Why study at the University of Waikato

Our changing world creates new opportunities and faces new challenges every day. At Waikato, we’re leading the way with an innovative approach to education that is supported by world-renowned experts and is producing successful graduates across all subject areas.

Check out some of the top reasons that Waikato is a great place to study Science:

**CUTTING-EDGE RESEARCH FACILITIES**

In 2018 $37,500 worth of Science Scholarships were given out.

**UNIQUE COASTAL MARINE FIELD STATION**, a major centre of marine research excellence.

**FIELD TRIPS** which take you right to the source of your study.

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

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

**WORLD-CLASS RESEARCH EXCELLENCE**

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

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

UNDERGRADUATE STUDY

Overview of Qualifications 14
Certificates and Diplomas 15
General Entry Requirements (Bachelors Degrees) 16
General Information for International Students 18
Example Degree Planners 19

MAJORS

Aquaculture (TGA) 24
Chemistry 26
Earth Sciences 28
Ecology and Biodiversity 30
Environmental Sciences (HAM) 32
Environmental Sciences (TGA) 34
Materials Science 36
Molecular and Cellular Biology 38
Psychology 40

MINORS

Major / Minor Combinations 42
Animal Behaviour 43
Aquaculture (TGA) 43
Biochemistry 43
Chemistry 44
Coastal Processes 44
Ecology and Biodiversity 44
Environmental Sciences 45
Geology 45
Hydrology 46
Materials Science 46
Molecular and Cellular Biology 47
Soil Science 47

UNDERGRADUATE PAPERS

100 Level Papers 49
200 Level Papers 57
300 Level Papers 66
The information contained in this handbook is correct at the time of printing. However, it is subject to a continuous process of review and improvement. A new handbook is produced every year and students should use the latest handbook available. The handbook can also be downloaded from sci.waikato.ac.nz/student-resources. The University’s document of authority for information contained in this handbook is the 2019 University of Waikato Calendar.
Science contributes to almost every aspect of our lives. Scientists research changes in molecules, the microcosm, the environment and the universe. These findings help us discover how climate change is affecting the environment, how to increase the efficiency of our use of physical resources, how to turn waste into useful products, how to improve the health of both humans and the environment and so on. The great challenges society is facing demand research and technology that go across disciplinary boundaries. The School of Science offers flexible, innovative programmes that produce multi-skilled, adaptable graduates who are ready for today’s challenges and have the skills to tackle tomorrow’s obstacles.

The career prospects of our graduates are limited only by their interests and imagination. They are employed throughout New Zealand and overseas in a wide range of well-paid, interesting, stimulating and challenging occupations. Our academics have national and international reputations in their subject areas. Their teaching and their research demonstrate a good balance between science and technological applications that help improve society and the environment, which is demonstrated by the research outputs. Staff and students at Waikato have access to some of the world’s most advanced lab equipment, making them well placed to address many of the challenges described in New Zealand’s National Science Challenges and the UN’s Millennium Development Goals.

By enrolling in science at the University of Waikato, you will be exposed to relevant, real-world research and will have the skills and knowledge to make a meaningful contribution to society.

Professor Janis Swan
ACTING DEAN OF SCIENCE

WELCOME TO SCIENCE

Do you want to make a difference to the physical world?

New Zealand and the world need people with curious minds who can ask the hard questions about our surroundings, identify possible solutions, examine and research what is unknown, and work towards creating a brighter future.
SCHOOL CONTACTS

The FG Link Reception is the first stop for advice on degree planning and enrolment queries.

**ACTING DEAN**
Professor Janis Swan  
Room: FG.1.03  
Email: janis.swan@waikato.ac.nz

**SCHOOL ADMINISTRATOR**
Julia Middleton  
Room: F.G.06B  
Email: julia.middleton@waikato.ac.nz

**ASSOCIATE DEAN (TEACHING & LEARNING)**
Dr Alison Campbell  
Room: F.G.06D  
Email: alison.campbell@waikato.ac.nz

**ASSOCIATE DEAN (RESEARCH)**
Professor Craig Cary  
Room: TRU.G.23  
Email: craig.cary@waikato.ac.nz

**COOPERATIVE EDUCATION UNIT DIRECTOR**
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Room: E.G.16A  
Email: karsten.zegwaard@waikato.ac.nz

**RECEPTIONIST**
Michelle Earney  
Room: FG.G.04 Reception  
Email: michelle.earney@waikato.ac.nz

**FACULTY REGISTRAR**
Hannah Te Puia  
Room: FG.G.06  
Email: hannah.tepuia@waikato.ac.nz

**STUDENT SUPPORT COORDINATOR**
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Email: rewa.gilbert@waikato.ac.nz

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**ASSOCIATE DEAN (EXTERNAL ENGAGEMENT)**
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**RECEPTIONIST**
Rosie Campbell  
Room: FG.G.04 Reception  
Email: rosie.campbell@waikato.ac.nz
UNIVERSITY TERMINOLOGY

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

BACHELORS DEGREE
This is a first degree. It is sometimes also called an undergraduate degree. It takes a minimum of three years of full-time study to complete.

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

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

CONJOINT DEGREE
This is a special programme in which you study for two bachelors degrees at the same time, eg BSc/LLB (Science and Law). Some universities call this a double degree.

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

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

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

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

GRADUATE
A person who has been awarded a university degree.

GRADUATE QUALIFICATIONS
Students who have successfully completed an undergraduate qualification may be eligible to take a graduate qualification. Graduate qualifications include the Master of Science, Master of Environmental Sciences, Master of Science (Research), Master of Science (Technology), Graduate Diplomas and Postgraduate Diplomas.
LECTURES, LABS AND TUTORIALS

Lectures start in the first week of term and are detailed in the University’s Catalogue of Paper Offerings and Timetable. Lab sessions normally start in the first or second week of teaching. You can select your tutorial times during the first week of teaching from a list of options included in the timetable and available at the first lecture.

MAJOR

This is the main subject in your degree. To major in a subject, you study it to a higher level, ie 300 level. A single major requires 135 points in a three year (360 point) degree. A double major is when you study two subjects in depth.

MINOR

This is a smaller collection of papers relating to a particular subject in your degree. To minor in a subject, you must complete 60 points separate from your major subject, usually with at least 30 points above 200 level. Most minors require at least 15 points at 300 level.

PAPER

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

POINTS

Degree requirements are expressed in terms of points (eg a three-year degree generally requires 360 points). Points bear a direct relationship to workload: one point equates to approximately 10 hours total work; so a student might expect to spend about 150 hours on 15-point papers.

PREREQUISITES

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

RESTRICTION

A restriction against a paper means you cannot do that paper if you have done a paper with similar content, eg BIOEB102 is restricted against BIOL102.

ROOM NUMBERS

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

SCIENCE PAPERS

Science papers are defined as papers offered by the School of Computing & Mathematical Sciences and the School of Science & School of Engineering. Some Philosophy and Psychology papers are also defined as Science papers. The Philosophy papers are PHILO102 and PHILO208.

UNDERGRADUATE

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

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

### SCIENCE PAPER CODES

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

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOEB</td>
<td>Ecology and Biodiversity</td>
</tr>
<tr>
<td>BIOMO</td>
<td>Molecular and Cellular Biology</td>
</tr>
<tr>
<td>CHEMY</td>
<td>Chemistry</td>
</tr>
<tr>
<td>EARTH</td>
<td>Earth Science</td>
</tr>
<tr>
<td>ENVSC</td>
<td>Environmental Sciences</td>
</tr>
<tr>
<td>SCIEN</td>
<td>Science</td>
</tr>
</tbody>
</table>

### OTHER UNIVERSITY PAPER CODES

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

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APHYS</td>
<td>Applied Physics</td>
</tr>
<tr>
<td>COMPX</td>
<td>Computer Science</td>
</tr>
<tr>
<td>ENVPL</td>
<td>Environmental Planning</td>
</tr>
<tr>
<td>MĀORI</td>
<td>Te Reo Māori</td>
</tr>
<tr>
<td>MATHS</td>
<td>Mathematics</td>
</tr>
<tr>
<td>PHILO</td>
<td>Philosophy</td>
</tr>
<tr>
<td>PSYCH</td>
<td>Psychology</td>
</tr>
<tr>
<td>STATS</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

### SEMESTER INDICATORS

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A Semester: March – June</td>
</tr>
<tr>
<td>B</td>
<td>B Semester: July – November</td>
</tr>
<tr>
<td>C</td>
<td>An atypical teaching period</td>
</tr>
<tr>
<td>S</td>
<td>Summer School 1: January – February</td>
</tr>
<tr>
<td>T</td>
<td>Summer School 2: November – December</td>
</tr>
<tr>
<td>Y</td>
<td>Full year: March – November</td>
</tr>
</tbody>
</table>

### LOCATION INDICATORS

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAM</td>
<td>Papers taught in Hamilton</td>
</tr>
<tr>
<td>TGA</td>
<td>Papers taught in Tauranga</td>
</tr>
<tr>
<td>NET</td>
<td>Online course</td>
</tr>
</tbody>
</table>
HELP AND ADVICE

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

CHECK YOUR TIMETABLE
Science papers normally involve attending lectures, tutorials and lab work. Timetable clashes can occur between papers from different subject areas, or between papers at different levels.

You are required to attend all lectures and you will not usually be permitted to take papers that have more than one lecture clash per semester. Lectures in the School of Science are recorded with Panopto to make it easier to accommodate students who may have a lecture clash.

There are often several streams for laboratories, so lab clashes can usually be resolved. If you have a lab clash, you should initially contact the convenor/lecturer/co-ordinator of the papers concerned.

You can check your timetable at timetable.waikato.ac.nz or via your MyWaikato.

If you want to change your papers after you have paid your fees (i.e. after you become officially enrolled), you can apply to do a “change of enrolment” on MyWaikato at my.waikato.ac.nz.

CHANGING PAPERS
Withdrawals must be made by the required date to obtain a fees refund. You can add or withdraw from an industry paper or any C Semester paper with a full fees refund at any time before those papers begin.

Withdrawals on medical or compassionate grounds may be made after these periods, and fees may be refunded on a pro-rata basis. Some conditions apply, and you should consult with the Faculty Registrar by calling 0800 438 254 or by dropping into the FG Link Reception.
FREQUENTLY ASKED QUESTIONS

WHAT PAPERS SHOULD I TAKE?
The answer to this question depends on a lot of things - what major(s) you are taking, which qualification you’re enrolled in, how far through the qualification you are, amongst other things. The best thing to do is to make an appointment for personal enrolment advice with the School Office staff by calling them on 0800 438 254, calling in to FG.G.04 or by emailing science@waikato.ac.nz.

WHERE CAN I GET SUBJECT SPECIFIC ADVICE?
You can make an appointment with the relevant subject contact of your programme listed in this handbook.

HOW DO I CHANGE MY PAPERS AFTER I AM ENROLLED?
You need to complete and submit a Change of Enrolment application online through your MyWaikato account, click on ‘change enrolment’ then follow the steps onscreen. If you do wish to change your papers, you have until the end of the first week of classes (for S or T semester papers) and until the end of the second week of classes (for A, B and Y Semester papers) to apply to change your papers.

HOW LONG DO I HAVE TO MAKE CHANGES TO MY PROGRAMME OF PAPERS?
The best thing to do is to try and finalise your papers before the semester starts, but we know that due to a variety of circumstances, this is not always possible.

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

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

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

WHERE CAN I FIND THE TIMETABLE FOR THE PAPERS THAT I AM TAKING/WANT TO TAKE?
The University’s Online Timetable (timetable.waikato.ac.nz) is available for everyone to be able to search for timetables associated with most papers offered. You will need to know the paper codes (the alpha-numerical code that each paper is assigned; ie; BIOMO101-19B) for each of the papers you are interested in.

You can search by lecture, lab, workshop, tutorial or a combination of all of these things, but it’s best to start with lectures, and work around these where possible for labs/tutorials/workshops etc. You can also use the other functions on the Timetable page to check what lab times are available and when and where lectures are held. Once you are enrolled, your timetable can be found via your MyWaikato.
WHERE DO I GET A LAB COAT FROM?
Lab coats can be purchased by paying the prescribed fee (currently $58.00) at the Fees Office in the Student Centre at the Library, and then taking your receipt to collect your lab coat from the Science Store, which is located on the Ground Floor of F block.
Alternatively, you can purchase a second-hand lab coat for a reasonable price at ApparelMaster, 10 Mainstreet Place, off Sunshine Ave, Te Rapa.

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

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

HOW DO I ENSURE RE-ENTRY INTO MY DEGREE IN THE FOLLOWING YEAR?
You should aim to get the best possible grades you can, but if you are struggling at all, then it is best to try and gain a clear pass with a C grade or better in all your papers. The absolute minimum you need to be automatically eligible for re-entry is unrestricted passes (i.e. C- grades or better) in papers worth at least half of the total points you are enrolled in for the year.
UNDERGRADUATE
STUDY
OVERVIEW OF QUALIFICATIONS

The School of Science offers the following undergraduate degrees.

BACHELOR OF SCIENCE (BSc)

Putting into practice what you learn in your lectures is a major part of this degree. You will gain hands-on experience with some of the most up-to-date and high-tech computing facilities and lab equipment.

Three-year degrees with majors in:
- Aquaculture (only offered in Tauranga)
- Chemistry
- Earth Sciences
- Ecology and Biodiversity
- Environmental Sciences
- Materials Science
- Molecular and Cellular Biology
- Psychology

BACHELOR OF SCIENCE (TECHNOLOGY) (BSc(Tech))

The Bachelor of Science (Technology) degree provides you with an opportunity to gain practical, relevant work experience as part of your undergraduate degree. This will help you to step into the professional world in your chosen career and successfully integrates theoretical learning with hands-on experience.

Three-year degrees with majors in:
- Chemistry
- Earth Sciences
- Ecology and Biodiversity
- Environmental Sciences
- Materials Science
- Molecular and Cellular Biology

Besides the requirements of the major, a BSc or BSc(Tech) degree in the School of Science requires two numeracy papers to be completed, either both at 100 level or one at 100 level and the second at 200 level. One 100 level paper is allocated for this numeracy requirement, the second can either be completed as one of your electives in Year 1, or as one of your electives in Year 2, or as one of your 200 level Science papers.

The recommended selection of papers for the numeracy requirement are given in each major. Your options for inclusion are indicated below by the yellow border box (see key below).

KEY

- Numeracy Requirement
- Compulsory paper
- Elective paper
CERTIFICATES AND DIPLOMAS

WHO ARE DIPLOMAS AND CERTIFICATES SUITABLE FOR?

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

CERTIFICATE

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

CERTIFICATE (SCIENCE) PLANNER 1 year 120 points

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

DIPLOMAS

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

DIPLOMA (SCIENCE) PLANNER 1 year 120 points

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

The Cert(STEM) is a 60 point undergraduate qualification, which means you have the flexibility to study on a part-time basis while in full-time employment.

CERTIFICATE (STEM) PLANNER 60 points

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

There is an increased demand for "science champions" in schools, which makes the Certificate in STEM particularly relevant to primary or secondary school teachers wanting to improve their knowledge in the Science, Technology, Engineering and Mathematics (STEM) subjects. More information about the Cert(STEM) can be found at waikato.ac.nz/study/qualifications/certificate-in-stem.
GENERAL ENTRY REQUIREMENTS (BACHELORS DEGREES)

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

If you gain University Entrance through NCEA you are eligible to apply to enrol in the BSc and BSc(Tech) without any additional requirements.

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

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

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

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

= University Entrance from NCEA
ALTERNATIVE ENTRY REQUIREMENTS
(BACHELORS DEGREES)

CAMBRIDGE INTERNATIONAL EXAMINATIONS (CIE) STANDARD RECOGNISED BY UNIVERSITIES NEW ZEALAND

PART A: A minimum of 120 points on the UCAS Tariff at A or AS level other than the General Paper, including at least three subjects (other than Thinking Skills) in which no grade is lower than D.

PART B: Literacy: An E grade or better in any one of AS English Language, Language and Literature in English, Literature in English. A D grade or better will satisfy one of the subject requirements of Part A; or as prescribed for University Entrance with NCEA.

Numeracy: Either a D grade or better in IGCSE or GCSE mathematics, or any mathematics passed at AS level. A D grade or better will satisfy one of the subject requirements of Part A; or as prescribed for University Entrance with NCEA.

INTERNATIONAL BACCALAUREATE (IB) STANDARD RECOGNISED BY UNIVERSITIES NEW ZEALAND

Award of the full IB Diploma (24 points or higher).

UNIVERSITY ENTRANCE FROM BURSARY

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

ADMISSION AT ENTRANCE LEVEL OR WITH CREDIT FROM PREVIOUS STUDY

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

DISCRETIONARY ENTRANCE

STUDENTS UNDER 20 WITHOUT UNIVERSITY ENTRANCE

If you are 16 years of age or over and a New Zealand citizen or permanent resident, you may be eligible to apply for Discretionary Entrance.

Students are assessed on the basis of their academic background and an Advisor’s recommendation. If you are still at school, or have left school recently, your school principal must be your Advisor. If you have left school, a Future Student Advisor at the University can help you.

Email info@waikato.ac.nz or phone 0800 WAIKATO (0800 924 528).

SPECIAL ADMISSION

STUDENTS AGED 20 AND OVER

If you left school without University Entrance and will be 20 years of age or over by the first day of the semester in which you are applying to enrol, you may be eligible for special admission.
GENERAL INFORMATION FOR INTERNATIONAL STUDENTS

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

ENGLISH LANGUAGE REQUIREMENTS FOR UNDERGRADUATE STUDY IN THE SCHOOL OF ENGINEERING

All students whose application for admission is on the basis of study completed overseas where the medium of instruction is not English, are required to provide evidence of a satisfactory level of competence in the English Language.

An iBT (Internet Based TOEFL) score of 80 (with a Writing score of 21), or an IELTS overall score of 6.0 with no bands below 5.5, or a PTE Academic overall score of 50 (no PTE communicative skills score below 42).

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

ENGLISH LANGUAGE REQUIREMENTS FOR GRADUATE AND POSTGRADUATE STUDY

You are required to meet the English language requirements for admission into Graduate and Postgraduate qualifications. You are required to achieve an iBT (Internet Based TOEFL) score of 90 with a Writing score of 21, or an IELTS Overall score of at least 6.5 overall (with no less than 6.0 in any band), or an PTE Academic overall score of 58 and no PTE communicative skills score below 50, or a B grade or better at Level 8 in the Certificate of Attainment in Academic English.

CODE

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

IMMIGRATION

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

INTERNATIONAL STUDENT SUPPORT

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

THE STUDENT CENTRE

The Student Information Centre, The University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand

Phone: +64 7 838 4176 or 0800 WAIKATO (0800 924 528)
Fax: +64 7 838 4370
**SINGLE MAJOR**

A major is the main subject of the degree. To major in a subject it must be studied at an advanced level. A single major requires 135 points in a three year (360 point) degree.

**EXAMPLE BSc SINGLE MAJOR DEGREE PLANNER** 3 years 360 points

Each box represents one paper. Each paper is worth 15 points unless otherwise specified.

| Y1 | 100 level | 100 level | 100 level | 100 level | 100 level | 100 level | 100 level |
| Y2 | 200 level | 200 level | 200 level | 200 level | 100/200 level | 200 level | 100 level or above |
| Y3 | 300 level | 300 level | 300 level | Career Start | SCIEN305 | 200 level or above | 200 level or above | 200 level or above |

**DOUBLE MAJOR**

A double major is simply two majors completed in one degree. Although it doesn’t necessarily take longer to complete a degree, pursuing a double major will reduce your overall number of elective papers as you study your two majors in depth.

For further details about a double major, contact the School Reception science@waikato.ac.nz.

**EXAMPLE BSc DOUBLE MAJOR DEGREE PLANNER** 3 years 360 points

| Y1 | 1st Major 100 level | 1st Major 100 level | 100 level | 100 level | 100 level | 100 level | 2nd Major 100 level | 2nd Major 100 level |
| Y2 | 1st Major 200 level | 1st Major 200 level | 1st Major 200 level | 1st Major 200 level | 100/200 level | 2nd Major 200 level | 2nd Major 200 level | 2nd Major 200 level |
| Y3 | 1st Major 300 level | 1st Major 300 level | 300 level | Career Start | SCIEN305 | 2nd Major 200 level | 2nd Major 300 level | 2nd Major 300 level |

**Key**

- Major
- Compulsory
- Numeracy requirement
- Elective
BACHELOR OF SCIENCE (BSc)

IF YOU’RE INTRIGUED BY THE NATURAL WORLD AROUND YOU, OR ENJOY UNDERSTANDING HOW THINGS WORK, WAIKATO’S BACHELOR OF SCIENCE (BSc) IS WHAT YOU’RE LOOKING FOR.

