 838 4357)
Time: Online in Semester B

CSTER PAPERS

STER513-12C (HAM) – Environmental and Sustainability Education

30 Points

This paper aims to provide an opportunity for in-service and pre-service teachers, and community educators to enhance their knowledge and skills in environmental/sustainability education. During this paper students will have an opportunity to:

- » Develop an understanding of the links of environmental education/education for sustainability with other bodies of knowledge (eg indigenous knowledges, gender ideas, philosophy/values etc);
- » Develop a critical understanding of the Guidelines for Environmental Education in NZ Schools;
- » Develop knowledge of national and international research, policy and practice in environmental education/education for sustainability;
- » Develop an awareness of the principles and theoretical ideas which underpin environmental education/education for sustainability practice in schools and/or the community; and
- » Develop an understanding of the teaching and learning approaches that are appropriate to environmental education/education for sustainability practice.

Assessment: The course is fully internally assessed by means of assignments.

Required text(s): Students will be provided with references and extensive course material at the beginning of the paper.

Co-ordinator(s): Dr Chris Eames (Room: KPG.26; Phone: +64 7 838 4357)

Time: 9-13 January 2012, 9am – 3pm followed by online supported learning at your place until early June 2012.

STER541 – Research Methods in Science, Mathematics and Technology Education

30 Points

This paper will not be offered in 2012.

STER543 – Development Project

30 Points

This paper will not be offered in 2012.

STER590-12C/D (HAM) – Directed Study*30 Points*

This paper aims to provide students with an opportunity to work one-to-one with a supervisor to undertake a research study in an area of interest to them, within the areas of science, technology, environmental or ICT education or a closely related area. This study will normally take the form of a small-scale research project involving data collection, but could take the form of an extensive review of the research literature on a particular topic, or the trial and evaluation of an aspect of education.

During the paper, students will have opportunities for some or all of the following:

- » Develop an understanding of an area of educational research
- » Frame a research question to be investigated
- » Develop skills in reviewing and critiquing educational research literature
- » Develop skills in the use of one data generation method
- » Analyse data
- » Construct an argument based on data that has been collected and analysed
- » Discuss research findings or the problem of interest in relation to relevant literature.

This paper can be taken completely online, completely face-to-face or through a mix of these modes.

Students at a distance to the University will typically work with a supervisor through email and telephone calls, with possible but not essential occasional face-to-face sessions.

Assessment:

The directed study report will normally comprise a document in report format. The exact nature of the product of the directed study should be negotiated and agreed with the CSTER supervisor of the study. Typically, the study will be a small-scale research project or an in-depth literature review. The word limit for the report is between 8- 10,000 words.

Co-ordinator(s):

First contact should be with Associate Professor John Williams (Room: KP.G.26; Phone: +64 7838 4357)

Time:

All Centre staff are available for the supervision of projects. Times may be negotiated.

CSTER PAPERS

STER593-12C and STER594-12C – Masterate Theses

The Centre offers theses equivalent to three (eg STER593) or four (STER594) papers at the masterate level, in accordance with the calendar regulations. In exceptional circumstances, smaller dissertations equivalent to one paper (STER591) or two papers (STER592) may be offered.

Thesis work involves study over one year (full-time) or two years (part-time) on a research topic of interest. The topic is negotiated with, and supervised by, at least one member of the Centre staff.

Co-ordinator(s): First contact should be with Associate Professor John Williams
(Room: KP.G.26; Phone: +64 7838 4357)
All Centre staff are available for the supervision of projects.

STER600-12C – MPhil Thesis

The Centre offers an MPhil thesis option over one year (full-time) or two years (part-time) for study on a research topic. This option is suitable to those students who already hold an Honours degree (masters or bachelors degree with honours) who wish to undertake a short research study, rather than a PhD. Students may be encouraged to enrol in the MPhil option and subject to satisfactory performance upgrade to a PhD. Approval to undertake this programme is required from Centre staff. The research topic is negotiated with, and supervised by, at least one member of the Centre staff.