A BSc from Waikato will open doors to some of the world’s fastest growing industries and most exciting research areas, including climate change and the sustainable management of environmental resources. You’ll graduate with the theory, technical ability and leadership skills to succeed in the science industry.

A lot of our scientific research involves collaboration with businesses, other research institutes and local authorities, and it impacts development all over New Zealand and around the world. Part of our success comes from our investment in world-class research equipment and facilities, most of which is available to students during their studies. Putting into practice what you learn in your lectures is a major part of our BSc. You’ll gain hands-on experience in the laboratory and we also organise field trips to local beaches, forests and lakes for you to directly apply what you’re learning.

The first year of the BSc will enable you to explore a range of scientific disciplines and lay a solid foundation for you to build on. In your second or third year of the BSc you can choose from a range of specific skill sets depending on how you wish to use your degree and the career you want to pursue. The career start papers include:

• Project-based learning that will prepare you for management careers in the science field.
• Research experience where you can practice the skills needed to succeed in postgraduate study and research-oriented careers.
• Entrepreneurial courses where mentors will help you develop your own ideas and teach you how to assess commercial viability.

BSC OVERVIEW

| Y1 | 100 level | 100 level | 100 level | 100 level | 100 level | 100 level | 100 level |
| Y2 | 200 level | 200 level | 200 level | 200 level | 100/200 level | 200 level | 200 level |
| Y3 | 300 level | 300 level | 300 level | Career Start | SCIEN305 | 200 level or above | 200 level or above |

Key

- Major
- Compulsory
- Numeracy requirement
- Elective

Note: Details of the BSc in Computer Science is available from the School of Computing and Mathematical Sciences. Students majoring in Psychology in the BSc will have a slightly different layout.
BSc MAJORS
Aquaculture (TGA only)
Chemistry
Earth Sciences
Ecology and Biodiversity
Environmental Sciences (Available in HAM and TGA)
Materials Science
Molecular and Cellular Biology
Psychology

BSc MINORS
Animal Behaviour
Applied Physics (not available in 2019)
Aquaculture (TGA only)
Biochemistry
Chemistry
Coastal Processes
Ecology and Biodiversity
Environmental Sciences
Geology
Hydrology
Materials Science
Molecular and Cellular Biology
Soil Science

Minor subjects enable you to design a tailored programme that helps differentiate yourself and ensure you have a unique skill set by giving you a taste of a complementary discipline to broaden your knowledge and scientific skills. Alternatively, select a minor from a supporting non-science discipline to show employers you can apply yourself in a range of fields.
BACHELOR OF SCIENCE (TECHNOLOGY) (BSc(TECH))

WAIKATO’S BACHELOR OF SCIENCE (TECHNOLOGY) WAS THE FIRST DEGREE OF ITS KIND IN NEW ZEALAND, AND OFFERS A UNIQUE, JOB-ORIENTED APPROACH TO SCIENTIFIC STUDY.

A BSc(Tech) degree puts you on the first step of the career ladder, giving you valuable work experience (usually paid) alongside practicing scientists and technologists.

The BSc(Tech) degree is a flexible degree, designed to provide students with the necessary practical experience to stand out among other science graduates. It’s an internationally recognised degree, meaning you can find work anywhere in the world. This degree includes 10 weeks of relevant work experience. The Cooperative Education Unit assists in matching students with placement opportunities, and offering reflective learning and skill development after the placements are completed; all of which ensure the quality of your work placement. Students are regularly offered permanent roles following their placements.

The degree structure is similar to the BSc, enabling you to explore a range of scientific disciplines, broaden your opportunities and lay a foundation for you to build on, even if you haven’t studied science before.

From second year, to prepare you for the workplace and gain an understanding of how the business world works, the BSc(Tech) degree includes a work preparation paper in addition to your major and other complementary science papers. You’ll spend the summer between your second and third year gaining work experience and, in most cases, being paid for your efforts.

BSC(TECH) OVERVIEW

| Y1 | 100 level | 100 level | 100 level | 100 level | 100 level | 100 level | 100 level |
| Y2 | 200 level | 200 level | 200 level | 200 level | SCIEN270 | 100/200 level | 200 level |
| Y3 | 300 level | 300 level | 300 level | SCIEN305 | SCIEN371 | 200 level or above | 200 level or above |

Key

- Major
- Compulsory
- Numeracy requirement
- Elective

Note: Details of the BSc(Tech) in Computer Science is available from the School of Computing and Mathematical Sciences.
BSc(TECH) MAJORS
Chemistry
Earth Sciences
Ecology and Biodiversity
Environmental Sciences
Materials Science
Molecular and Cellular Biology

BSc(TECH) MINORS
Animal Behaviour
Applied Physics (not available in 2019)
Biochemistry
Chemistry
Coastal Processes
Ecology and Biodiversity
Environmental Sciences
Geology
Hydrology
Materials Science
Molecular and Cellular Biology
Soil Science

Minor subjects enable you to design a tailored programme that helps differentiate yourself and ensure you have a unique skill set by giving you a taste of a complementary discipline to broaden your knowledge and scientific skills. Alternatively, select a minor from a supporting non-science discipline to show employers you can apply yourself in a range of fields.
AQUACULTURE (TGA ONLY)

AQUACULTURE INVOLVES STUDYING THE UNDERLYING REPRODUCTIVE PHYSIOLOGY AND DEVELOPMENTAL BIOLOGY OF EARLY LIFE CYCLE STRATEGIES USED BY AQUATIC ANIMAL SPECIES. AQUACULTURE IS ONLY AVAILABLE AT OUR TAURANGA CAMPUS.

Aquaculture is available as a major for the BSc. Aquaculture may also be taken as a second major or as a minor, subject to academic approval of the School in which the student is enrolled.

To complete Aquaculture as a single major, students must gain 135 points including 105 points above 100 level, and 60 points above 200 level. Students must complete AQCUL101, MARIN101, AQCUL201, AQCUL202, BIOEB203, EARTH241 and 45 points from AQCUL301, AQCUL302, EARTH342 and MARIN301.

To complete Aquaculture as part of a double major, students must gain 120 points including 90 points above 100 level, and 45 points above 200 level. Students must complete AQCUL101, MARIN101, AQCUL201, AQCUL202, BIOEB203, EARTH241 and 30 points from AQCUL301, AQCUL302, EARTH342 and MARIN301, including one of AQCUL301 or AQCUL302.

To complete a minor in Aquaculture, students must complete 60 points from the papers listed for the Aquaculture major, including at least 30 points above 100 level. Students must complete AQCUL101 and 45 points from AQCUL201, AQCUL202, AQCUL301 and AQCUL302.

CAREER OPPORTUNITIES

• Science Technician
• Research Assistant

SALARY EXPECTATIONS*

Recent graduates in Aquaculture usually earn $35 - $60K per year.
Senior Scientists in Aquaculture usually earn $60 - $100K per year.

*Sourced from www.careers.govt.nz

CONTACT FOR AQUACULTURE

Dr Steve Bird
Room: C.2.01C Phone: 07 838 4723
Email: steve.bird@waikato.ac.nz
## BSC DEGREE PLANNER

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**List A Choose three of:** BIOEB102, CHEMY100, EARTH101, ENGEN111, ENGEN112, ENGEN180

**List B (Career Start) Choose one of:** SCIEN301, SCIEN303, SCIEN313

**List C (Numeracy) Choose two of:** COMPX101, ENGEN183, ENGEN184, STATS111

### Key

- **Major**
- **Compulsory**
- **Numeracy requirement**
- **Elective**

**Note:** Papers may have prerequisites.
CHEMISTRY

CHEMISTRY IS CONCERNED WITH THE PROPERTIES OF SUBSTANCES AND MATERIALS FROM AN ATOMIC AND MOLECULAR PERSPECTIVE. MOST CHEMISTRY PAPERS INVOLVE APPROXIMATELY EQUAL TIME SPENT IN LECTURES AND IN LAB WORK SO THAT THE THEORETICAL AND EXPERIMENTAL ASPECTS OF THE TOPICS MAY BE EXPLORED TOGETHER.

Chemistry is available as a major for the BSc and BSc(Tech). Chemistry may also be taken as a second major or as a minor, subject to academic approval of the School in which the student is enrolled.

To complete Chemistry as a single major, students must gain 135 points including CHEMY101, CHEMY102, CHEMY201, CHEMY202, CHEMY203 and CHEMY204, and at least 45 points from CHEMY301, CHEMY302, CHEMY303 and CHEMY304.

To complete Chemistry as part of a double major, students must gain 120 points including CHEMY101, CHEMY102, CHEMY201, CHEMY202, CHEMY203 and CHEMY204, and at least 30 points from CHEMY301, CHEMY302, CHEMY303 and CHEMY304.

To complete a minor in Chemistry, students must complete CHEMY101, CHEMY102 plus 30 points from CHEMY201, CHEMY202, CHEMY203, CHEMY204, CHEMY301, CHEMY302, CHEMY303, CHEMY304.

CAREER OPPORTUNITIES

- Analytical Chemist
- Biotechnology
- Brewing
- Environmental Science
- Food and Dairy
- Forensic Science
- Medicine
- Pharmaceuticals
- Pyrotechnics

SALARY EXPECTATIONS*

Recent graduates in Chemistry usually earn $49 - $70K per year.
Senior Scientists in Chemistry usually earn $70 - $140K per year.

*Sourced from www.careers.govt.nz

CONTACT FOR CHEMISTRY

Professor Merilyn Manley-Harris
Room: E.3.19 Phone: 07 838 4384
Email: merilyn.manley-harris@waikato.ac.nz
### BSc DEGREE PLANNER

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### BSc(TECH) DEGREE PLANNER

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**List A** Choose three of: APHYS111, BIOEB101, BIOEB102, BIOMO101, EARTH101, EARTH102, ENGEN111, ENGEN112, ENGEN180, ENVSC101, PHILO102

**List B (Career Start for BSc)** Choose one of: SCIEN301, SCIEN303, SCIEN313

**List C (Numeracy for BSc) or List B (Numeracy for BSc(Tech))** Choose one of: MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYS100 OR ENGEN110

**Key**
- Major
- Compulsory
- Numeracy requirement
- Elective

**Note:** CHEMY202 OR CHEMY204 count towards the BSc and BSc(Tech) numeracy requirements.
EARTH SCIENCES

EARTH SCIENCES OFFERS A BROAD UNDERSTANDING OF EARTH’S LANDSCAPE FEATURES AND PROCESSES AND INCLUDES A RANGE OF BRANCHES OF THE SUBJECT, INCLUDING SOIL SCIENCE, HYDROLOGY, GEOMORPHOLOGY, PHYSICAL GEOGRAPHY, VOLCANOLOGY, SEDIMENTARY GEOLOGY, COASTAL MARINE STUDIES, ENGINEERING GEOLOGY AND ENVIRONMENTAL SCIENCE.

Earth Sciences is available as a major for the BSc and BSc(Tech) degrees. Earth Sciences may also be taken as a second major, subject to academic approval of the School in which the student is enrolled.

To complete Earth Sciences as a single major, students must gain 135 points, including EARTH101, EARTH102, EARTH211, EARTH221, EARTH231 and EARTH241, and at least 45 points from 300-level Earth Sciences papers.

To complete Earth Sciences as part of a double major, students must gain 120 points, including EARTH101, EARTH102, EARTH211, EARTH221, EARTH231 and EARTH241, and at least 30 points from 300-level Earth Sciences papers.

Students with a special interest in physical geography should consult with the subject convenor before selecting their papers. The majority of papers in Earth Sciences include both lab practical and field work.

Earth Sciences is not available as a standard minor, however students who are interested in doing a minor in Earth Sciences subjects can choose to minor in the subdisciplines of Earth Sciences, including:

- Coastal Processes
- Geology
- Hydrology
- Soil Science

CAREER OPPORTUNITIES

- Coastal Resource Manager
- Environmental Consultant
- Geologist
- Groundwater Specialist
- Hydrologist
- Oceanographer
- Petroleum Geologist
- Soil Conservator
- Volcanologist
- Water Resource Manager

SALARY EXPECTATIONS*

Recent graduates in Earth Sciences usually earn $49 - $75K per year.
Senior scientists in Earth Sciences usually earn $75 - $130K per year.

*Sourced from www.careers.govt.nz

CONTACT FOR EARTH SCIENCES

Associate Professor Mike Clearwater Room: D.1.05 Phone: 07 838 4613 Email: mike.clearwater@waikato.ac.nz
BSc DEGREE PLANNER

Y1
EARTH101  EARTH102
100 level Science List A  100 level Science List A  100 level Science List A  100 level List C
Elective  Elective

Y2
EARTH211  EARTH221  EARTH231  EARTH241
100/200 level List C
Elective  Elective  Elective

Y3
EARTH3XX  EARTH3XX  EARTH3XX  SCIEN305
Career Start List B
Elective  Elective  Elective

BSc(TECH) DEGREE PLANNER

Y1
EARTH101  EARTH102
100 level Science List A  100 level Science List A  100 level Science List A  100 level List B
Elective  Elective

Y2
EARTH211  EARTH221  EARTH231  EARTH241
SCIEN270  100/200 level List B
Elective  Elective  Elective

Y3
EARTH3XX  EARTH3XX  EARTH3XX  SCIEN305
SCIEN371 Science Work Placement
Elective  Elective  Elective

List A Choose three of: APHYS111, BIOEB101, BIOEB102, BIOMO101, CHEMY100, CHEMY101, CHEMY102, ENG111, ENG112, ENG180, ENV101, PHILO102

List B (Career Start for BSc) Choose one of: SCIEN301, SCIEN303, SCIEN313

List C (Numeracy for BSc) or List B (Numeracy for BSc(Tech)) Choose two of: MATHS168, MATHS165, MATHS135, MATHS101 OR ENG184, MATHS102 OR ENG183, COMXX101 OR ENG103, STATS111 OR STATS121, PHYS100 OR ENG110, MATHS2XX, COMXX2XX, STATS2XX, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, ENG101

Key

Major  Compulsory  Numeracy requirement  Elective

Note: Papers may have prerequisites. If you choose to select a 200 Level Numeracy paper, please make sure that you have selected it’s prerequisite at 100 Level.
ECOLOGY AND BIODIVERSITY

IN STUDYING ECOLOGY AND BIODIVERSITY YOU’LL LEARN ABOUT THE DISTRIBUTION, ABUNDANCE, AND BIOLOGY OF ORGANISMS AND THEIR ROLE IN NEW ZEALAND’S MOST IMPORTANT ECOSYSTEMS. YOUR SKILLS WILL BE GAINED THROUGH A COMBINATION OF HANDS-ON LAB EXPERIENCE, PRACTICAL FIELD COURSES, AND TEACHING FROM LEADING ECOLOGISTS AND BIOLOGISTS.

Ecology and Biodiversity is available as a major for the BSc and BSc(Tech) degrees. Ecology and Biodiversity may also be taken as a second major, subject to academic approval of the School in which the student is enrolled.

To complete Ecology and Biodiversity as a single major, students must gain 135 points, including BIOEB101, BIOEB102, BIOEB201, BIOEB202, BIOEB203, BIOEB204, and at least 45 points from 300 level Ecology and Biodiversity papers.

To complete Ecology and Biodiversity as part of a double major, students must gain 120 points including BIOEB101, BIOEB102, BIOEB201, BIOEB202, BIOEB203, BIOEB204, and at least 30 points from 300 level Ecology and Biodiversity papers.

To complete a minor in Ecology and Biodiversity, students must take BIOEB102 and 45 points above 100 level taken from the papers listed below, including at least 15 points at 200 level and 15 points at 300 level.

CAREER OPPORTUNITIES

• Biosecurity Officer
• Ecologist
• Forestry Scientist
• Land Degradation Analyst
• Marine Ecologist
• Taxonomist
• Water Quality Analyst
• Sustainability Engineer
• Restoration Engineer
• Project Management
• Consultancy

SALARY EXPECTATIONS*

Recent graduates in Ecology and Biodiversity usually earn $40 - $70K per year.
Senior scientists in Ecology and Biodiversity usually earn $80 - $120K per year.

*Sourced from www.careers.govt.nz

CONTACT FOR ECOLOGY AND BIODIVERSITY

Associate Professor Mike Clearwater

Room: D.1.05  Phone: 07 838 4613
Email: mike.clearwater@waikato.ac.nz
### BSc DEGREE PLANNER

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### BSc(TECH) DEGREE PLANNER

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**List A**: Choose three of: APHYS111, BIOMO101, CHEMY100, CHEMY101, CHEMY102, EARTH101, EARTH102, ENGEN111, ENGEN112, ENGEN180, ENVSC101, PHILO102

**List B (Career Start for BSc)**: Choose one of: SCIEN301, SCIEN303, SCIEN313

**List C (Numeracy)**: Choose two of: MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYS100 OR ENGEN110, MATHS2XX, COMPX2XX, STAT2XX, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, ENGEN201

**Key**

- **Major**: Compulsory
- **Numeracy requirement**: Elective

**Note**: Papers may have prerequisites. If you choose to select a 200 Level Numeracy paper, please make sure that you have selected it’s prerequisite at 100 Level.
ENVIRONMENTAL SCIENCES (HAM)

ENVIRONMENTAL SCIENCES ARE INTERDISCIPLINARY WITH A FOCUS ON ECOLOGY, SOIL AND WATER ENVIRONMENTS AND GEOCHEMISTRY.

In Hamilton, Environmental Sciences is available as a major for the BSc and BSc(Tech). Environmental Sciences may also be taken as a second major or as a minor, subject to academic approval of the School in which the student is enrolled.

To complete Environmental Sciences as a single major, students must gain 135 points including ENVSC101, EARTH101, ENVSC201 and ENVPL303; one of BIOMO203 or BIOEB202; one of ENVSC202 or CHEMY204; one of EARTH221, EARTH231 or EARTH241; and two papers in different subject areas from ENVSC302, BIOEB303, BIOEB304, BIOEB305, BIOMO303, CHEMY304, EARTH313, EARTH321, EARTH322, EARTH331, EARTH341, EARTH342.

To complete Environmental Sciences as part of a double major, students must gain 120 points including ENVSC101, EARTH101, ENVSC201 and ENVPL303; one of BIOMO203 or BIOEB202; one of ENVSC202 or CHEMY204; one of EARTH221, EARTH231 or EARTH241; one of ENVSC302, BIOEB303, BIOEB304, BIOEB305, BIOMO303, CHEMY304, EARTH313, EARTH321, EARTH322, EARTH331, EARTH341, EARTH342.

To complete a minor in Environmental Sciences, students must complete 60 points from the papers listed for the Environmental Sciences major, including at least 30 points above 100 level. Students must include ENVSC101 and ENVSC201.

CAREER OPPORTUNITIES

- Air Pollution Analyst
- Conservation Officer
- Environmental Health Officers
- Environmental Scientist
- Forestry Scientist
- Land Degradation Analyst
- Science Technician
- Water Quality Analyst

SALARY EXPECTATIONS*

Recent graduates in Environmental Sciences usually earn $45-75K per year.
Senior scientists in Environmental Science usually earn $75-$130K per year.
*Sourced from www.careers.govt.nz

CONTACT FOR ENVIRONMENTAL SCIENCES (HAM)

Associate Professor Mike Clearwater
Room: D.1.05 Phone: 07 838 4613
Email: mike.clearwater@waikato.ac.nz
### BSc DEGREE PLANNER

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### BSc(TECH) DEGREE PLANNER

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### List A
- Choose three of: APHYS111, BIOEB101, BIOEB102, BIOMO101, CHEMY100, CHEMY101, CHEMY102, EARTH102, ENGEN111, ENGEN112, ENGEN180, PHILO102

### List B (Career Start for BSc)
- Choose one of: SCIEN301, SCIEN303, SCIEN313

### List C (Numeracy for BSc) or List B (Numeracy for BSc(Tech))
- Choose two of: MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYS100 OR ENGEN110, MATHS2XX, COMPX2XX, STATS2XX, CHEMY202 OR CHEMY204, EARTH251 OR ENVL202, ENGEN201

### ENVSC3 (must be from two different subject areas)
- Choose from: BIOEB303, BIOEB304, BIOEB305, CHEMY304, EARTH313, EARTH321, EARTH322, EARTH331, EARTH341, EARTH342, ENVSC302

**Key**
- **Major**
- **Compulsory**
- **Numeracy requirement**
- **Elective**

**Note:** Papers may have prerequisites. If you choose to select a 200 Level Numeracy paper, please make sure that you have selected it’s prerequisite at 100 Level. CHEMY204 counts towards the BSc and BSc(Tech) numeracy requirements.
ENVIRONMENTAL SCIENCES (TGA)

ENVIRONMENTAL SCIENCES ARE INTERDISCIPLINARY WITH A FOCUS ON ECOLOGY, SOIL AND WATER ENVIRONMENTS AND GEOCHEMISTRY.