Co-ordinator(s): Initial contact should be with Associate Professor John Williams
(Room: KP.G.26; Phone: +64 7838 4357)
All Centre staff are available for the supervision of projects.

STER792 – Diploma in Scientific Investigation

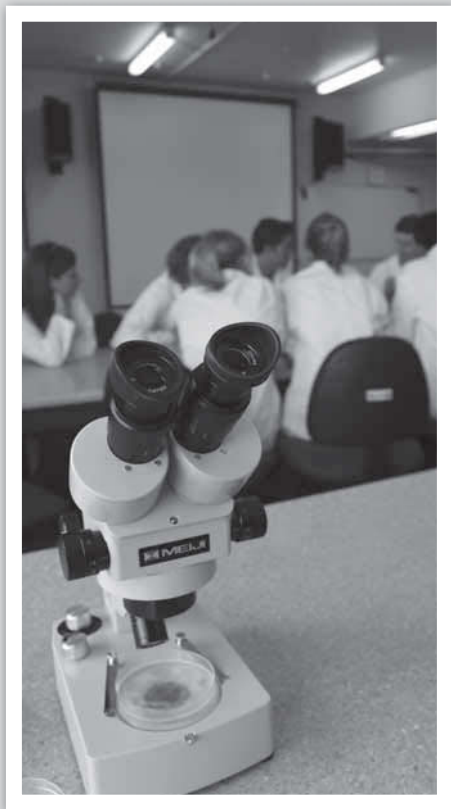
This paper will not be offered in 2012.

STER900-12C – PhD Thesis

The Centre offers a PhD thesis option over three years (full-time) or five-six years (part-time) for study on a research topic. This option is open to those students who already hold an Honours degree (masters or bachelors degree with honours) who wish to undertake an original research study. Approval to undertake this programme is required from Centre staff and the University Postgraduate Studies Committee. The research topic is negotiated with, and supervised by, at least two members of the Centre staff.

*Co-ordinator(s): First contact should be with Associate Professor John Williams
(Room: KP.G.26; Phone: +64 7838 4357)
All Centre staff are available for the supervision of projects.*

GENERAL INFORMATION



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SCHOLARSHIPS AND FINANCIAL ASSISTANCE

Departmental and External Funding

Each department 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 chairperson of the department or the director of the centre about scholarships or external funding opportunities.

Scholarships

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

Phone: +64 7 838 4964 or +64 7 858 5195

Fax: +64 7 838 4600

Email: scholarships@waikato.ac.nz

www.waikato.ac.nz/scholarships

Science & Engineering Masters Fees Awards

A total of 15 awards valued at \$2000 each are available for new MSc, MSc(Tech) or ME students enrolled in the Faculty of Science & Engineering. The award is intended for full-time students but maybe awarded to part-time applicants on a pro-rata basis.

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.

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.

There are also many external scholarships available to Science & Engineering graduate students. Please visit www.waikato.ac.nz/scholarships

FACILITIES FOR GRADUATES

Computer Facilities

The Faculty of Science & Engineering has two computer labs for student use. Both labs are only available to students taking courses in the Faculty of Science & Engineering. F1.14 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 F1.14 is:

- » Booked classes
- » Graduates
- » Undergraduates

R1.22 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 R1.22 is the same as that for F1.14. For both labs, students should see their departmental administrator to obtain swipe card authorisation forms.

Each department/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.

Information Technology Services (ITS) is an independent service division that provides computing services for the University. Students may approach the ITS Service Desk for any computing related support. The ITS Service Desk may be contacted at extension 4008.

In addition, each department, centre and unit within the Faculty has its own computer support consultant. For queries and advice regarding computing facilities within the Faculty, please email: science_csg@waikato.ac.nz

Note(s): *All students using University computer facilities must abide by the computer systems regulations. 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:

Earth & Ocean Sciences Subject Librarian

Jenny McGhee

Phone: +64 7 838 4466 extn 6511

Email: jmmcgee@waikato.ac.nz

Science Librarian

Cheryl Ward

Phone: +64 7 838 4466 extn 6513

Email: cward@waikato.ac.nz

Cheryl is also available for tours and tutorials.