In Tauranga, Environmental Sciences is only available as a major for the BSc and has an emphasis on marine environments. Environmental Sciences may also be taken as a second major or as a minor, subject to academic approval of the School in which the student is enrolled.

To complete Environmental Sciences as a single major, students must gain 135 points including ENVSC101, EARTH101, ENVSC201, BIOEB202, EARTH241, ENVSC202, ENVPL303, BIOEB305, and EARTH342.

To complete Environmental Sciences as part of a double major, students must gain 120 points including ENVSC101, EARTH101, ENVSC201 BIOEB202, EARTH241, ENVSC202, ENVPL303, BIOEB305, and EARTH342.

To complete a minor in Environmental Sciences, students must complete 60 points from the papers listed for the Environmental Sciences major, including at least 30 points above 100 level. Students must include ENVSC101 and ENVSC201.

CAREER OPPORTUNITIES

- Air Pollution Analyst
- Conservation Officer
- Environmental Health Officers
- Environmental Scientist
- Forestry Scientist
- Land Degradation Analyst
- Science Technician
- Water Quality Analyst

SALARY EXPECTATIONS*

Recent graduates in Environmental Sciences usually earn $45-75K per year.
Senior scientists in Environmental Science usually earn $75-$130K per year.

*Sourced from www.careers.govt.nz

CONTACTS FOR ENVIRONMENTAL SCIENCES (TGA)

Dr Steve Bird

Room: C.2.01C Phone: 07 838 4723
Email: steve.bird@waikato.ac.nz
**BSc DEGREE PLANNER**

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**List A** Choose three of: BIOEB102, CHEMY100, ENGEN111, ENGEN112, ENGEN180

**List B (Career Start)** Choose one of: SCIEN301, SCIEN303, SCIEN313

**List C (Numeracy)** Choose two of: STATS111, ENGEN183, ENGEN184, COMPX101

**Key**

- **Major**
- **Compulsory**
- **Numeracy requirement**
- **Elective**

**Note:** Papers may have prerequisites. If you choose to select a 200 Level Numeracy paper, please make sure that you have selected it’s prerequisite at 100 Level.
MATERIALS SCIENCE


Materials Science is available as a major for the BSc and the BSc(Tech). Materials Science may also be included as a second major or minor in other undergraduate degrees, subject to the approval of the School in which the student is enrolled.

To complete Materials Science as a single major, students must gain 135 points from the papers listed for Materials Science, including CHEMY101, ENGEN112, CHEMY204, ENGME280, ENGMP211, 15 points from either CHEMY201 or CHEMY203 and 45 points from ENGMP311, ENGMP312, CHEMY301, CHEMY303 or CHEMY304.

To complete Materials Science as part of a double major, students must gain 120 points from the papers listed for Materials Science, including CHEMY101, ENGEN112, CHEMY204, ENGME280, ENGMP211, 15 points from either CHEMY201 or CHEMY203 and 30 points from ENGMP311, ENGMP312, CHEMY301, CHEMY303 or CHEMY304.

To complete a minor in Materials Science, students must complete ENGEN112, ENGEN180, ENGMP211 and ENGMP311.

CAREER OPPORTUNITIES

- Ceramic Manufacturing Scientist
- Composites Manufacturing Scientist
- Corrosion Consultant
- Life Cycle Analysis Scientist/Consultant
- Materials Failure Analyst
- Metallurgical Manufacturing Scientist
- Sustainable Development Scientist
- Wood Manufacturing Scientist
- Sustainable Development Scientist
- Project Manager
- Safety Engineer
- Computer Aided Engineering Specialist

SALARY EXPECTATIONS*

Recent graduates in Materials Science usually earn $50K - $60K per year.
Senior professionals in Materials Science usually earn $70K - $120K per year.
*Sourced from www.careers.govt.nz

CONTACT FOR MATERIALS SCIENCE

Professor Kim Pickering
Room: EF.2.01 Phone: 07 838 4672
Email: kim.pickering@waikato.ac.nz
### BSc DEGREE PLANNER

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**List A Choose three of:** APHYS111, BIOEB101, BIOEB102, BIOMO101, CHEMY100, CHEMY102, EARTH101, EARTH102, ENGEN111, ENGEN180, PHILO102

**List B (Career Start for BSc) Choose one of:** SCIEN301, SCIEN303, SCIEN313

**List C (Numeracy for BSc) or List B (Numeracy for BSc(Tech)) Choose one of:** MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYSC100 OR ENGEN110, MATHS2XX, COMPX2XX, STATS2XX, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, ENGEN201

**Key**

- **Major**
- **Compulsory**
- **Numeracy requirement**
- **Elective**

**Note:** CHEMY204 counts towards the BSc and BSc(Tech) numeracy requirements.
MOLECULAR AND CELLULAR BIOLOGY

MOLECULAR AND CELLULAR BIOLOGY IS AN INTERDISCIPLINARY FIELD COMBINING BIOCHEMISTRY, MICROBIOLOGY, GENETICS AND PHYSIOLOGY.

It studies the complex mechanisms that coordinate the essential systems that define a living cell and that allows cells to have differentiated properties. This knowledge is then used to look at how unicellular and multicellular organisms function and how it can provide researchers with crucial insights into the basis of human and animal diseases.

Molecular and Cellular Biology is available as a major for the BSc and the BSc(Tech). Molecular and Cellular Biology may also be included as a second major or minor in other undergraduate degrees, subject to the approval of the School in which the student is enrolled.

To complete Molecular and Cellular Biology as a single major, students must gain 135 points from papers listed for Molecular and Cellular Biology, including BIOEB101, BIOMO101, BIOMO201, BIOMO202, BIOMO203, BIOMO204, and at least 45 points from BIOMO301, BIOMO302, BIOMO303, BIOMO304, BIOMO305 or BIOMO306.

To complete Molecular and Cellular Biology as part of a double major, students must gain 120 points from the papers listed for Molecular and Cellular Biology including BIOEB101, BIOMO101, BIOMO201, BIOMO202, BIOMO203, BIOMO204, and at least 30 points from BIOMO301, BIOMO302, BIOMO303, BIOMO304 or BIOMO306.

To complete a minor in Molecular and Cellular Biology, students must complete BIOMO101 and 45 points above 100 level from the papers listed below, including at least 15 points at 200 level and 15 points at 300 level: BIOMO101, BIOMO202, BIOMO203, BIOMO204, BIOMO302, BIOMO303, BIOMO304, BIOMO305, BIOMO306.

CAREER OPPORTUNITIES

- Agricultural Researcher
- Biochemist
- Biotechnologist
- Chemical Analyst
- Consultant
- Lab Technician
- Plant and Food Researcher
- Quarantine Officer

SALARY EXPECTATIONS*

Recent graduates in Molecular and Cellular Biology usually earn $50 - $60K per year.
Senior scientists in Molecular and Cellular Biology usually earn $70 - $120K per year.

*Sourced from www.careers.govt.nz

CONTACT FOR MOLECULAR AND CELLULAR BIOLOGY

Professor Merilyn Manley-Harris
Room: E.3.19 Phone: 07 838 4384
Email: merilyn.manley-harris@waikato.ac.nz
### BSc DEGREE PLANNER

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**List A Choose three of:** APHYS111, BIOEB102, CHEMY100, CHEMY101, CHEMY102, EARTH101, EARTH102, ENGEN111, ENGEN112, ENGEN180, PHILO102

**List B (Career Start for BSc) Choose one of:** SCIEN301, SCIEN303, SCIEN313

**List C (Numeracy for BSc) or List B (Numeracy for BSc(Tech)) Choose two of:** MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYS100 OR ENGEN110, MATHS2XX, COMPX2XX, STATS2XX, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, ENGEN201

**Key**

- **Major**
- **Compulsory**
- **Numeracy requirement**
- **Elective**

**Note:** Papers may have prerequisites. If you choose to select a 200 Level Numeracy paper, please make sure that you have selected it’s prerequisite at 100 Level.
FROM ANALYSING THE REASONS FOR ANGER TO CONSIDERING THE BEST WAY TO TRAIN DOGS, THE STUDY OF PSYCHOLOGY ALLOWS INSIGHT INTO COUNTLESS INTRIGUING FACETS OF COGNITIVE FUNCTION. WIDELY REGARDED AS THE CENTRE OF APPLIED PSYCHOLOGY IN NEW ZEALAND, PSYCHOLOGY AT WAIKATO OFFERS NUMEROUS STUDY OPTIONS FOR THOSE KEEN TO PURSUE THIS REMARKABLE DISCIPLINE.

Psychology is available as a major for the BSc. Psychology may also be included as a second major or minor in other undergraduate degrees, subject to the approval of the School in which the student is enrolled.

To complete Psychology as a single major for the BSc, students must gain 135 points from papers listed for Psychology, including 105 points above 100 level, and 60 points above 200 level. Students must include PSYCH100, PSYCH101, PSYCH203, PSYCH204, PSYCH211, and 60 points from PSYCH307, PSYCH314, PSYCH319, PSYCH322, PSYCH337 and PSYCH338.

To complete Psychology as part of a double major for the BSc, students must gain 120 points including at least 45 points above 200 level and must include at least and 30 points from PSYCH307, PSYCH314, PSYCH319, PSYCH322, PSYCH337 and PSYCH338.

CAREER OPPORTUNITIES*

- Behaviour Analyst
- Clinical or Community Psychologist
- Community Programme Coordinator
- Human Resource Advisor
- Private Practitioner
- Research Scientist

SALARY EXPECTATIONS

Recent graduates in Psychology usually earn $50 - $90K per year.
Senior scientists in Psychology usually earn $70 - $120K per year.

*Sourced from www.careers.govt.nz

CONTACT FOR PSYCHOLOGY

Professor Maryanne Garry
Room: J.1.17  Phone: 07 837 9556
Email: maryanne.garry@waikato.ac.nz
### List A
Choose three of:
- APHYS111, BIOEB101, BIOEB102, BIOMO101, CHEMY100, CHEMY101, CHEMY102, EARTH101, EARTH102, ENGEN111, ENGEN112, ENGEN180, PHILO102

### List B (Career Start)
Choose one of:
- SCIEN301, SCIEN303, SCIEN313

### List C (Numeracy)
Choose two of:
- MATH168, MATH165, MATH135, MATH101 or ENGEN184, MATH102 or ENGEN183, COMPX101 or ENGEN103, STATS111 or STATS121, PHYS100 or ENGEN110, MATH2XX, COMPX2XX, STATS2XX, CHEMY202 or CHEMY204, EARTH251 or ENVPL202, ENGEN201

### PSYCH3
Choose four of:
- PSYCH307, PSYCH314, PSYCH319, PSYCH322, PSYCH337 and PSYCH338.

### Key

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### Note:
Papers may have prerequisites. If you choose to select a 200 Level Numeracy paper, please make sure that you have selected its prerequisite at 100 Level.
MINORS

WHAT IS A MINOR?
A minor is a secondary concentration of papers that complements the major. A minor requires completion of 60 points in the minor subject area, with at least 30 points at 200 level or above. Minors are optional but highly recommended.

For further details about a minor, contact the School Reception science@waikato.ac.nz.

MAJOR / MINOR COMBINATIONS

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ANIMAL BEHAVIOUR

Animal Behaviour is the study of behaviour patterns in animals (including humans), and of how the behaviour of individuals helps to determine the density and distribution of populations. A knowledge of animal behaviour is of increasing importance in areas such as evolutionary biology, conservation biology, and the efficient and humane management of farm animals.

Note: To complete a minor in Animal Behaviour students must complete 60 points from the papers listed below, including BIOEB200, BIOEB301 and a further 30 points.

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AQUACULTURE (TGA ONLY)

Aquaculture involves studying the underlying reproductive physiology and developmental biology of early life cycle strategies used by aquatic animal species.

Note: To complete a minor in Aquaculture students must complete 60 points from the papers listed below, including AQCUL101, and 45 points from AQCUL201, AQCUL202, AQCUL301, AQCUL302

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BIOCHEMISTRY

Biochemistry is the explanation of life in molecular terms. It involves the study of fundamental molecules of life: proteins, lipids, carbohydrates and nucleic acids, and how these molecules interact in living organisms, in health and disease. By taking a combination of papers from both Molecular and Cellular Biology and Chemistry students will gain a solid grounding in the molecular and chemical principles underlying Biochemistry, one of the fastest growing areas of modern science.

Note: To complete a minor in Biochemistry students must complete 60 points from the papers listed below, including BIOMO301, and a further 45 points of which at least 15 points must be BIOMO coded, and another 15 points must be CHEMY coded.

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CHEMISTRY

Chemistry is concerned with the properties of substances and materials from an atomic and molecular perspective. Theoretical and experimental aspects of topics are explored together through lectures and in lab work.

Note: To complete a minor in Chemistry, students must complete 60 points from the papers listed for the Chemistry major, including CHEMY101, CHEMY102 and at least 30 points above 100 level.

COASTAL PROCESSES

Coastal Processes involves identifying and evaluating processes and factors that contribute to the formation and evolution of coastal landforms, allowing for the prediction of future coastal responses to changing climate and human activities.

Note: To complete a minor in Coastal Processes, students must gain 60 points, consisting of EARTH101, EARTH241, EARTH341 and EARTH342.

ECOLOGY AND BIODIVERSITY

Ecology and Biodiversity is the study of the distribution, abundance and biology of organisms and their role in ecosystems.

Note: To complete a minor in Ecology and Biodiversity, students must take BIOEB102 and 45 points above 100 level taken from the papers listed below, including at least 15 points at 200 level and 15 points at 300 level.
**ENVIRONMENTAL SCIENCES**

Environmental Sciences is interdisciplinary with a focus on ecology, soil and water environments and geochemistry.

**Note:** To complete a minor in Environmental Sciences, students must complete 60 points from the papers listed for the Environmental Sciences major, including ENVSC101, ENVSC201, and at least 30 points above 100 level. Students must include ENVSC101 and ENVSC201. Papers may have prerequisites.

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**GEOLOGY**

The Geology minor provides the basic knowledge and skills required to understand the distribution of resources on the Earth, evaluate them as potential resources, and develop methods to maximise the utilisation of these resources while minimising the impact on the environment.

**Note:** To complete a minor in Geology, students must gain 60 points, consisting of EARTH102, EARTH211, and 30 points from EARTH311, EARTH312 or EARTH313.

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HYDROLOGY

The Hydrology minor focuses on assessing the impacts of climate change on water resources, which is an area of frequent media coverage with floods, droughts and the exportation of bottled water. The University of Waikato is located close to the longest river in New Zealand, which has been significantly modified by hydroelectricity and flood control schemes, and impacted by point and diffuse discharges of contaminants.

*Note:* To complete a minor in Hydrology, students must gain 60 points, consisting of EARTH101, EARTH231, EARTH241 and EARTH331.

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MATERIALS SCIENCE

Materials Science focuses on understanding the intrinsic structure of a material and the control of its structure through processing. It studies the relationship of the engineering properties of the three main classes of materials (metals, polymers and ceramics) as well as composites and semiconductors.

*Note:* To complete a minor in Materials Science, students must gain 60 points consisting of ENGEN112, ENGEN180, ENGMP211 and ENGMP311.

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MOLECULAR AND CELLULAR BIOLOGY

Molecular and Cellular Biology focuses on the broad subject areas of biochemistry, genetics, microbiology and physiology.

Note: To complete a minor in Molecular and Cellular Biology, students must complete BIOMO101 and 45 points above 100 level from the papers listed below, including at least 15 points at 200 level and 15 points at 300 level.

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SOIL SCIENCE

Soil Science focuses on understanding the distribution of different soil types, evaluating their characteristics, and developing methods to combat degradation and depletion of productive soils, and associated reduction in water quality due to historical pressures and mismanagement.

Note: To complete a minor in Soil Science, students must gain 60 points, consisting of EARTH101, EARTH221, EARTH321 and EARTH322.

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100 LEVEL PAPERS

All papers are worth 15 points unless specified.

APHYS111-19A (HAM)
PHYSICS IN CONTEXT
This is an introductory paper in physics for students who have not studied physics or mathematics at NCEA level 2 or 3. It is intended to support a major in other science subjects. Emphasis is placed on describing everyday physics concepts using correct terminology. Examples of physics in action are drawn from many science areas. Topics include Newton’s laws of motion, electricity & magnetism, the structure of matter & the universe, waves and heat.

Paper coordinator(s): Dr Marcus Wilson
Restricted paper(s): PHYS100, PHYSC100
Assessment: Internal assessment/examination ratio 50:50

AQCU101-19B (TGA)
INTRODUCTION TO AQUACULTURE
This paper will introduce marine aquaculture in a New Zealand context, with perspectives from historical Māori aquaculture and that of ancient cultures.

Paper coordinator(s): Dr Steve Bird
Assessment: Internal assessment/examination ratio 60:40

BIOEB101-19A (HAM)
CONCEPTS OF BIOLOGY
An introduction to the foundations of biology, including the structure and functioning of cells, evolution, the origins and diversity of life, and a tour of the major forms of life and their defining characteristics.

Paper coordinator(s): Professor Ian McDonald
Restriction(s): BIOL101, BIOL102
Assessment: Internal assessment/examination ratio 50:50

BIOEB102-19B (HAM) & (TGA)
INTRODUCTION TO ECOLOGY AND BIODIVERSITY
An introduction to the principles of ecology and biodiversity. Topics include population, community and ecosystem ecology, conservation biology, and the structure, functioning and environmental responses of animals and plants. Examples will include New Zealand ecosystems and biota.

Paper coordinator(s): Associate Professor Mike Clearwater (HAM), Dr Joanne Ellis (TGA)
Equivalent paper(s): BIOL102
Restricted paper(s): BIOL102
Assessment: Internal assessment/examination ratio 50:50
BIOMO101-19B (HAM)

INTRODUCTION TO MOLECULAR AND CELLULAR BIOLOGY

An introduction to the central concepts of molecular and cellular biology, including the ultrastructure and function of cells, the biochemical processes involved, and the role of DNA in cellular function, inheritance and evolution. Specific attributes covered are: the basic building blocks of biological macromolecules; the organisation of cells and the biochemical pathways required for their survival; the organisation of genetic material within cells and how genes are expressed; and the genetic mechanisms important for inheritance and evolution.

Note: CHEMY100 is strongly recommended for students who have not achieved at least 16 credits in chemistry in NCEA Level 3.

Paper coordinator(s): Dr Steve Bird
Equivalent paper(s): BIOL101
Restricted paper(s): BIOL101
Assessment: Internal assessment/examination ratio 50:50

CHEMY100-19A (HAM) & 19B (TGA)

CHEMISTRY IN CONTEXT

This is an introductory paper for students with a limited background in chemistry. There is a strong emphasis on teaching chemical concepts through real-world examples relevant to different science and engineering disciplines.

Paper coordinator(s): Associate Professor Joseph Lane
Equivalent paper(s): CHEM100
Restricted paper(s): CHEM100
Assessment: Internal assessment/examination ratio 60:40

CHEMY101-19A/C (HAM)

STRUCTURE AND SPECTROSCOPY

A theoretical and practical course covering aspects of analytical and inorganic chemistry. This course is required for the chemistry major.

Paper coordinator(s): Professor Bill Henderson
Prerequisites: 16 credits in NCEA chemistry at level 3, CHEMY100 or CHEM100, or by discretion of the Chemistry undergraduate convenor
Equivalent paper(s): CHEM111
Restricted paper(s): CHEM101 or CHEM111
Assessment: Internal assessment/examination ratio 50:50

CHEMY102-19B (HAM)

CHEMICAL REACTIVITY

A theoretical and practical course covering aspects of physical and organic chemistry. This course is required for the chemistry major.

Paper coordinator(s): Professor Merilyn Manley-Harris
Prerequisites: CHEM100, CHEMY100, 16 credits in NCEA chemistry at level 3, or by discretion of the Chemistry undergraduate convenor
Equivalent paper(s): CHEM112
Restricted paper(s): CHEM102 or CHEM112
Assessment: Internal assessment/examination ratio 50:50
COMPX101-19A/B (HAM) & 19A (NET)
INTRODUCTION TO COMPUTER SCIENCE
This paper introduces computer programming in C# – the exciting challenge of creating software and designing artificial worlds within the computer. It also covers concepts such as the internals of the home computer, the history and future of computers, cyber security, computer gaming, databases, mobile computing and current research and challenges in computer science.

Paper coordinator(s): Please see 2019 SCMS Handbook
Equivalent paper(s): COMP103
Restricted paper(s): COMP103, ENGEN103, ENGG182
Assessment: Internal assessment/examination ratio: 19A/B (HAM) 67:33 or 33:67; 19A (NET) 100:0

EARTH101-19A (HAM) & (TGA)
INTRODUCTION TO EARTH SYSTEM SCIENCES
A lecture and lab paper that explores the interacting processes that affect the surface of the Earth, producing landforms and resources, with a focus on physical processes. Topics covered include coastal processes and hazards; climate change; weathering; erosion and mass movement; soil formation; the hydrological cycle; rivers and groundwater; and glaciers. A one-day field trip introduces students to the environment of the Waipa-Raglan district.

Paper coordinator(s): Dr Hazel Needham (HAM), Dr Shari Gallop (TGA)
Equivalent paper(s): ERTH104
Restricted paper(s): ERTH104
Assessment: Internal assessment/examination ratio 50:50

EARTH102-19B (HAM)
DISCOVERING PLANET EARTH
This paper explores the Earth’s interior and its dynamic interaction with the crust, including: the major rocks and minerals; interpreting the rock record and geologic maps; the geological time scale and fossils; plate tectonics; volcanism; earthquakes.

Paper coordinator(s): Dr Adrian Pittari
Equivalent paper(s): ERTH103
Restricted paper(s): ERTH103
Assessment: Internal assessment/examination ratio 50:50

ENGEN100-19C(HAM)
GENERAL PHYSICS AND MATHS FOR ENGINEERS
Please refer to the School of Engineering Handbook for further details.
ENGEN103-19A (HAM) & (TGA) -19T (HAM)
ENGINEERING COMPUTING
Please refer to the School of Engineering Handbook for further details.

ENGEN110-19B (HAM) & (TGA)
ENGINEERING MECHANICS
This paper covers aspects of engineering mechanics.

Paper coordinator(s): Please see 2019 Engineering Handbook
Restricted paper(s): ENGG110
Prerequisites: 14 credits at Level 3 in NCEA Physics or one of PHYS100 or PHYSC100 or a B- grade in ENGEN100; and 14 credits at Level 3 in NCEA Calculus or one of MATH165, MATHS165, MATH101, MATHS101, MATH102, MATH102, ENGG183, ENGEN183, ENGG184, ENGEN184, or a B in CAFS011 or FOUND011
Assessment: Internal assessment/examination ratio: 50:50

ENGEN111-19A (HAM) & (TGA) -19T (HAM)
ELECTRICITY AND ELECTRONICS
Students are introduced to underlying concepts in electricity such as current, voltage and power, and apply these concepts in a lab by making circuits and measuring them with common lab instruments.

Paper coordinator(s): Please see 2019 Engineering Handbook
Prerequisites: 16 credits at Level 3 in NCEA Physics.
Equivalent paper(s): ENEL111
Restricted paper(s): ENEL111
Assessment: Internal assessment/examination ratio: 50:50

ENGEN112-19B (HAM) & (TGA)
MATERIALS SCIENCE AND ENGINEERING
Introduction to engineering materials (metals, ceramics, polymers, composites, semiconductors and biomaterials) and their atomic structure and mechanical properties. Includes: elastic and plastic deformation, fracture mechanisms, failure in service, iron-carbon phase diagram, redox reactions in corrosion, production of polymers, cement and concrete.

Paper coordinator(s): Please see 2019 Engineering Handbook
Equivalent paper(s): ENMP102
Restricted paper(s): ENMP102
Assessment: Internal assessment/examination ratio 50:50
ENGEN180-19A (HAM) & (TGA)
FOUNDATIONS OF ENGINEERING
Introduction to the engineering design process and computer-aided design, fundamental principles of engineering analysis, open-ended problem-solving, engineering economics and the skills of a successful engineer. Includes a design-build-test experience.

Paper coordinator(s): Please see 2019 Engineering Handbook
Equivalent paper(s): ENGG180
Restricted paper(s): ENGG180, ENGG302
Assessment: Internal assessment/examination ratio 50:50

ENGEN183-19A/B (HAM) & (TGA)
LINEAR ALGEBRA AND STATISTICS FOR ENGINEERS
Please refer to the School of Engineering Handbook for further details.

ENGEN184-19A/B/S (HAM) & (TGA)
CALCULUS FOR ENGINEERS
Please refer to the School of Engineering Handbook for further details.

ENVSC101-19B (HAM) & 19A (TGA)
ENVIRONMENTAL SCIENCE
A scientific study of the interaction between humans and the environment including climate change, utilisation and exploitation of natural resources and the effects of human activities on biological, chemical and physical processes that form resources and control ecosystems.

Paper coordinator(s): Dr Ian Duggan (HAM), Professor Ian Hawes (TGA)
Equivalent paper(s): ENVS101
Restricted paper(s): ENVS101
Assessment: Internal assessment/examination ratio 50:50

MARIN101-19A (TGA)
MARINE BIODIVERSITY
This paper provides grounding in the identification of New Zealand marine plants & animals (both indigenous & introduced).

Paper coordinator(s): Dr Rebecca Lawton
Assessment: Internal assessment/examination ratio 60:40
MATHS101-19A/B (HAM)
INTRODUCTION TO CALCULUS
A study of the fundamental techniques of calculus, including differentiation and integration for functions of one real variable, with applications to rate problems, graph sketching, areas and volumes.

Paper coordinator(s): Please see 2019 SCMS Handbook
Prerequisites: At least a B- grade in MATHS165, MATH165, MATHS166, MATH166, FOUND007 or CAFS004; or a pass in MATHS102 or MATH102; or 16 credits of NCEA Level 3 Calculus including at least 11 credits from AS91577, AS91578 and AS91579; or equivalent.
Equivalent paper(s): MATH101
Restricted paper(s): ENGEN184, ENGG184, MATH101
Assessment: Internal assessment/examination ratio: 50:50

MATHS102-19A/B (HAM)
INTRODUCTION TO ALGEBRA
A study of the fundamental techniques and applications of algebra including Gaussian elimination, vector and matrix algebra, complex numbers, induction and recursion.

Paper coordinator(s): Please see 2019 SCMS Handbook
Prerequisites: Any one of MATHS165, MATH165, MATHS166, or MATH166; or at least a B- grade in CAFS004 or FOUND007; or 16 credits at Level 3 in NCEA Calculus; or equivalent.
Equivalent paper(s): MATH102
Restricted paper(s): ENGEN183, ENGG183, MATH102
Assessment: Internal assessment/examination ratio: 50:50

MATHS135-19A (HAM)
DISCRETE STRUCTURES
An introduction to a number of the structures of discrete mathematics with wide applicability in areas such as: computer logic, analysis of algorithms, telecommunications, networks and public key cryptography. In addition it introduces a number of fundamental concepts which are useful in Statistics, Computer Science and further studies in Mathematics. Topics covered are: sets, binary relations, directed and undirected graphs; propositional and some predicate logic; permutations, combinations, and elementary probability theory; modular arithmetic.

Paper coordinator(s): Please see 2019 SCMS Handbook
Prerequisites: At least one of MATHS165, MATHS166, MATH165, MATH166, or 16 credits in NCEA Level 3 Mathematics.
Restricted paper(s): COMP235, MATH258
Assessment: Internal assessment/examination ratio: 50:50

MATHS165-19A/B (HAM)
GENERAL MATHEMATICS
An introduction to algebra, calculus and applications. This paper is provided for students who have not attained entry for MATHS101, MATHS002 or MATHS135.

Paper coordinator(s): Please see 2019 SCMS Handbook
Prerequisites: 18 credits at Level 2 in NCEA Mathematics, or 10 credits at Level 3 in NCEA Calculus, or 14 credits at Level 3 in NCEA Mathematics, or at least a B- in MATH168 or MATHS168, or equivalent.
Restricted paper(s): MATH165
Assessment: Internal assessment/examination ratio: 50:50
MATHS168-19A/B (HAM)
**PREPARATORY MATHEMATICS**
Basic algebraic concepts and an introduction to Calculus and Statistics. This paper provides a last chance for students to correct a weak background in mathematics. Students who meet the prerequisites of MATH165 or MATH166 should take one of those papers instead.

**Note(s):** This paper may not be taken concurrently with or subsequent to obtaining a pass in any other 100 level Mathematics or Statistics paper. This paper may not be credited towards supporting subject in Mathematics.

**Paper coordinator(s):** Please see 2019 SCMS Handbook

**Restricted paper(s):** MATH168

**Assessment:** Internal assessment/examination ratio: 50:50

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PHYSC100-19A (HAM)
**GENERAL PHYSICS**
This paper provides an introduction to the core ideas in physics. Topics covered include kinematics, mechanics, fluids, electric and magnetic forces and fields, electric circuits, optics, modern physics and relativity, taught in a problem-solving context.

**Paper coordinator(s):** Dr Marcus Wilson

**Prerequisites:** 14 credits at Level 2 in NCEA Mathematics or Physics, or a minimum of 8 credits at Level 3 in NCEA across Mathematics and/or Physics.

**Restricted paper(s):** PHYS100, APHYS111

**Assessment:** Internal assessment/examination ratio: 50:50

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PSYCH100-19A (HAM) & (TGA)
**BRAIN, BEHAVIOUR AND COGNITION**
This paper introduces perceptual systems, mechanisms of learning, emotions and motivation, the biological basis of psychology, such as brain structure and functioning, processes underlying behaviour, memory and cognition.

**Paper coordinator(s):** Please see 2019 School of Arts & Social Sciences Handbook

**Restricted paper(s):** PSYC103

**Assessment:** Internal assessment/examination ratio: 60:40

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PSYCH101-19B (HAM) & (TGA)
**SOCIAL PSYCHOLOGY, HEALTH AND WELL-BEING**
This paper will introduce major issues in psychology particularly as they relate to health, wellbeing, mental illness, forensic psychology, lifespan development, and social factors in a range of contexts.

**Paper coordinator(s):** Please see 2019 School of Arts & Social Sciences Handbook

**Restricted paper(s):** PSYC102

**Assessment:** Internal assessment/examination ratio: 60:40
STATS111-19B (HAM) & (TGA)
STATISTICS FOR SCIENCE
This paper provides a first course in statistics for students in the School of Science or School of Engineering. Microsoft Excel is used throughout. Topics include the collection and presentation of data, basic principles of experimental design, hypothesis testing, regression and the analysis of categorical data.

*Note:* BSc students with a weak mathematics background are advised to take MATH168 before enrolling in this paper.

**Paper coordinator(s):** Dr Chaitanya Joshi (HAM), Dr Joanne Ellis (TGA)

**Prerequisites:** Admission to the BSc; or MATH168, or MATHS168; or 18 credits at Level 2 in NCEA Mathematics; or 14 credits at Level 3 in Statistics, Calculus or Mathematics.

**Restricted paper(s):** STAT111, STATS121, STAT121, STAT160

**Assessment:** Internal assessment/examination ratio: 50:50

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STATS121-19A (HAM)
INTRODUCTION TO STATISTICAL METHODS
An introduction to statistical data collection and analysis. Topics include general principles for statistical problem-solving; some practical examples of statistical inference; and the study of relationships between variables using regression analysis.

**Paper coordinator(s):** Please see 2019 SCMS Handbook

**Prerequisites:** MATHS168, MATH168; or 18 credits at Level 2 in NCEA Mathematics; or 14 credits at Level 3 in NCEA Statistics, Calculus or Mathematics.

**Equivalent paper(s):** STAT121

**Restricted paper(s):** STAT111, STATS111, STAT121, STAT160

**Assessment:** Internal assessment/examination ratio: 50:50
200 LEVEL PAPERS

BIOEB200-19B (HAM)

BEHAVIOURAL ECOLOGY & CONSERVATION
This paper provides an introduction to the principles and concepts of behavioural ecology, and to the application of these to case studies in conservation biology in New Zealand.

Paper coordinator(s): Dr Clare Browne
Prerequisites: BIOEB102 or BIOL102
Restricted paper(s): BIOL200
Assessment: Internal assessment/examination ratio 50:50

BIOEB201-19A (HAM)

PRINCIPLES OF EVOLUTION
This paper examines the evolution and diversity of life. Topics include the history and philosophy of evolutionary thought, discussion of the mechanisms of evolution, present-day evidence of evolution in animal, plant and bacterial taxa; modern methods of analysing this evidence, and the evolutionary origins of current-day biodiversity.

Paper coordinator(s): Dr Chrissen Gemmill
Prerequisites: BIOEB101, BIOEB102 or BIOL102
Restricted paper(s): BIOL201
Assessment: Internal assessment/examination ratio 50:50

BIOEB202-19B (HAM)

PRINCIPLES OF ECOLOGY
This paper covers the principles of ecology, including adaptation to the environment, intra- and inter-specific interactions, community and ecosystem dynamics, and biogeography. Weekend field trips and computer lab work are essential elements.

Paper coordinator(s): Dr Ian Duggan
Prerequisites: BIOEB102 or BIOL102
Restricted paper(s): BIOL212
Assessment: Internal assessment/examination ratio 50:50

BIOEB203-19A (HAM) & (TGA)

ANIMAL STRUCTURE AND FUNCTION
This paper is an integrated theoretical and experimental study of the principles of animal structure and function. Comparative aspects will be emphasised in how animals adapt to their environment. Topics covered include homeostasis, the function of major organ systems, ecophysiology, musculoskeletal design and locomotion. An introduction to the physiological basis of animal behaviour will include chemical ecology, orientation and senses, biological rhythms and the genetics of behaviour.

Paper coordinator(s): Associate Professor Nick Ling
Prerequisites: BIOEB102 or BIOL102
Restricted paper(s): BIOL234
Assessment: Internal assessment/examination ratio 50:50
BIOEB204-19B (HAM)

PLANT STRUCTURE AND FUNCTION

Plants are key regulators of ecosystem processes, and actively respond to and change their environments. This paper examines how plants have these effects by exploring plant structure, functioning, and adaptation to different environments. Lab work emphasises the handling and identification of common native plants.

Paper coordinator(s): Associate Professor Mike Clearwater
Prerequisites: BIOEB102 or BIOL102
Restricted paper(s): BIOL223
Assessment: Internal assessment/examination ratio 50:50

BIOMO201-19A (HAM)

BIOCHEMISTRY

The aim of this paper is to familiarise students with the structure and function of proteins, nucleic acids, lipids and carbohydrates (as fundamental molecules of life). Students will be introduced to molecular techniques used to study these molecules and gain an appreciation of how they interact in living organisms in health and disease.

Paper coordinator(s): Dr Ryan Martinus
Prerequisites: BIOMO101 or BIOL101
Restricted paper(s): BIOL251
Assessment: Internal assessment/examination ratio 50:50

BIOMO202-19B (HAM)

GENETICS

This paper deals with genetics in the widest sense from the molecular and cellular to the applied and evolutionary. Both prokaryote and eukaryote genetics are discussed with respect to DNA replication, heredity, gene expression and control, and the role of mutations at both the DNA and chromosomal levels. The paper provides a pathway from basic research in molecular genetics to clinical applications in health and disease.

The paper is important to students of biology, irrespective of whether their interests are in metabolic and cellular processes, plant/animal genetic improvement, or ecological and evolutionary.

Paper coordinator(s): Dr Linda Peters
Prerequisites: BIOMO101 or BIOL101
Restricted paper(s): BIOL210
Assessment: Internal assessment/examination ratio 50:50

BIOMO203-19A (HAM)

MICROBIOLOGY

This paper will focus on microbial cell structure, function, and metabolism. Content and context will be drawn from both human and environmental examples. Students will acquire skills in microbiological lab techniques, data collection, data analysis, and report presentation.

Paper coordinator(s): Professor Ian McDonald
Prerequisites: BIOEB101 or BIOL101
Restricted paper(s): BIOL241
Assessment: Internal assessment/examination ratio 50:50
BIOMO204-19B (HAM)
CELL AND ORGAN PHYSIOLOGY IN HEALTH AND DISEASE
This paper integrates basic cell physiology with organ-based physiology and histology, providing students with a comprehensive understanding of the structure-function relationships in physiological processes. Intercellular communication, tissue/organ structure and systems physiology will be discussed in the context of health and disease.

Paper coordinator(s): Associate Professor Pawel Olszewski
Prerequisites: BIOMO101 or BIOL101 or SPLS103
Restricted paper(s): BIOL235
Assessment: Internal assessment/examination ratio: 50:50

CHEMY201-19B (HAM)
ORGANIC CHEMISTRY
This paper covers aspects of organic chemistry including reaction mechanisms with carbanion and radical intermediates; mechanisms of reactions of carbonyl groups and multiple electrophilic substitutions of aromatic rings; an introduction to carbohydrate chemistry.

Paper coordinator(s): Associate Professor Michèle Prinsep
Prerequisites: CHEM112 or CHEMY102
Equivalent paper(s): CHEM212 and CHEM214 combined
Restricted paper(s): CHEM201, CHEM212, CHEM214, CHEM231
Assessment: Internal assessment/examination ratio 50:50

CHEMY202-19B (HAM)
PHYSICAL CHEMISTRY
This course covers aspects of physical chemistry including thermodynamics and phase equilibria; chemical kinetics; conductance and electrochemistry.

Paper coordinator(s): Associate Professor Michael Mucalo
Prerequisites: CHEM112 or CHEMY102
Equivalent paper(s): CHEM212 and CHEM214 combined
Restricted paper(s): CHEM202, CHEM232, CHEM212, CHEM214, CHEMY201
Assessment: Internal assessment/examination ratio 50:50

CHEMY203-19A (HAM)
INORGANIC CHEMISTRY
This paper covers aspects of inorganic chemistry including structure and reactivity of the main-group elements; point-group symmetry; molecular orbital, crystal field theories; transition metal coordination complexes.

Paper coordinator(s): Professor Bill Henderson
Prerequisites: CHEMY101 or CHEM111
Equivalent paper(s): CHEM211 and CHEM213 combined
Restricted paper(s): CHEM203, CHEM211, CHEM213
Assessment: Internal assessment/examination ratio 50:50
CHEMY204-19A (HAM)
ANALYTICAL CHEMISTRY
This paper covers aspects of analytical chemistry including characterisation using nuclear magnetic resonance (NMR) and mass-spectrometry (MS); qualitative and quantitative analysis of mixtures using gas chromatography (GC) and high-performance liquid chromatography (HPLC).

Paper coordinator(s): Associate Professor Michèle Prinsep
Prerequisites: CHEMY101 or CHEM111
Equivalent paper(s): CHEM211 and CHEM213 combined
Restricted paper(s): CHEM204, CHEM211, CHEM213, CHEM306, CHEMY203
Assessment: Internal assessment/examination ratio: 50:50

COMPX201-19A (HAM)
DATA STRUCTURES AND ALGORITHMS
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

COMPX202-19B (HAM)
MOBILE COMPUTING AND SOFTWARE ARCHITECTURE
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

COMPX203-19A (HAM)
COMPUTER SYSTEMS
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

COMPX204-19B (HAM)
PRACTICAL NETWORKING AND CYBER SECURITY
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

COMPX221-19A (HAM)
PROGRAMMING FOR CREATIVE INDUSTRIES
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

COMPX222-19B (HAM)
INTERNET APPLICATIONS
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

COMPX223-19A (HAM)
DATABASE PRACTICE AND EXPERIENCE
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

COMPX241-19A (HAM)
SOFTWARE ENGINEERING DEVELOPMENT
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.
COMPX242-19B (HAM)
SOFTWARE ENGINEERING PROCESS
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

COMPX251-19A/B/S (HAM) & 19A(TGA)
APPLIED COMPUTING TOOLS 1
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

COMPX252-19A/B/S (HAM)
INTERACTIVE COMPUTING
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

EARTH211-19A (HAM)
EARTH RESOURCES AND MATERIALS
An introduction to the nature, composition and origin of earth resources and materials. Topics covered include: minerals in society and their properties; origin of igneous, sedimentary and metamorphic rocks; volcanological and sedimentary processes and the importance of earth materials as sources for resources used by society.