Your Space

Each department has their own method for allocation of office and laboratory space. In most cases, graduate students are allocated a carrel and lab space as well as computer accounts and access to supplies.

Social Interaction

Regular social functions are held in each department. 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 in room F1.06A or phone: +64 7 838 4290. Alternatively you could contact the disabilities co-ordinator for the University, phone: +64 7 838 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.

FACILITIES FOR GRADUATES

Academic Support

Your main source of support in this area will be your supervisor and your department 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

The University of Waikato has agreed to observe and be bound by the Code of Practice for the Pastoral Care of International Students published by the Ministry of Education. Copies of the Code are available on request from this institution or from the New Zealand Ministry of Education website at www.minedu.govt.nz

International graduate and postgraduate students should make contact with both the chairperson of their department, and with the associate dean for international students in the Faculty, who can help with any problems or issues outside of the department.

Associate Dean (International)
Professor Richard Coll

Room: KPG.19
Phone: +64 7 856 4100
Email: rcoll@waikato.ac.nz

There is also an international student support person in each department, and students may obtain their names from department 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
- » A Paper-based TOEFL score of 577 plus a TWE (Test of Written English) of 5 or better, 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.

Please note that students applying for an MSc in Biological Sciences require a higher score. The English language proficiency requirements for admission to particular qualifications are at the discretion of the dean concerned.

COMPLAINTS PROCEDURE

In 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 chairperson of the relevant department. 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 AND SECURITY REGULATIONS

All laboratories have a designated laboratory safety supervisor. Each laboratory safety supervisor is responsible for the safe operation of their laboratory and has full authority over all operational and health and safety matters relating to the laboratory. Their 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.

Make sure you know what hazards exist in any laboratory you are using, what safety compliance is required and what personal protective equipment is needed.

There is a laboratory safety folder in each laboratory which contain 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. Make sure you are familiar with all the information in the laboratory safety folder in any laboratory that you work in.

Make sure you know where the fire exits, fire extinguishers, and first aid boxes are located in any laboratory or workshop you occupy.

1. It is forbidden to eat or drink in laboratories.
2. Smoking is forbidden in all areas of the science blocks.
3. Bare feet are forbidden in the science blocks. 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 forbidden 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 departmental 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. You are responsible for any friend or relation who visits you in the laboratory.
7. All visitors must report to the Faculty Office F1.07, or relevant department for a visitors pass.
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 department. A filled-out Requisition Form is required, stating full name, department, 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. All laboratory drains empty via neutraliser pits. Milk and other biological material should not be flushed down these drains; use the toilet and tearoom drains which are connected directly to the main sewage system. For advice on the disposal of chemicals, consult your 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 department 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 and leave the building.

SAFETY AND SECURITY REGULATIONS

Occupational Safety and Health Issues

If you have any safety and health concerns, contact your laboratory safety 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 Operations Manager
Stephen Bergin

Email: s.bergin@waikato.ac.nz
Room: F1.01
Phone: +64 7 838 4292

OTHER CONTACTS FOR EMERGENCY USE ARE:

Faculty Chemical Safety Officer

Wendy Jackson

Phone: +64 7 838 4532

Evacuation Officer

Ivan Bell

Phone: +64 7 838 4117

Radiation Subcommittee Chairperson

Associate Professor Alan Langdon

Phone: +64 7 838 4102

Chemical Emergencies

Phone: +64 7 838 4466 extn 8888

University Security

Phone: +64 7 838 4444

Laser Safety Officer

Rainer Künemeyer

Phone: +64 7 838 4630

Sources of Health and Safety information in the Faculty are from a regular Faculty Safety Bulletin and the Health and Safety notice board in the Science Tearoom.

Many staff in the Faculty hold current first aid certificates; these are listed in the internal phone book, website: <http://phonebook.waikato.ac.nz>





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Te Whare Wānanga o Waikato

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