Paper coordinator(s): Dr Andrew La Croix
Prerequisites: EARTH102 or ERTH103
Restricted paper(s): ERTH221
Assessment: Internal assessment/examination ratio 50:50

EARTH221-19B (HAM)
SOIL SCIENCE
An introduction to the nature, formation, and classification of soils, their physical, chemical, mineralogical, and biological properties, and issues of soil quality, land degradation and sustainable management.

Paper coordinator(s): Professor David Lowe
Prerequisites: EARTH101 or ENVSC101 or ERTH104 or ENV101
Restricted paper(s): ERTH233, ERTH234
Assessment: Internal assessment/examination ratio 50:50

EARTH231-19A (HAM)
WATER RESOURCES, WEATHER AND CLIMATE
New Zealand’s water resources are coming under increasing pressure for human use, while their management requires that they also provide for healthy freshwater ecosystems. This paper describes the key physical processes that influence the distribution of water in space and time from a New Zealand perspective. Topics covered include atmospheric processes at a range of space and timescales that ultimately affect the availability of water across New Zealand’s diverse landscapes, including changes in climate into the future; a description of New Zealand’s water resources and key hydrological processes acting on water and affecting its availability; and utilisation and modification of hydrological systems and processes by human activities.

Paper coordinator(s): Associate Professor Dave Campbell
Prerequisites: EARTH101 or ENVSC101 or ERTH103 or ERTH104 or ENV101 or GOC103
Restricted paper(s): ERTH245
Assessment: Internal assessment/examination ratio 50:50
EARTH241-19B (HAM)
OCEANOGRAPHY
This paper introduces students to the broad scale properties, issues, and research importance of the global ocean via the main disciplines of oceanography: particularly biological, chemical, geological and physical oceanography.

Paper coordinator(s): Dr Julia Mullarney
Prerequisites: EARTH101 or ENVSC101 or ERTH104 or ENV101
Restricted paper(s): ERTH242
Assessment: Internal assessment/examination ratio 50:50

EARTH251-19B (HAM)
SPATIAL ANALYSIS IN GEO SCIENCES
An introduction to quantitative spatial analysis in the geosciences, including production of maps and cross-sections of geomorphology and Earth materials from field and aerial image interpretation, use of 3D models of Earth materials, and an appreciation of volumes and stresses in the Earth’s crust.

Paper coordinator(s): Dr Vicki Moon
Prerequisites: EARTH102 or ERTH103
Restricted paper(s): ERTH222 and ERTH251
Assessment: Internal assessment/examination ratio 50:50

ENGEN201-19B (HAM)
ENGINEERING MATHEMATICS 2
Calculus of Several Variables and its Applications. Vector calculus (Green’s, Gauss’ and Stokes’ theorems). Taylor’s Theorem in n dimensions. Introduction to partial differential equations. Fourier series.

Note: There is a compulsory lab component.
Paper coordinator(s): Please see 2019 Engineering Handbook
Prerequisites: ENGEN183 or ENGG183 and ENGEN184 or ENGG184
Equivalent paper(s): ENGG284, ENGG285
Restricted paper(s): MATH251, MATH255, MATHS201, MATHS203
Assessment: Internal assessment/examination ratio: 50:50

ENGME280-19B (HAM)
DESIGN AND MANUFACTURING 1
This paper covers the fundamentals of engineering design and manufacture.

Paper coordinator(s): Please see 2019 Engineering Handbook
Prerequisites: ENGEN180 or ENGG180
Restricted paper(s): ENGG282, ENMP215
Assessment: Internal assessment/examination ratio 100:0
ENGMP211-19A (HAM)

MATERIALS 1
This paper will provide a foundation for understanding the relationship between material structure, processing and behaviour to support engineering of materials and engineering with materials.

Paper coordinator(s): Please see 2019 Engineering Handbook
Prerequisites: 15 points at Level 100 in Chemistry or equivalent credit, or ENGEN112 or ENMP102
Restricted paper(s): ENMP211
Assessment: Internal assessment/examination ratio 50:50

ENGMP213-19A (HAM)

MECHANICS OF MATERIALS 1
Stress and failure analysis of statically determinant and material systems under axial, bending and torsional loads, including beam deflections, buckling of struts, shear in joints, twisting in circular shafts and couplings.

Paper coordinator(s): Please see 2019 Engineering Handbook
Prerequisites: (ENGEN112 or ENMP102) and (ENGEN110 or ENGG110
Restricted paper(s): ENMP213, ENGCV212
Assessment: Internal assessment/examination ratio 50:50

ENVPL202-19B (HAM)

CARTOGRAPHY AND SPATIAL ANALYSIS
This paper is the second year component of the GIS stream in Geography; it balances technical skill developments and critical analyses in urban and environmental planning.

Paper coordinator(s): Please see 2019 School of Arts & Social Sciences Handbook
Restricted paper(s): ENVP207, GEOG228
Assessment: Internal assessment/examination ratio: 100:0

ENVSC201-19B (HAM)

ENVIRONMENTAL MONITORING
An introduction to reasons for, and design and implementation of, environmental monitoring in New Zealand. Skills in data collection, management, presentation, and interpretation are developed for a range of environments using both field data collection and published data-sets.

Paper coordinator(s): Dr Julia Mularney
Prerequisites: ENVSC101 or ENVST101
Restricted paper(s): ERTH284, ERTH384
Assessment: Internal assessment/examination ratio 50:50

ENVSC202-19A (HAM)

ENVIRONMENTAL CHEMISTRY AND GEOCHEMISTRY
This paper is a broad introduction into environmental chemistry and geochemistry including the formation of the elements, chemical evolution of Earth, modern Earth surface processes, fossil fuels and biomarkers, global biogeochemical cycling, atmospheric chemistry and global climate change.

Paper coordinator(s): Dr Megan Grainger
Prerequisites: CHEMY100 or CHEMY101 or CHEMY102 or CHEM100 or CHEM111 or CHEM112
Restricted paper(s): CHEM200, CHEM261
Assessment: Internal assessment/examination ratio: 50:50
MATHS201-19B (HAM)
CONTINUING CALCULUS
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

MATHS202-19A (HAM)
LINEAR ALGEBRA
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

MATHS203-19B (HAM)
DIFFERENTIAL EQUATIONS AND MODELLING
Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

PSYCH203-19B (HAM) & (TGA)
BRAIN, COGNITION, AND DEVELOPMENT
This paper will provide students with an overview of current findings and theories of cognitive neuroscience, cognitive development, and cognitive processes such as memory, attention, language, and decision making.

Paper coordinator(s): Please see 2019 School of Arts & Social Sciences Handbook
Restricted paper(s): PSYC230
Assessment: Internal assessment/examination ratio: 100:0

PSYCH204-19A (HAM) & (TGA)
BEHAVIOURAL PSYCHOLOGY AND PERCEPTION
Students will learn the basic assumptions of the philosophy of behaviourism, the principles of behaviour analysis, and how those principles can be applied to issues of clinical and community importance.

Paper coordinator(s): Please see 2019 School of Arts & Social Sciences Handbook
Prerequisites: PSYCH100 or PSYC103
Restricted paper(s): PSYC225 and PSYC226
Assessment: Internal assessment/examination ratio: 100:0

PSYCH211-19A (HAM) & (TGA)
UNDERSTANDING PSYCHOLOGICAL RESEARCH
This paper will cover the basic methodological approaches relevant to psychological and social science research, including research design, data collection, data analysis, and the dissemination of research.

Paper coordinator(s): Please see 2019 School of Arts & Social Sciences Handbook
Prerequisites: PSYCH100 or PSYC101 (or equivalents)
Restricted paper(s): PSYC208
Assessment: Internal assessment/examination ratio: 100:0
SCIEN270-19B (HAM)

PREPARATION FOR THE PROFESSIONAL WORKPLACE

This paper constitutes preparation for the scientific workplace, and includes CV preparation, interview technique, career mentoring/direction, skill identification, organisational; management structures, self-assessment tools, and professional behaviour.

Paper coordinator(s): Dr Karsten Zegwaard
Restricted paper(s): SCIE279 and SCIEN279
Assessment: Internal assessment/examination ratio: 100:0

STATS221-19A (HAM)

STATISTICAL DATA ANALYSIS

Please refer to the School of Computing & Mathematical Sciences Handbook for further details.

STATS226-19B (HAM)

BAYESIAN STATISTICS

Please refer to the School of Computing & Mathematical Sciences Handbook for further details.
300 LEVEL PAPERS

BIOEB301-19B (HAM)
ADVANCED ANIMAL BEHAVIOUR
This paper examines how animals interact with each other and with their environments. Content and context will be drawn from New Zealand ecology and conservation, lab and captive environments. Students will acquire skills in field and lab measurement of animal behaviour, research project design, data collection, data analysis and report presentation.

Paper coordinator(s): Dr Christina Painting
Prerequisites: BIOEB203 and BIOEB200 are recommended
Restricted paper(s): BIOL333
Assessment: Internal assessment/examination ratio 50:50

BIOEB302-19B (HAM)
ADVANCED ZOOLOGY
An examination of the evolutionary biology of animals, including structure, function and evolutionary adaptation of selected invertebrates and vertebrates.

Paper coordinator(s): Dr Andrew Barnes
Prerequisites: BIOEB201 or BIOL201 or BIOL234
Restricted paper(s): BIOL338
Assessment: Internal assessment/examination ratio 50:50

BIOEB303-19A (HAM) & (TGA)
TERRESTRIAL ECOLOGY
A paper that explores ecological principles and ecosystem dynamics, functioning, restoration and conservation ecology of New Zealand forest ecosystems.

Paper coordinator(s): Dr Andrew Barnes
Prerequisites: BIOEB202 or BIOL212, or NZ Diploma in Environmental Management (Level 6)
Restricted paper(s): BIOL312
Assessment: Internal assessment/examination ratio 60:40

BIOEB304-19A (HAM) & (TGA)
FRESHWATER ECOLOGY
An introduction to the ecology of lakes and rivers. Topics covered include the structure and function of major freshwater communities, fish and fisheries, human impacts and the management of inland waters.

Paper coordinator(s): Professor Brendan Hicks
Prerequisites: BIOEB202 or BIOL212 or NZ Diploma in Environmental Management (Level 6)
Restricted paper(s): BIOL313
Assessment: Internal assessment/examination ratio: 50:50
BIOEB305-19B (HAM) & (TGA)  
**MARINE ECOLOGY**  
An introduction to the structure and functioning of marine ecosystems. The paper explores the fundamentals of ecology (e.g. disturbance/recovery, recruitment, organism interactions with their environment, nutrient cycles, limits on productivity) in a marine setting. We also cover human impacts on marine environments including fisheries as well as the design of ecological surveys and experiments. Field trip and practical classes are integral to the paper.  
**Paper coordinator(s):** Professor Conrad Pilditch  
**Prerequisites:** BIOEB202 or BIOL212 or NZ Diploma in Environmental Management (Level 6)  
**Restricted paper(s):** BIOL314  
**Assessment:** Internal assessment/examination ratio: 50:50

BIOEB307-19B (HAM)  
**ADVANCED PLANT BIOLOGY**  
An introduction to the discipline of plant physiological ecology and the interactions between plants and their environment. Includes an emphasis on practical techniques for measuring plant microclimate, photosynthesis and growth.  
**Paper coordinator(s):** Associate Professor Mike Clearwater  
**Prerequisites:** BIOEB204 or BIOL223  
**Restricted paper(s):** BIOL325  
**Assessment:** Internal assessment/examination ratio: 50:50

BIOEB324-19B (TGA)  
**AQUACULTURE**  
This is an introduction to the reproductive and early life history of target aquaculture species, focusing on New Zealand fish and shellfish species, and comparing this with successful aquaculture species from tropical environments.  
**Paper coordinator(s):** Professor Chris Battershill  
**Prerequisites:** BIOEB203 or BIOL234 or NZ Diploma in Environmental Management (Level 6)  
**Restricted paper(s):** BIOL224  
**Assessment:** Internal assessment/examination ratio: 60:40

BIOMO301-19B (HAM)  
**ADVANCED BIOCHEMISTRY**  
This paper examines molecular mechanisms underlying cellular communication and trafficking of proteins between organelles, cellular stress responses, cell death, and the degradation of biomolecules. The molecular basis of human diseases such as diabetes and how protein structures are determined, the process of nucleotide metabolism and transcription and features of molecular motors (such as the ATP synthase) are also examined. Critical evaluation and oral presentations from primary research findings in biochemistry and molecular cell biology form part of the directed study section.  
**Paper coordinator(s):** Dr Ryan Martinus  
**Prerequisites:** BIOMO201 or BIOL251  
**Restricted paper(s):** BIOL351 and ENMP425  
**Assessment:** Internal assessment/examination ratio 50:50
BIOMO302-19A (HAM)  
**ADVANCED GENETICS**  
A study of advanced microbial and eukaryotic genomes, DNA topology, next generation sequencing, the expression of genes, genetic variation, inheritance patterns, human disease, complex traits, bioinformatics, population genetics and protein evolution.  
**Paper coordinator(s):** Dr Linda Peters  
**Prerequisites:** BIOMO202 or BIOL210  
**Restricted paper(s):** BIOL310  
**Assessment:** Internal assessment/examination ratio 50:50

BIOMO303-19B (HAM)  
**ADVANCED MICROBIOLOGY**  
This paper provides knowledge of microbial functions and the role of the microbiome in human and ecosystem health.  
**Paper coordinator(s):** Dr Charles Lee  
**Prerequisites:** BIOMO203 or BIOL241  
**Restricted paper(s):** BIOL341  
**Assessment:** Internal assessment/examination ratio 50:50

BIOMO304-19A (HAM)  
**APPLIED ANIMAL PHYSIOLOGY**  
This paper provides a knowledge of mammalian physiology and its application to research in health, exercise and primary production.  
**Paper coordinator(s):** Associate Professor Pawel Olszewski  
**Prerequisites:** BIOMO204 or BIOL235  
**Restricted paper(s):** BIOL335  
**Assessment:** Internal assessment/examination ratio: 50:50

BIOMO306-19B (HAM)  
**MOLECULAR BIOLOGY AND HEALTH**  
This paper provides experience in the application of molecular biology knowledge and skills in the health sciences. Throughout the paper there is an emphasis on the application of molecular techniques, bioinformatic approaches, data collection, data analysis and report presentation.  
**Paper coordinator(s):** Associate Professor Brett Langley  
**Prerequisites:** BIOMO202 and a further 15 points of 200-level BIOMO papers  
**Assessment:** Internal assessment/examination ratio: 50:50
CHEMY301-19A (HAM)
ADVANCED ORGANIC CHEMISTRY
This paper covers advanced aspects of organic chemistry including pericyclic reactions, natural product chemistry, organic synthesis including retrosynthetic analysis and stereo-electronic influences in carbohydrate chemistry.

Paper coordinator(s): Professor Merilyn Manley-Harris
Prerequisites: CHEMY201 or CHEM212 and CHEM214
Restricted paper(s): CHEM301, CHEM312, CHEM314
Assessment: Internal assessment/examination ratio 50:50

CHEMY302-19A (HAM)
ADVANCED PHYSICAL CHEMISTRY
This course covers advanced aspects of physical chemistry including quantum mechanics and spectroscopy; statistical thermodynamics; surface chemistry.

Paper coordinator(s): Dr Marcus Wilson
Prerequisites: CHEMY202 or CHEM212 and CHEM214
Restricted paper(s): CHEM302, CHEM312, CHEM314
Assessment: Internal assessment/examination ratio 50:50

CHEMY303-19B (HAM)
ADVANCED INORGANIC CHEMISTRY
This paper covers advanced aspects of inorganic chemistry including heavy transition elements; f-elements; organometallic chemistry of main group and transition metals; bioinorganic chemistry; solid state chemistry; green chemistry.

Paper coordinator(s): Associate Professor Graham Saunders
Prerequisites: CHEMY203 or CHEM211 and CHEM213
Restricted paper(s): CHEM303, CHEM311, CHEM313
Assessment: Internal assessment/examination ratio 50:50

CHEMY304-19B (HAM)
ADVANCED ANALYTICAL CHEMISTRY
This paper covers advanced aspects of analytical chemistry including ICP-MS, quality assurance, quality control, statistical analysis, CHN analyses, Mossbauer spectroscopy, Raman spectroscopy and surface plasmon resonance.

Paper coordinator(s): Dr Megan Grainger
Prerequisites: CHEMY204 or CHEM211 and CHEM213
Restricted paper(s): CHEM311, CHEM313
Assessment: Internal assessment/examination ratio: 50:50
EARTH311-19A (HAM)

VOLCANOLOGY
A study of pyroclastic rocks, physical volcanology, volcanic hazards, the origin of magmas, crystallisation of rock-forming minerals and phase equilibria, petrology and trace element geochemistry of volcanic rocks, and geothermal and mineral resources.

Paper coordinator(s): Dr Adrian Pittari
Prerequisites: EARTH211; EARTH251 is recommended.
Restricted paper(s): ERTH321
Assessment: Internal assessment/examination ratio: 50:50

EARTH312-19B (HAM)

SEDIMENTARY GEOLOGY
The ultimate goal of sedimentary geology is to reconstruct the history of the Earth’s surface. This paper explores the links between sedimentary rocks and past environments through two major strands: reconstructing depositional environments and understanding the effects of sea-level change on sedimentary processes (sequence stratigraphy). A third strand explores the economic aspects of sedimentary geology, in particular aspects of petroleum geology, including unconventional resources. The paper includes an integrated lab-field component, with a three-day field mapping trip to the North Taranaki region.

Paper coordinator(s): Dr Andrew La Croix
Prerequisites: EARTH211; EARTH251 is recommended.
Restricted paper(s): ERTH322
Assessment: Internal assessment/examination ratio: 60:40

EARTH313-19A (HAM)

ENGINEERING GEOLOGY
Engineering Geology is the application of the principles of earth sciences to ensure hazards associated with landslides or unfavourable soil and rock conditions are identified in engineering or environmental work. This paper gives an introduction to the field of engineering geology. Topics covered include: landslide processes and their recognition based on geomorphic evidence; an introduction to rock and soil mechanics; the role of the geological model in engineering geology; slope stability analysis; and site investigation methods.

Paper coordinator(s): Dr Vicki Moon
Prerequisites: EARTH211 or EARTH221; EARTH251 is recommended.
Restricted paper(s): ERTH352, ENGCV231
Assessment: Internal assessment/examination ratio: 50:50

EARTH321-19B (HAM)

PEDOLOGY AND LAND EVALUATION
This paper comprises two parts that together examine the role of pedology in land-use related issues and land management. Part (1): the stratigraphy of soils, their formation and classification in New Zealand; the occurrence and variability spatially of soils, and how they can be mapped using classical and digital techniques including the use of geostatistics. Part (2): land evaluation, the interpretation of soil and land data in forms applicable to land-use planning and management.

Paper coordinator(s): Professor David Lowe
Prerequisites: EARTH221
Restricted paper(s): ERTH333
Assessment: Internal assessment/examination ratio: 60:40
EARTH322-19A (HAM)
SOIL AND WATER MANAGEMENT
This paper integrates an understanding of land/soil and water processes that occur at paddock to catchment to national scales. A focus is on management practices that optimise resource use for productive purposes with attention to avoidance or minimisation of environmental effects. Topics include soil degradation, soil fertility, nitrogen and phosphorus cycling, coupled to the hydrological setting within which land-use practices lie. Hydrological concepts build on an understanding of catchment-scale processes, analysis of hydrological regimes, and the estimation of water balance components including evaporation and drainage. Topics in the paper are set within the context of resource management law and the National Policy Statement for Freshwater Management (NPS-FM).

Paper coordinator(s): Dr Tanya O’Neill
Prerequisites: EARTH221
Restricted paper(s): ERTH334 and ERTH345
Assessment: Internal assessment/examination ratio: 60:40

EARTH331-19B (HAM)
HYDROLOGY
This paper introduces students to the techniques of both resource and hazard analysis of fresh water. There is a focus on groundwater modelling for resource studies, at the regional level and for analysis of pumped wells. There are also aspects of surface water application, including hydro power studies. Hazard aspects will include the analysis of floods and droughts, and impacts on water resources by agriculture and industry. Guest lecturers will provide case studies of water resource management in industry and regional councils. There will be a one-day field trip to the Tongariro power scheme as a case study of a water-collecting hydro power system.

Paper coordinator(s): Associate Professor Earl Bardsley
Prerequisites: EARTH231
Restricted paper(s) ERTH246 and ERTH346
Assessment: Internal assessment/examination ratio: 100:0

EARTH341-19A (HAM)
COASTAL OCEANOGRAPHY
This paper focuses on the physical oceanography of the coastal zone. Topics include estuarine circulation, wind-driven currents on the shelf, longwaves, resonance, seiching, methodologies for quantifying processes and coastal responses, waves and surfzone processes.

Paper coordinator(s): Professor Karin Bryan
Prerequisites: EARTH241
Restricted paper(s) ERTH344
Assessment: Internal assessment/examination ratio: 60:40
EARTH342-19B (HAM) & (TGA)
COASTAL GEOMORPHOLOGY AND MANAGEMENT
This paper focuses on understanding of coastal processes, sediments, and evolution of coastal landforms as a basis for coastal management. Topics covered include coastal sediments and processes; coastal landforms, their origin and evolution; coastal hazards and their mitigation; and case studies of coastal issues.

Paper coordinator(s): Dr Willem de Lange
Prerequisites: EARTH241
Restricted paper(s): ERTH343
Assessment: Internal assessment/examination ratio: 60:40

ENGMP311-19B (HAM)
MATERIALS 2
This paper will develop understanding of the relationship between material structure, processing and behaviour to support engineering of materials and engineering with materials.

Paper coordinator(s): Please see 2019 Engineering Handbook
Prerequisites: ENGMP211 or ENMP211
Restricted paper(s): ENMP311
Assessment: Internal assessment/examination ratio: 50:50

ENGMP312-19A (HAM)
MATERIALS MANUFACTURE
This paper deals with advanced materials science knowledge and principles underlying materials engineering. It focuses on the relationships between processing conditions and microstructures of materials and major materials processing technologies.

Paper coordinator(s): Please see 2019 Engineering Handbook
Prerequisites: Departmental approval required
Restricted paper(s): ENGMP512, ENMP411
Assessment: Internal assessment/examination ratio: 20:80

ENVPL303-19B (HAM)
ENVIRONMENTAL ASSESSMENT AND POLICY
To provide an understanding of the types of environmental assessments and the policy process.

Paper coordinator(s): Please see 2019 School of Arts & Social Sciences Handbook
Assessment: Internal assessment/examination ratio: 70:30

PSYCH307-19B (HAM) & (TGA)
PSYCHOLOGICAL RESEARCH METHODS
The paper covers research theory and methods, making students critical consumers of psychological research. It expands on concepts taught in PSYCH211 to build more advanced research skills.

Paper coordinator(s): Please see 2019 School of Arts & Social Sciences Handbook
Prerequisites: PSYCH211
Restricted paper(s): PSYC307
Assessment: Internal assessment/examination ratio: 100:0
PSYCH314-19B (HAM) & (TGA)
**BEHAVIOURAL ANALYSIS**
This course is intended to give students an understanding of the philosophy of behaviourism, experimental methods used in the study of behaviour, and the application of behavioural principles.

**Paper coordinator(s):** Please see 2019 School of Arts & Social Sciences Handbook
**Prerequisites:** PSYCH204 and PSYCH211 or equivalent
**Restricted paper(s):** PSYC314
**Assessment:** Internal assessment/examination ratio: 100:0

PSYCH319-19B (HAM) & (TGA)
**INFANT AND CHILD DEVELOPMENT**
The objective of this paper is to provide students with an understanding of infants' and children's cognitive, emotional, and social development from a psychological perspective.

**Paper coordinator(s):** Please see 2019 School of Arts & Social Sciences Handbook
**Prerequisites:** PSYCH203 and PSYCH211 or permission from the convenor
**Restricted paper(s):** PSYC319
**Assessment:** Internal assessment/examination ratio: 100:0

PSYCH322-19A (HAM)
**MEMORY AND COGNITION**
Research, theories and principles in memory and cognition, with an emphasis on the applications to real-world problems, such as the overlap of psychology and the law.

**Paper coordinator(s):** Please see 2019 School of Arts & Social Sciences Handbook
**Prerequisites:** PSYCH203 and PSYCH211 (PSYCH204 recommended)
**Restricted paper(s):** PSYC340
**Assessment:** Internal assessment/examination ratio: 100:0

PSYCH337-19B (HAM)
**INDIVIDUAL DIFFERENCES AND MEASUREMENT**
This course will cover measurement issues in psychology, and a range of basic measurement techniques. It will include coverage of theories of intelligence and of personality and their measurement.

**Paper coordinator(s):** Please see 2019 School of Arts & Social Sciences Handbook
**Prerequisites:** PSYCH211 or equivalent
**Restricted paper(s):** PSYC337
**Assessment:** Internal assessment/examination ratio: 65:35

PSYCH338-19B (HAM) & (TGA)
**ABNORMAL PSYCHOLOGY**
This course offers an introduction to the definition, assessment, and treatment of mental disorders.

**Paper coordinator(s):** Please see 2019 School of Arts & Social Sciences Handbook
**Prerequisites:** PSYCH211 or equivalent
**Restricted paper(s):** PSYC338
**Assessment:** Internal assessment/examination ratio: 60:40
SCIEN300-19T (HAM)
**SCIENCE COMMUNICATION**
This paper discusses different ways in which science can be communicated by scientists to others. It gives students opportunities to practise verbal, written, graphical and other forms of communication.

*Paper coordinator(s): Dr Marcus Wilson*
*Prerequisites: 30 points in 100 level science papers*
*Restricted paper(s): SCIE300*
*Assessment: Internal assessment/examination ratio: 100:0*

SCIEN301-19A/B/C (HAM) & (TGA)
**CAPSTONE PROJECT**
Students complete an interdisciplinary group project on a topic of relevance to the scientific or wider community. For a list of available projects, please contact the paper coordinator.

*Paper coordinator(s): Associate Professor Joseph Lane*
*Prerequisites: Minimum of 120 points in science*
*Restricted paper(s): SCIE303, SCIE313, SCIE314 or SCIE371*
*Assessment: Internal assessment/examination ratio: 100:0*

SCIEN303-19A/B (HAM) & (TGA)
**UNDERGRADUATE RESEARCH PROJECT**
Students carry out an independent research project on an approved topic under staff supervision. For a list of available projects, please contact the paper coordinator.

*Paper coordinator(s): Associate Professor Graham Saunders*
*Prerequisites: Entry into the paper is at the discretion of the paper coordinator.*
*Restricted paper(s): BIOL307, CHEM304, ERTH311, ERTH312, SCIE301, SCIE302, SCIE301, SCIE313, SCIE314 and SCIE371*
*Assessment: Internal assessment/examination ratio: 100:0*

SCIEN305-19B (HAM)
**SCIENCE AND MĀTAURANGA MĀORI**
This paper will provide science graduates with an understanding of both scientific and Mātauranga Māori perspectives on topical issues and the ability to apply these in a Vision Mātauranga context.

*Paper coordinator(s): Dr Alison Campbell*
*Prerequisites: No Te Reo prerequisites; students should have at least 60 points in 200-level Science papers.*
*Assessment: Internal assessment/examination ratio: 100:0*

SCIEN313-19C (HAM) & (TGA)
**UNDERGRADUATE RESEARCH PROJECT**
*30 points*
Students carry out an independent research project on an approved topic under staff supervision. For a list of available projects, please contact the paper coordinator.

*Paper coordinator(s): Associate Professor Graham Saunders*
*Prerequisites: Entry into the paper is at the discretion of the paper coordinator.*
*Restricted paper(s): SCIE301, SCIE302, SCIE301, SCIEN303, SCIEN314, SCIEN371, BIOL307, CHEM304, ERTH311 and ERTH312*
*Assessment: Internal assessment/examination ratio: 100:0*
SCIEN371-19C (HAM)  
SCIENCE WORK PLACEMENT  
30 points  
This paper provides a full-immersion, authentic work experience that is relevant to a student's study, in a professional workplace.  

Paper coordinator(s): Dr Karsten Zegwaard  
Prerequisites: SCIEN279, SCIEN270 or SCIE279  
Restricted paper(s): SCIE371, SCIE372, SCIE373, and SCIE374  
Assessment: Internal assessment/examination ratio: 100:0

SCIEN372-19C (HAM)  
SCIENCE WORK PLACEMENT 2  
This paper provides a full-immersion, authentic work experience that is relevant to a student's study, in a professional workplace.  

Paper coordinator(s): Dr Karsten Zegwaard  
Prerequisites: SCIEN279, SCIEN279 or SCIEN371  
Restricted paper(s): SCIE372  
Assessment: Internal assessment/examination ratio: 100:0

SCIEN373-19C (HAM)  
20 points  
SCIENCE WORK PLACEMENT 3  
This paper provides a full-immersion, authentic work experience that is relevant to a student's study, in a professional workplace.  

Paper coordinator(s): Dr Karsten Zegwaard  
Prerequisites: SCIEN279, SCIEN279 or SCIEN372  
Restricted paper(s): SCIE373  
Assessment: Internal assessment/examination ratio: 100:0

SCIEN374-19C (HAM)  
20 points  
SCIENCE WORK PLACEMENT 4  
This paper provides a full-immersion, authentic work experience that is relevant to a student's study, in a professional workplace.  

Paper coordinator(s): Dr Karsten Zegwaard  
Prerequisites: SCIEN279, SCIEN279 or SCIEN371  
Restricted paper(s): SCIE374  
Assessment: Internal assessment/examination ratio: 100:0
GRADUATE STUDY
The challenges facing society require research that transcends disciplinary boundaries and increased flexibility in the ways we seek to understand the world and the ways we prepare students for the future.

The School of Science provides research and postgraduate study opportunities whereby 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 sub-disciplines, supported by the primary research interests of staff. These research projects are supported by multi-million dollar investments from national and local government, many of which have significant iwi and other community involvement. Funding also supports a variety of student and collaborative projects, together with scholarships and postgraduate opportunities.

Employers recognise Waikato graduates for their analytical and problem-solving skills as well as for their high level of practical abilities – including hands-on bench and modern instrumentation skills. Get in touch with the closest postgraduate convenor to your research interest and create a plan to suit you.

**ECOLOGY AND BIODIVERSITY POSTGRADUATE CONVENOR**

Dr Chrissen Gemmill  
Room: CD.1.01  
Email: chrissen.gemmill@waikato.ac.nz

**MOLECULAR AND CELLULAR BIOLOGY POSTGRADUATE CONVENOR**

Professor Ian McDonald  
Room: TRU.G.24  
Email: ian.mcdonald@waikato.ac.nz

**CHEMISTRY POSTGRADUATE CONVENOR**

Associate Professor Michèle Prinsep  
Room: E.3.06  
Email: michele.prinsep@waikato.ac.nz

**EARTH SCIENCES POSTGRADUATE CONVENOR**

Dr Adrian Pittari  
Room: DE.3.01  
Email: adrian.pittari@waikato.ac.nz

**ENVIRONMENTAL SCIENCES POSTGRADUATE CONVENOR**

Associate Professor Kevin Collier  
Room: R.2.16  
Email: kevin.collier@waikato.ac.nz
GRADUATE AND POSTGRADUATE QUALIFICATIONS SUMMARY

The School of Science brings together the subjects of Biology, Chemistry and Earth Sciences into a cohesive cross-disciplinary unit providing greater opportunities in teaching and research.

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

- Bachelor of Science with Honours (BSc(Hons))
- Graduate Certificate (GradCert)
- Graduate Diploma (GradDip)
- Postgraduate Certificate (PGCert)
- Postgraduate Diploma (PGDip)
- Master of Science (MSc)
- Master of Environmental Sciences (MEnvSci)
- Master of Science (Research) (MSc(Research))
- Master of Science (Technology) (MSc(Tech))
- Master of Philosophy (MPhil)
- Doctor of Philosophy (PhD).

Most graduate programmes require candidates to have completed a bachelors degree with a major in the relevant subject. Students must contact their postgraduate adviser to complete a Graduate Planner Form before their papers can be approved.
GRADUATE AND POSTGRADUATE QUALIFICATIONS

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

BACHELOR OF SCIENCE WITH HONOURS (BSC(HONS))

The BSc(Hons) is a one-year, 120 point, graduate qualification available to students who have completed a BSc or BSc(Tech) and who have reached a high standard in their major subject.

Admission to this degree is by invitation only.

Intending candidates for the degree should discuss these requirements with the Postgraduate Convenor for the relevant subject.

BSC(HONS) REQUIREMENTS

BSc(Hons) students are required to complete 120 points at 500 level including a dissertation normally worth 60 points (SCIEN592).

BSC(HONS) DEGREE PLANNER 120 points 1 year

- Subject Papers at 500 level (60 points)
- SCIEN592 Dissertation (60 points)

GRADUATE CERTIFICATES (GRADCERT)

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

GRADCERT PLANNER 60 points 6 months

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

GRADDIP PLANNER 120 points 1 year

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POSTGRADUATE CERTIFICATES (PGCERT)
The Postgraduate Certificate (PGCert) is a qualification for graduates with at least a bachelors degree in a related subject. The normal minimal time for completion of the PGCert is one semester. You will need to pass 60 points at 500 level in your subject area.

POSTGRAD CERT PLANNER 60 points 6 months

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

You should design your programme in consultation with the Postgraduate Convenor in the relevant subject.

PGDIP PLANNER 120 points 1 year

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MASTERS QUALIFICATIONS

MASTER OF SCIENCE (MSc)

The MSc is valued for its flexibility and excellence. You can select your papers from a range of subjects and the mix of research and taught papers are customised to suit your interests and goals.

Study a MSc at Waikato University and you will enjoy more lab and field work, more one-on-one time with top academics and access to world-class research equipment. Our great industry contacts will also mean exciting collaborations with local, national and international companies and organisations.

Admission requires a relevant Bachelors level qualification or equivalent, with at least a B grade average across the 300 level papers. If you do not hold the appropriate qualifications required for direct entry, you may be eligible to apply for a pathway via a Postgraduate Diploma in a relevant subject.

The MSc normally takes 12-18 months of full-time study to complete. The degree requires 180 points, which is made up of 120 points in taught papers and a 60-point dissertation (research project).

MSc DEGREE PLANNER 180 points 16 months

| Elective / Preparatory Papers (60 points) | Subject Papers (60 points) | SCIENS592 Dissertation (60 points) |

MASTER OF SCIENCE (RESEARCH) (MSc(Research))

The MSc(Research) is an internationally-recognised qualification, suitable for students who want a complete research experience, coupled with taught papers. A core feature of the degree is the development of independent research skills, including the collection and analysis of data and critical review of the relevant literature.

Admission requires a relevant Bachelors level qualification or equivalent, with at least a B grade average across the 300 level papers. If you do not hold the appropriate qualifications required for direct entry, you may be eligible to apply for a pathway via a Postgraduate Certificate or Diploma.

The MSc(Research) normally takes one and half academic years of full-time study to complete, but you have the option to complete on a part-time basis. In the first semester, you will complete 60 points of taught papers with the remaining period spent doing a 120 point research thesis. The thesis must comprise a satisfactory record of research undertaken by the candidate, or a satisfactory critical survey of knowledge in the approved field of study. It must show competence in the appropriate method of research and/or an adequate knowledge of the field of study; exhibit independence of approach or presentation; be satisfactory in literary presentation; and include full reference to the literature.

MSc(Research) DEGREE PLANNER 180 points 16 months

| Subject Papers (60 points) | SCIENS594 Thesis (120 points) |
MASTER OF SCIENCE (TECHNOLOGY) (MSc(TECH))

The MSc(Tech) is a unique degree that allows students to complete a relevant, real-world research project in combination with an industry partner or other external stakeholder.

To enrol in an MSc(Tech) you must have completed (or almost completed) a BSc or BSc(Tech) degree with a major in the relevant subject and attained good enough grades for advanced study. If you have a PGDip you may be eligible to enter directly into the second year of the MSc(Tech). The degree may be awarded with or without honours.

The MSc(Tech) is a one and a half year degree, consisting of 180 points, with 60 points of taught papers, 30 points of professional practice papers and a 90 point thesis that reports the results of an investigation relating to some applied or industrial study.

MSc(TECH) DEGREE PLANNER 180 points 16 months

| Subject Papers (60 points) | Professional Practice 1 (15 points) | SCIEN593 Thesis (90 points) | Professional Practice 2 (15 points) |

MASTER OF ENVIRONMENTAL SCIENCES (MENVSCI)

The MEnvSci is a degree that draws on a wide range of papers across the Biological, Chemical, Earth and Environmental Sciences.

To enrol in an MEnvSci you must have completed (or almost completed) a BSc or BSc(Tech) degree with a major in the relevant subject and attained good enough grades for advanced study. If you have a PGDip you may be eligible to enter directly into the second year of the MEnvSci. The degree may be awarded with or without honours.

The MEnvSci is normally a year and a half degree, consisting of a 120 points in taught papers and a 60 point dissertation. The balance of thesis papers to taught papers may be altered subject to permission from the Postgraduate Convenor.

MENVSCI DEGREE PLANNER 180 points 16 months

| Elective / Preparatory Papers (60 points) | Subject Papers (60 points) | SCIEN592 Dissertation (60 points) |

Please enquire with the FG Link Reception about other graduate qualification options.
HIGHER RESEARCH DEGREES

DOCTOR OF PHILOSOPHY (PhD)

To enrol for a PhD you normally need a bachelors with honours or masters degree with a research component of at least 30 points and have achieved at least Second Class Honours (First Division) or Distinction.

Once your online application is received, it will be considered on a competitive basis along with other applications, in March, July, or November respectively. If your application is accepted you will be sent an Offer of Place, and you will then be able to choose a start date for your study, which can be the first day of any month between February and November.

When you apply to undertake a Higher Research Degree, your application is assessed to check that you meet our admission criteria, as well as meeting any specific entry requirements for the qualification in which you wish to enrol. All incomplete or incorrect applications are unable to be considered further.

A PhD involves advanced study and research under the direction of a supervisor for at least three years (full-time). You write a thesis on an original investigation relating to some branch of your chosen subject (Chemistry, Earth Sciences, Ecology and Biodiversity, Environmental Sciences, Molecular and Cellular Biology).

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

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

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

HIGHER DEGREE APPLICATION PROCESS

PhD applicants apply online through the University online application portal at waikato.ac.nz/enrol.

Documentation required:

- A completed supplementary form - this is where you will provide the contact details for your academic referees and the name of any Waikato academic you may have been speaking to.
- A Statement of Research Interest.
- A sample of your academic writing.
- Copies of academic transcripts and certificates.
- Copy of passport.
- Evidence of English language proficiency.

Ensure that your two academic referees submit their letters of recommendation by the application closing date for which you are applying. Academic referees must submit their references directly to doctoralenrolments@waikato.ac.nz.
You will receive email notification of the outcome of your application and if appropriate, your scholarship application six weeks after the closing date. An offer of place in the higher degree programme will only be valid for 12 months. For more information visit waikato.ac.nz/study/apply/higher-research-degrees-application-process.

RESEARCH EXPERTISE DATABASE
We strongly recommend you search our research expertise database, which holds the research profiles of the University’s supervising staff. Here you will see if there is an academic undertaking research in your area of interest. You may wish to contact an academic to discuss possible supervision but it is not required before you submit your application. waikato.ac.nz/staff-profiles.

MASTER OF PHILOSOPHY (MPhil)
To enrol for a MPhil you normally need a bachelors with honours or masters degree with at least Second Class Honours (First Division) or Distinction. Like the PhD, this is a research degree, but of more limited scope, and the aim is to complete in one year (full-time). As with the PhD, you first choose a supervisor, topic, write a proposal and apply to the Postgraduate Studies Committee. You may be required to take up to two preliminary papers.

It is sometimes possible to transfer from an MPhil to a PhD, usually after one year, provided you have made good progress. An application and expanded research proposal must be submitted to the Postgraduate Studies committee.

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

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

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

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

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

EXAMINATION

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

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

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

FULL-TIME VS PART-TIME

Domestic candidates can apply for full-time or part-time enrolment and may apply to change this status at any stage during their enrolment in the degree.

International candidates are usually enrolled as full-time students as a condition of their student visa. International candidates studying full-time, are likely to qualify for domestic student fees, if they are residing in New Zealand during the period of their study. Those studying part-time may be required to pay international fees.

Full-time candidates should expect to devote the majority of their working time to their studies. The University defines full-time research study as a minimum of 30 hours per week on average over a period of 12 months that can be committed to study in reasonable 'blocks' of time. Part-time research study is defined as a minimum of 15 hours per week on average over a period of 12 months that can be committed to study in reasonable 'blocks' of time.

TAUGHT PAPERS VS THESIS PAPER

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

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

COASTAL MARINE GROUP
Director: Professor Chris Battershill
Phone: +64 7 557 0481
Email: chris.battershill@waikato.ac.nz
Web: sci.waikato.ac.nz/research/centres-and-units/cmg

CO-OPERATIVE EDUCATION UNIT
Director: Dr Karsten Zegwaard
Phone: +64 7 838 4892
Email: karsten.zegwaard@waikato.ac.nz
Web: sci.waikato.ac.nz/study/work-placements

ENVIRONMENTAL RESEARCH INSTITUTE
Director: Professor Karin Bryan
Phone: +64 7 838 4123
Email: karin.bryan@waikato.ac.nz
Web: waikato.ac.nz/eri

INTERNATIONAL CENTRE FOR TERRESTRIAL ANTARCTIC RESEARCH
Director: Professor Craig Cary
Phone: +64 7 858 4593
Email: craig.cary@waikato.ac.nz
Web: nztabs.ictar.aq

TE WAIORA FRESHWATER INSTITUTE
Director: Dr Chris Tanner
Phone: +64 7 856 1792
Email: contact@tewaiorafreshwater.co.nz
Web: tewaiorafreshwater.co.nz

THERMOPHILE & MICROBIAL BIOCHEMISTRY & BIOTECHNOLOGY UNIT
Director: Professor Ian McDonald
Phone: +64 7 838 5165
Email: ian.mcdonald@waikato.ac.nz
Director: Professor Craig Cary
Phone: +64 7 858 4593
Email: craig.cary@waikato.ac.nz
WAIKATO BIO-IMAGING FACILITY
Manager: Miss Bex Gibson  
Phone: +64 7 838 4287  
Email: bex.gibson@waikato.ac.nz  
Web: microscopy@waikato.ac.nz

WAIKATO CENTRE FOR ADVANCED MATERIALS (WAICAM)
Contact: Professor Kim Pickering  
Phone: +64 7 838 6753  
Email: engineering@waikato.ac.nz  
Web: sci.waikato.ac.nz/waicam

WAIKATO DNA SEQUENCING UNIT
Director: Dr Charles Lee  
Phone: +64 7 838 4757  
Email: charles.lee@waikato.ac.nz  
Web: bio.waikato.ac.nz/sequence

WAIKATO ELECTRON MICROSCOPE FACILITY
Manager: Helen Turner  
Phone: +64 7 858 5027  
Email: helen.turner@waikato.ac.nz  
Web: sci.waikato.ac.nz/research/facilities/microscopy@waikato

WAIKATO MASS SPECTROMETRY FACILITY
Manager: Professor Merilyn Manley-Harris  
Phone: +64 7 838 4384  
Email: merilyn.manley-harris@waikato.ac.nz  
Web: mass-spec.co.nz

WAIKATO RADIOCARBON DATING LAB
Director: Associate Professor Alan Hogg  
Phone: +64 7 838 4707  
Email: alan.hogg@waikato.ac.nz  
Web: radiocarbondating.com

WAIKATO STABLE ISOTOPE UNIT
Director: Professor Brendan Hicks  
Phone: +64 7 838 4613  
Email: brendan.hicks@waikato.ac.nz  
Web: bio.waikato.ac.nz/isotope

UNIVERSITY OF WAIKATO HERBARIUM
Curator: Dr Chrissen Gemmill  
Phone: +64 7 838 4053  
Email: chrissen.gemmill@waikato.ac.nz
SCHOOL OF SCIENCE STAFF

Professor Vic Arcus vic.arcus@waikato.ac.nz
BSc, MSc Waikato, PhD Cambridge
Molecular biology, with a particular focus on biochemistry, structural biology and protein engineering. Tuberculosis genomics and biochemistry. Development of Macromolecular Rate Theory (MMRT), which accounts for the temperature dependence of enzyme-catalyzed rates up to biological rates at the the ecosystem scale (respiration and photosynthesis).

Dr Andrew Barnes andrew.barnes@waikato.ac.nz
BSc, MSc University of Canterbury, PhD University of Goettingen
Research interests: terrestrial community ecology, with a particular focus on trophic interactions in both below and above ground invertebrate communities. My research centres on three major topics: global change ecology, food web ecology and biodiversity and ecosystem functioning.

Professor Troy Baisden troy.baisden@waikato.ac.nz
BA(Hons) Dartmouth, PhD Berkeley
Bay of Plenty Regional Council Chair in Lake and Freshwater Science. Flow of nutrients, water and carbon through terrestrial ecosystems and resulting impacts in freshwater. Isotope biogeochemistry and mathematical modelling. Interface between science, policy and management.

Professor Chris Battershill chris.battershill@waikato.ac.nz
BSc MSc(Hons) PhD Auckland
Bay of Plenty Regional Council Chair in Coastal Science. Marine science; coastal science; environmental science; marine biosystematics; marine biodiversity; marine conservation; marine ecology; marine microbiology; chemical ecology; environmental toxicology; environmental impacts; marine biodiscovery; aquaculture; temperate reefs; tropical reefs; and Antarctic marine science.

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

Dr Steve Bird steve.bird@waikato.ac.nz
BSc(Hons), PhD Aberdeen
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.

Professor James Brasington james.brasington@waikato.ac.nz
BSc Bristol, PhD Cambridge
Waikato Regional Council Chair of River Science. The development of new methods to both monitor and numerically model feedbacks between Earth surface forms and processes. Much of this research has focused on river and catchment dynamics over scales that range from individual events to decades and from single bars to entire catchments.

Dr Clare Browne clare.browne@waikato.ac.nz
BSc, MSc Massey, PhD Waikato
Animal behaviour and welfare; learning in animals; communication; detection dogs, particularly conservation detection dogs and companion animal behaviour.
Professor Karin Bryan karin.bryan@waikato.ac.nz
BSc(Hons) Toronto, PhD Dalhousie
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 Alison Campbell alison.campbell@waikato.ac.nz
BSc(Hons), PhD Massey, TTC
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.

Associate Professor Dave Campbell dave.campbell@waikato.ac.nz
BSc(Hons), PhD Otago
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.

Professor Craig Cary craig.cary@waikato.ac.nz
BSc Florida Tech, MSc San Diego State, PhD UC San Diego
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.

Associate Professor Mike Clearwater mike.clearwater@waikato.ac.nz
BSc, MSc(Hons) Auckland, PhD Edinburgh
Plant biology; plant physiology; plant physiological ecology; plant water relations; xylem and phloem transport; photosynthesis; tree biology; horticulture; fruit production; kiwifruit; avocado; sap flow; and forest ecology.

Associate Professor Kevin Collier kevin.collier@waikato.ac.nz
BSc Waikato, PhD Canterbury
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 Willem de Lange willem.delange@waikato.ac.nz
MSc(Hons), DPhil Waikato
Oceanography, coastal processes and climatic hazards; tsunami and storm surge prediction and mitigation; wave-induced sediment transport on the continental shelf and within estuaries; dispersal of materials in the coastal zone; and numerical modelling.

Dr Ian Duggan ian.duggan@waikato.ac.nz
BSc, MSc, PhD Waikato
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 Joanne Ellis joanne.ellis@waikato.ac.nz
BSc Auckland, BSc(Hons) Victoria, PhD MUN
Understanding changes in benthic biodiversity due to anthropogenic stressors including sedimentation, eutrophication, fishing and offshore hydrocarbon extraction. This includes assessment of impacts of stressors on key habitat forming species and ecosystem service delivery, consideration of multiple cumulative impacts and the identification of marine environmental limits.

Dr Amanda French amanda.french@waikato.ac.nz
B.S. Chemistry, Ph.D. Environmental Toxicology
I have a strong background in analytical chemistry and have focused on elemental analysis by ICP-MS. General interests: Movement of metals in the environment, arsenic and other elemental speciation in environmental and biological samples, metal source apportionment (determining if elevated metal concentrations are due to anthropogenic input), metal toxicology, ornithology.

Dr Shari Gallop shari.gallop@waikato.ac.nz
BSc MSc(Hons) Waikato, PhD University of Western Australia
Coastal geomorphology, physical oceanography and sediment transport in estuaries, reef/rock coasts, and open-ocean beaches. Looks at variability and change in coastal morphodynamics from meso- to mega-scale. Research interests include rip currents and coastal hazards, coastal video observation systems, geological control of coastal processes, storm impacts and recovery processes and stability/dynamics of estuarine shorelines.

Dr Chrissen Gemmill chrissen.gemmill@waikato.ac.nz
BSc California, PhD Colorado
Molecular systematics; conservation and restoration genetics; and biogeography of endemic Pacific plants, in particular plants of New Zealand and New Caledonia.

Dr Chris Glasson chris.glasson@waikato.ac.nz
BSc(Hons) PhD James Cook
Development and study of molecular systems capable of mimicking and/or modulating natural biological systems. Current focus on algal sulfated polysaccharides (ASPs), which are known for their interesting rheological and chemical properties, and biological activities, including antiviral, antioxidant, anticoagulant, antihyperlipidemic, anti-inflammatory, and immunomodulatory properties.

Dr Megan Grainger megan.grainger@waikato.ac.nz
BSc, MSc, PhD Waikato
Analytical Chemistry; predominant instruments of interest are HPLC (UV, RI, FLD), ICP-MS (solution, laser ablation and single particle) and GC-MS. My main research themes are honey and bee research, trace elements and nanoparticles in the environment, and detection of a wide range of analytes in food matrices. I often work with industry to solve current problems or create new methodology for quantitation of analytes.

Dr Adam Hartland adam.hartland@waikato.ac.nz
BSc(Hons), PhD Birmingham
Trace element and isotope geochemistry. In particular: Interactions between dissolved organic matter, nanoparticles and trace metals and feedbacks biogeochemical processes.

Professor Ian Hawes ian.hawes@waikato.ac.nz
BSc (Hons) Liverpool PhD CNZZ
Aquatic Photosynthesis; Cyanobacteria, Alge; and Antarctic Aquatic Ecosystems.
Professor Bill Henderson  bill.henderson@waikato.ac.nz
BSc(Hons), PhD Leicester, FNZIC
Co-ordination and organometallic chemistry of platinum metals and gold; synthesis and applications of new organophosphorus compounds; electrospray mass spectrometry.

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

Dr Joanna Hicks  joanna.hicks@waikato.ac.nz
BSc, MSc, PhD Waikato
Biochemistry and molecular biology of infectious diseases (tuberculosis, malaria, and gonorrhoea) and protein engineering for biotechnology applications. I focus on bacterial metabolism and regulation of gene expression to understand how pathogenic bacteria are able to grow in unique often inhospitable environments and evade host immune responses.

Associate Professor Alan Hogg  alan.hogg@waikato.ac.nz
MSc, DPhil Waikato
Current research centres upon C calibration and palaeoclimate as well as C wiggle matching.

Adjunct Professor Ian Hogg  ian.hogg@waikato.ac.nz
BSc(Hons) Toronto, MAppSc Canberra, PhD Toronto
Ecology and consequences of environmental change/disturbance. In particular, the biodiversity of Antarctic invertebrates; genetic diversity and conservation of natural populations; freshwater and estuarine ecology; global climate change and environmental stress.

Professor Peter Kamp  peter.kamp@waikato.ac.nz
MSc, PhD Waikato
Sedimentary geology; sequence stratigraphy applied to New Zealand Cenozoic basins (Taranaki, Wanganui, East Coast); tectonic development of New Zealand; fission track thermochronology and U-Th/He thermochronometry applied to uplift/denudation history of New Zealand and thermal history of sedimentary basins.

Dr Sari Karppinen  sari.karppinen@waikato.ac.nz
BSc, MSc Waikato, PhD Eastern Finland
Senior tutor for Molecular and Cellular Biology, whose research interests are in embryonic physiology, more specifically on what triggers the heart beat on an early embryo (using mostly live cell imaging).

Dr Anica Klockars  anica.klockars@waikato.ac.nz
MSc Örebro, PhD Uppsala
The relationship between brain activity in social deficit disorders and neuroendocrine and behavioural parameters.

Dr Andrew La Croix  andrew.lacroix@waikato.ac.nz
BSc Simon Fraser, MSc Alberta, PhD Simon Fraser
Sedimentary geology with an interest in the process-response dynamics that control the character and distribution of facies. I integrate sedimentology, ichnology, and stratigraphy to study modern depositional environments and build analogues for deciphering the rock record. My research bridges the gap between scientific curiosity and real-world application such as reservoir characterization and modelling of hydrogeological and petroleum reservoirs.
**Associate Professor Joseph Lane** joseph.lane@waikato.ac.nz
BSc(Hons), PhD Otago, FNZIC
The application of computational chemistry methods to predict/interpret various aspects of chemistry. Primarily interested in modelling small atmospherically relevant molecules and understanding weak intermolecular interactions.

**Dr Rebecca Lawton** rebecca.lawton@waikato.ac.nz
BSc(Hons) Otago, PhD James Cook
Growth and production of macroalgae (both freshwater and marine/seaweeds) for bioremediation of nutrient rich wastewaters from a range of sources including agriculture, aquaculture, horticulture, and municipal waste treatment.

**Dr Charles Lee** charles.lee@waikato.ac.nz
BSc (Life Science) Tsing-Hua Taiwan, PhD Waikato
I study the microbial ecology of a wide range of unusual ecosystems, including deep-sea hydrothermal vents and the Antarctic Dry Valleys, using molecular genetic and bioinformatic tools. I'm interested in the development and validation of novel molecular techniques and bioinformatic analyses, and I use them in conjunction with geochemistry to examine the interactions between microbial communities and their environments.

**Associate Professor Nick Ling** nick.ling@waikato.ac.nz
BSc, MSc(Hons), PhD Auckland
Comparative physiology, particularly of fishes; ecotoxicology of fish and invertebrates; ecology of fishes; and physiology of vertebrate muscle.

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

**Associate Professor Chris Lusk** chris.lusk@waikato.ac.nz
BSc Massey, PhD Auckland
Plant ecology; forest dynamics; plant functional ecology; plant physiological ecology; plant-herbivore interactions. I aim to reconcile New Zealand’s strange flora and vegetation with ecological theory, and to understand the implications of introduced mammals and climate change for NZ vegetation.

**Dr Marie Magnusson** marie.magnusson@waikato.ac.nz
MSc Gothenburg, PhD James Cook
Development of algal biotechnology and bio-products as feed, food, and nutra-pharmaceuticals. Specific research interests include testing biorefinery models to maximise biomass utilisation and value for macroalgae grown in the bioremediation of aquaculture and municipal waste waters.

**Professor Merilyn Manley-Harris** merilyn.manley-harris@waikato.ac.nz
BSc(Hons) James Cook, PhD Montana
Chemistry of honey; prebiotic carbohydrates; analysis of various substrates using a variety of chromatographic and spectroscopic techniques; structure and chemistry of biochars.
Dr Ryan Martinus ryan.martinus@waikato.ac.nz
BSc, MSc Waikato, PhD Massey
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).

Professor Ian McDonald ian.mcdonald@waikato.ac.nz
BSc(Hons) Ulster, PhD Liverpool
Microbiology, molecular biology and biochemistry of atmospheric trace gas degrading bacteria; microbial ecology of methane, methyl halide and carbon monoxide utilising bacteria; and microbial ecology in extreme environments, including the Antarctic and New Zealand geothermal environments.

Dr Vicki Moon vicki.moon@waikato.ac.nz
MSc(Hons), PhD Waikato, PEngGeol
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.

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

Dr Julia Mullarney julia.mullarney@waikato.ac.nz
BA(Hons) Cambridge, MSc Bristol, PhD ANU
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 lab experiments to elucidate fundamental physical processes that cannot be resolved in large-scale models; and vegetation dynamics.

Dr Simon Muncaster simon.muncaster@waikato.ac.nz
MSc(Hons) Otago, PhD Bergen
Aquaculture with a particular interest in the reproductive biology of finfish, including sex changing fish and the impacts of oil contaminants on larval fish.

Blair Munro blair.munro@waikato.ac.nz
BSc PGDip Waikato
Senior Tutor for Chemistry and Environmental Science.

Dr Hazel Needham hazel.needham@waikato.ac.nz
BSc(Hons) Portsmouth, PhD Waikato
I am interested in the role of key benthic organisms in the regulation of ecosystem function in soft sediment environments. My research focuses on establishing the influence of key bioturbating species on nutrient fluxes across the sediment-water interface in both present and future world scenarios, primarily through field base studies. I am also interested in the resilience and recovery of benthic communities following disturbance events.
Dr Tanya O’Neill toneill@waikato.ac.nz  
BSc, MSc (first class honors) Massey PhD Waikato  
An early-career environmental soil scientist whose main research focus is understanding the impacts of human activities on Antarctic terrestrial environments and quantifying rates of soil recovery following impacts. Currently involved in a multidisciplinary project characterising the environment around Scott Base, Antarctica, as a baseline against which any environmental effects of base redevelopment can be measured.

Associate Professor Pawel Olszewski pawel.olszewski@waikato.ac.nz  
MSc Warsaw, PhD Minnesota/Cracow (joint programme)  
Regulation of appetite and body weight; brain circuits that control hunger, satiety and feeding reward; and pharmacological agents that modify food intake.

Dr Christina Painting christina.painting@waikato.ac.nz  
BSc(Hons) Lincoln, PhD Auckland  
Behavioural ecology with interests mostly focussed around invertebrate mating systems and the evolution of sexually selected traits. I am curious about what drives animal diversity and use a range of approaches on mostly non-model species such as beetles and arachnids to answer these questions.

Dr Fiona Petchey fiona.petchey@waikato.ac.nz  
MA(Hons) Anthropology Auckland, DPhil Waikato  
The application of radiocarbon techniques to the improvement of archaeological chronologies by the joint investigation of site taphonomy combined with sample specific radiocarbon effects in shell and bone caused by diet and environmental conditions.

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

Dr Martina Pietsch Brown martina.pietschbrown@waikato.ac.nz  
MSc Muenster, PhD Braunschweig  
Senior Tutor for Chemistry.

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

Dr Adrian Pittari adrian.pittari@waikato.ac.nz  
BSc(Hons) Melbourne, PhD Monash  
Physical volcanology of modern and ancient volcanic deposits. In particular: Caldera dynamics; explosive conduit-vent processes; lateral and vertical process variations in pyroclastic deposits; ignimbrite emplacement processes; kimberlite volcanology; and volcaniclastic deposits in sedimentary successions.
Associate Professor Michèle Prinsep michele.prinsep@waikato.ac.nz
BSc(Hons), PhD Canterbury, FNZIC
Natural products chemistry, especially that of bryozoans and cyanobacteria (blue-green algae); structural determination of novel biologically active compounds using high-field NMR spectroscopy and mass spectrometry; structure-activity relationships; chemical ecology of marine organisms; secondary metabolites of terrestrial and marine fungi.

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

Associate Professor Graham Saunders graham.saunders@waikato.ac.nz
BA(Hons), MA, DPhil Oxon, FRSC, CChem, MRSNZ
Using the properties of the carbon-fluorine bond in organometallic chemistry, for extremely water repellent surfaces, and in crystal engineering.

Professor Louis Schipper louis.schipper@waikato.ac.nz
BSc, MSc, PhD Waikato, FNZSSS, FSSSA

Brydget Tulloch brydget.tulloch@waikato.ac.nz
BSc, MSc (Hons), PGCert (Tert Tch) Waikato
Senior Tutor for Ecology and Biodiversity.

Dr Kiri Joy Wallace kiri.wallace@waikato.ac.nz
BSc, MSc University of Delaware, PhD University of Waikato
Forest and community ecology, discovering how to restore native terrestrial ecosystems. Specific focus is on forest ecosystems within urban environments like city parks and public greenspaces. Restoration of people’s connection with nature to help them enjoy and benefit from it.
GRADUATE PAPERS
500 LEVEL PAPERS

All 500 level papers are delivered subject to demand and staff availability. Unless specified, all 500 level papers are 15 points.

BIOL503-19A (HAM)
DATA ANALYSIS AND EXPERIMENTAL DESIGN
This paper will cover aspects of research design for experiments, and methods for analysis of ecological data using univariate and multivariate statistical techniques.

Paper coordinator(s): Dr Ian Duggan
Prerequisite paper(s): BSc
Restriction paper(s): BIOL501
Assessment: Internal assessment/examination ratio: 100:0

BIOL560-19A (HAM)
FRESHWATER ECOLOGY
A critical examination of issues that freshwater ecosystems face (e.g. pollution, management) and methods to mitigate potentially competing interests.

Paper coordinator(s): Professor Brendan Hicks
Prerequisite paper(s): BSc, BIOL313 or equivalent
Restriction paper(s): BIOL513
Assessment: Internal assessment/examination ratio: 40:60

BIOL562-19C (HAM)
MARINE AND ESTUARINE ECOLOGY
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.

Paper coordinator(s): Professor Conrad Pilditch
Prerequisite paper(s): BSc, BIOL314 or equivalent
Restriction paper(s): BIOL514
Assessment: Internal assessment/examination ratio: 30:70

BIOL571-19B (HAM)
PLANT PHYSIOLOGY AND ECOLOGY
The paper focuses on 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.

Paper coordinator(s): Associate Professor Mike Clearwater
Prerequisite paper(s): BSc, BIOL312 or BIOL325 or equivalent
Corequisite paper(s): BIOL570
Restriction paper(s): BIOL521
Assessment: Internal assessment/examination ratio: 50:50
**BIOL572-19B (HAM)**

**ANIMAL BEHAVIOUR**

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.

**Paper coordinator(s):** Dr Christina Painting  
**Prerequisite paper(s):** BSc, BIOL333 or equivalent  
**Restriction paper(s):** BIOL533  
**Assessment:** Internal assessment/examination ratio: 50:50

**BIOL573-19B (HAM)**

**CONSERVATION AND RESTORATION**

The purpose of this paper is to explore the general principles of conservation biology and restoration ecology with special reference to threatened species management and approaches to restoring ecosystems impacted by human activities.

**Paper coordinator(s):** Associate Professor Kevin Collier  
**Prerequisite paper(s):** BSc and BIOL312, BIOL333, BIOL338 or equivalent  
**Restriction paper(s):** BIOL533  
**Assessment:** Internal assessment/examination ratio: 50:50

**BIOL576-19A (HAM)**

**ANIMAL ECOPHYSIOLOGY**

An introduction to specified topics in animal environmental physiology. Critical evaluation of selected readings from the scientific literature provides 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.

**Paper coordinator(s):** Associate Professor Nick Ling  
**Prerequisite paper(s):** BSc  
**Restriction paper(s):** BIOL538  
**Assessment:** Internal assessment/examination ratio: 50:50

**BIOMO501-19B (HAM)**

**BIOMOLECULAR STRUCTURE AND CELLULAR PATHWAYS**

This paper is an in-depth examination of biomolecular structure, function, and molecular metabolism using selected examples from the biochemistry literature.

**Paper coordinator(s):** Dr Ryan Martinus  
**Prerequisite paper(s):** BIOMO301 or BIOL351  
**Restriction paper(s):** BIOLS82 and BIOLS83  
**Assessment:** Internal assessment/examination ratio: 100:0
BIOMO502-19A (HAM)

MOLECULAR GENETICS IN HEALTH AND DISEASE
This paper explores how modern molecular approaches are contributing to our understanding of molecular genetics and how this information can be exploited to benefit animal and human health.

Paper coordinator(s): Dr Linda Peters
Prerequisite paper(s): BIOMO302, BIOMO305, BIOMO306 OR BIOEB306
Restriction paper(s): BIOL584 and BIOLS85
Assessment: Internal assessment/examination ratio: 50:50

BIOMO503-19A (HAM)

MICROBIOMES
This paper explores microbiomes in the environment and in association with multicellular organisms, including humans, to understand their critical ecological roles in ecosystem and host function and health.

Paper coordinator(s): Professor Ian McDonald
Prerequisite paper(s): BSc
Restriction paper(s): BIOLS80 and BIOLS81
Assessment: Internal assessment/examination ratio: 100:0

BIOMO504-19B (HAM)

BIOMEDICAL PHYSIOLOGY
This paper examines select topics in human/animal physiology in the context of functioning of the organism in health and disease. Elements of molecular biology, genetics, animal models of diseases, and pharmacology are used to present students with an integrated approach to physiological research.

Paper coordinator(s): Associate Professor Pawel Olszewski
Restriction paper(s): BIOL584 and BIOL575
Assessment: Internal assessment/examination ratio: 100:0

BIOMO511-19A (HAM)

CURRENT TOPICS IN THE BIOMEDICAL SCIENCES
This paper examines select topics in human/animal physiology in the context of functioning of the organism in health and disease. Elements of molecular biology, genetics, animal models of diseases, and pharmacology are used to present students with an integrated approach to physiological research.

Paper coordinator(s): Associate Professor Brett Langley
Restriction paper(s): BIOL582 and BIOL583
Assessment: Internal assessment/examination ratio: 50:50
BIOMOS12-19B (HAM)
MOLECULAR TECHNIQUES FOR ENVIRONMENTAL SCIENCE
This paper will introduce students of diverse scientific backgrounds to current and emerging molecular analytic and diagnostic techniques used across biological and environmental sciences.

Paper coordinator(s): Dr Charles Lee
Restriction paper(s): BIOL584 and BIOL585
Assessment: Internal assessment/examination ratio: 100:0

CHEMY501-19B (HAM)
GREEN CHEMISTRY
This paper covers concepts and practical applications in the important field of green chemistry.

Paper coordinator(s): Professor Bill Henderson
Assessment: Internal assessment/examination ratio: 100:0

CHEMY502-19A (HAM)
MATERIALS CHEMISTRY
This seminar style paper covers advanced topics in the area of inorganic materials chemistry, namely 1 and 2 dimensional solids and inorganic biomedical materials.

Paper coordinator(s): Associate Professor Michael Mucalo
Restriction paper(s): CHEM523
Assessment: Internal assessment/examination ratio: 100:0

CHEMY503-19A (HAM)
ANALYTICAL METHODOLOGY
An advanced study of analytical methodology and instrumental techniques, this will investigating sample extraction techniques, and instrument choice for a variety of sample matrices.

Paper coordinator(s): Dr Megan Grainger
Restriction paper(s): CHEM527
Assessment: Internal assessment/examination ratio: 100:0

CHEMY511-19A (HAM)
STRUCTURAL CHARACTERISATION I
Using a combination of lectures, flip teaching and instrumental work, students master the skills required to acquire NMR and mass spectra and interpret these to identify an unknown compound.

Paper coordinator(s): Associate Professor Michèle Prinsep
Prerequisite paper(s): CHEMY301 or CHEMY312 or CHEM314
Restriction paper(s): CHEM511
Assessment: Internal assessment/examination ratio: 100:0
CHEMY512-19B (HAM)
STRUCTURAL CHARACTERISATION II
Single crystal X-ray crystallography, solid-state nuclear magnetic resonance spectroscopy and electrospray mass spectrometry.

Paper coordinator(s): Associate Professor Graham Saunders
Prerequisite paper(s): CHEMY303 or CHEM311 or CHEM313
Restriction paper(s): CHEM524
Assessment: Internal assessment/examination ratio: 50:50

COMPX555-19B (HAM)
BIOINFORMATICS
An introduction to bioinformatics, open to students majoring in computer science or biology. It includes an overview of molecular biology, genomics, script language programming, algorithms for biological data, an introduction to machine learning and data mining, and relevant statistical methods.

Paper coordinator(s): Dr Tony Smith
Prerequisite paper(s): STAT111 or STAT121, and 60 points at 300 level in Biology and/or Computer Science including either COMP317 or BIOL310
Restriction paper(s): COMP455, COMP555
Assessment: Internal assessment/examination ratio: 100:0

EARTH501-19A (HAM)
VOLCANIC TECHNIQUES AND APPLICATIONS
This paper investigates geological techniques used to reconstruct eruption processes and histories, and their application to society, including volcanic facies analysis, tephra studies, volcanic glass and mineral studies, juvenile and lithic studies, and volcanic hazards.

Paper coordinator(s): Dr Adrian Pittari
Prerequisite paper(s): EARTH311 or EARTH321 or ERTH321 or ERTH333
Restriction paper(s): ERTH524
Assessment: Internal assessment/examination ratio: 60:40

EARTH502-19A (HAM)
LAND AND SOIL EVALUATION
Selected issues involved with land use and its intensification, including soil quality and degradation, are examined. Farm-scale soil and land-use capability (LUC) mapping are undertaken to illustrate their role in guiding management decisions to help reduce or mitigate environmental risks associated with particular land uses in the Waikato region.

Paper coordinator(s): Professor David Lowe
Prerequisite paper(s): EARTH321 or EARTH322 or ERTH333 or ERTH334
Restriction paper(s): ERTH535
Assessment: Internal assessment/examination ratio: 60:40
EARTH503-19A (HAM)
**COASTAL PROCESSES: ANALYSIS AND PREDICTION**
This paper considers techniques to predict coastal processes for management and research, including assessment of which processes to observe, how to obtain and analyse data, and using results for prediction.

**Paper coordinator(s):** Dr Julia Mullarney  
**Prerequisite paper(s):** One List C numeracy paper and one of ERTH343, ERTH344, EARTH341, or EARTH342  
**Restriction paper(s):** ERTH562 and ERTH563  
**Assessment:** Internal assessment/examination ratio: 60:40

EARTH504-19B (HAM)
**GEOHAZARD RISK**
This seminar paper evaluates the methodologies used to characterise risk associated with geohazards, and assesses the impact of strategies employed to avoid or mitigate this risk.

**Paper coordinator(s):** Dr Willem de Lange  
**Assessment:** Internal assessment/examination ratio: 60:40

EARTH505-19A (HAM)
**RIVER DYNAMICS**
This module investigates the processes that control the evolution of river form and structure over timescales of storm events to decades, through a combination of theory, environmental remote sensing and numerical modelling.

**Paper coordinator(s):** Professor James Brasington  
**Assessment:** Internal assessment/examination ratio: 100:0
EARTH506-19B (HAM)
GEOLOGICAL MODELS IN ENGINEERING GEOLOGY
This paper focusses on the development and application of 2D and 3D conceptual and numerical models of Earth materials for engineering purposes. Discussion includes data acquisition, model development, and interpretation.

Paper coordinator(s): Dr Vicki Moon
Prerequisite paper(s): EARTH313 or ERTH352
Restriction paper(s): ERTH552
Assessment: Internal assessment/examination ratio: 60:40

ENVS524-19A (HAM)
ENVIRONMENTAL EVALUATION
This paper 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.

Paper coordinator(s): Dr Mahdiyeh Salmanzadeh
Assessment: Internal assessment/examination ratio: 100:0

ENVSC503-19B (HAM)
TERRESTRIAL ECOSYSTEM-ATMOSHERE EXCHANGE PROCESSES
Processes and factors controlling exchanges of water, carbon and greenhouse gases in natural or managed ecosystems, methodologies to quantify them, and approaches to mitigate undesirable anthropogenic consequences.

Paper coordinator(s): Professor Louis Schipper
Restriction paper(s): ERTH535
Assessment: Internal assessment/examination ratio: 60:40

SCIEN511-19C (HAM)
SCIENTIFIC SUPERCOMPUTING
A practical introduction to undertaking scientific research on a supercomputer. The paper assumes no prior knowledge.

Paper coordinator(s): Associate Professor Joseph Lane
Assessment: Internal assessment/examination ratio: 100:0

SCIEN551-19A (HAM)
FUNDAMENTALS OF SCIENCE 1
A self-directed study on a sub-discipline of science. In most cases, successful completion of this paper provides the necessary pre-requisite entry into another 500-level science paper.

Prerequisite paper(s): Entry is at the discretion of the relevant Postgraduate Convenor.
Assessment: Internal assessment/examination ratio: 100:0
SCIEN552-19B (HAM)
FUNDAMENTALS OF SCIENCE 2
A self-directed study on a sub-discipline of science. In most cases, successful completion of this paper provides the necessary pre-requisite entry into another 500-level science paper.

Prerequisite paper(s): Entry is at the discretion of the relevant Postgraduate Convenor.
Assessment: Internal assessment/examination ratio: 100:0

SCIEN553-19A (HAM)
FUNDAMENTALS OF SCIENCE 3
A self-directed study on a sub-discipline of science. In most cases, successful completion of this paper provides the necessary pre-requisite entry into another 500-level science paper.

Prerequisite paper(s): Entry is at the discretion of the relevant Postgraduate Convenor.
Assessment: Internal assessment/examination ratio: 100:0

SCIEN554-19B (HAM)
FUNDAMENTALS OF SCIENCE 4
A self-directed study on a sub-discipline of science. In most cases, successful completion of this paper provides the necessary pre-requisite entry into another 500-level science paper.

Prerequisite paper(s): Entry is at the discretion of the relevant Postgraduate Convenor.
Assessment: Internal assessment/examination ratio: 100:0

SCIEN570-19C (HAM)
PLANNING FOR THE SCIENCE WORKPLACE AND SCIENTIFIC PRACTICE
This paper constitutes preparation for a professional scientific workplace, including evidencing skills, career planning, understanding societal expectations of a scientist, engaging with a relevant scientific workplace, sourcing a science problem to solve, ethical considerations, and writing a scientific investigation proposal.

Paper coordinator(s): Dr Karsten Zegwaard
Assessment: Internal assessment/examination ratio: 100:0

SCIEN579-19C (HAM)
REFLECTION ON SCIENTIFIC PRACTICE AND CAREER PLANNING
This paper constitutes the reflective element of the practice of scientific inquiry in the professional science workplace as part of their research thesis undertaking. It also is the planning elements of a science career, including career direction, and the professional presentation as a graduate who is transitioning from being an emerging scientist to a practicing scientist.

Paper coordinator(s): Dr Karsten Zegwaard
Prerequisite paper(s): SCIEN570
Assessment: Internal assessment/examination ratio: 100:0

SCIEN589-19A/B (HAM) & (TGA)
DIRECTED STUDY
Prerequisite paper(s): Entry is at the discretion of the relevant Postgraduate Convenor.
Assessment: Internal assessment/examination ratio: 100:0
DISSEMINATIONS AND THESES FOR
MENVSCI, MSC, MSC(TECH), MSC(RESEARCH)

BIOL591-19C (HAM) - Dissertation 30 points
CHEM591-19C (HAM) - Dissertation 30 points
ERTH591-19C (HAM) - Dissertation 30 points

SCIEN592-19C (HAM) - Dissertation 60 points

SCIEN593-19C (HAM) - Thesis 90 points

SCIEN594-19C (HAM) - Thesis 120 points

THESES FOR MPHIL

BIOL800-19C (HAM) - Biological Sciences MPhil Thesis 120 points
CHEM800-19C (HAM) - Chemistry MPhil Thesis 120 points
ERTH800-19C (HAM) - Earth Sciences MPhil Thesis 120 points
PHYS800-19C (HAM) - Physics MPhil Thesis 120 points

THESES FOR PHD

BIOL900-19C (HAM) - Biological Sciences PhD Thesis 120 points
CHEM900-19C (HAM) - Chemistry PhD Thesis 120 points
ERTH900-19C (HAM) - Earth Sciences PhD Thesis 120 points
PHYS900-19C (HAM) - Physics PhD Thesis 120 points
FURTHER INFORMATION
It is University policy to provide equal opportunities in both education and employment for all people regardless of factors that are irrelevant to their abilities, thereby deriving benefit from the overall pool of talent that exists in New Zealand society and contributing to its enrichment.

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

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

STEM PACIFKA AND MĀORI

STEM Pacifika and Māori welcomes Pacific and Māori students studying in Science, Technology, Engineering and Mathematics. The club provides an environment where students are able to have social, academic and networking support through design challenges, quiz nights, networking nights and other events organised by the committee. For more information, please email stem.pm18@gmail.com.

LADIES INC

Ladies Inc is a social club at the University of Waikato which aims to support women studying and working in science, technology, engineering and mathematical (STEM) related fields.

Our goal is to build a support network of women in which we can encourage and inspire each other through social and industry events. Along the way we hope to encourage women to continue pursuing careers in these areas as women are under-represented in the computing industry.

Check out facebook.com/groups/LadiesInCNZ for more information.
SOURCES OF FUNDING FOR DOCTORAL STUDY

UNIVERSITY OF WAIKATO DOCTORAL SCHOLARSHIPS
These awards provide three years of funding for students undertaking a full-time Doctoral degree at The University of Waikato. Awards are made on academic merit and the minimum average grade required for application is an A- (80%). University of Waikato Doctoral Scholarships can only be applied for during enrolment application.

Both international and domestic students are eligible to apply.
Application forms are available from the Scholarships website waikato.ac.nz/scholarships

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

POSTGRADUATE SCHOLARSHIPS
For further information on Science undergraduate and postgraduate scholarships contact the School of Graduate Research - Scholarships.

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

EXTERNAL FUNDING
External funding is often available for specific research projects. Students should initially consult with their Postgraduate Convenor or the director of the centre about external funding opportunities. Dr Michael Mucalo is the School representative for the Scholarships Committee and can also be contacted for advice.

SCHOOL OF GRADUATE RESEARCH - SCHOLARSHIPS
The Scholarships team are located in W Block and provide advice as well as administration services and information about available scholarships.
The University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand
Phone: +64 7 838 5096
Email: scholarships@waikato.ac.nz
Web: waikato.ac.nz/scholarships/
UNIVERSITY OF WAIKATO AND OTHER SCHOLARSHIPS

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

UNIVERSITY OF WAIKATO RESEARCH MASTERS SCHOLARSHIP
These awards provide one year of funding for students commencing the second or final year of a full-time masters degree at The University of Waikato. The awards are made on academic merit and the minimum average grade required for application is an A- (75%).
Application forms are available from the Scholarships website waikato.ac.nz/scholarships.

UNIVERSITY OF WAIKATO TAUGHT POSTGRADUATE SCHOLARSHIP
The University of Waikato established the Taught Postgraduate Scholarship to support students studying at postgraduate level, primarily undertaking coursework. Preference will be given to students on a pathway to research qualifications at The University of Waikato. Awards will be determined on academic merit.
Application forms are available from the Scholarships website waikato.ac.nz/scholarships.

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

APPLYING FOR AN EXTENSION

Candidates are expected to make a written application to the Faculty Registrar in the first instance. The application should outline the reasons for the extension, must be written by the candidate and include supporting documentation as appropriate, such as a medical statement or a support note from the supervisor. The Faculty Registrar may approach the supervisor and the Dean of Science 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 School undertakes to make a decision on any application within 10 working days.

RE-ENROLMENT

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

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

GUIDELINES FOR THE APPROVAL OF EXTENSIONS TO THE SUBMISSION DATE OF A MASTERS THESIS

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

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

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

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

- Staff leave
- Requirements for editorial revision
- Loss of electronically-stored data
- Commitments due to employment

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

STUDENT ASSISTANCE
The Student Administration Desk is located on Level 2 of the Student Centre. Come here if you need any help, including the following:
• All student enquiries
• StudyLink
• Academic records
• Academic credit
• ID Cards
• International Student Services

PAYMENTS
The Payment Office is located on level 2 of the Student Centre. The following can be paid here:
• Tuition Fees
• Library invoices
• Course-related costs including lab coats and science equipment
• Student visas for International students

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

BUILDING RESOURCES
• Computers, laptops, photocopiers, scanners
• Group study rooms
• Quiet study spaces

STUDY AND RESEARCH RESOURCES
• Books/Journal articles/Proceedings/Technical reports – print and online
• Other resources (DVDs, maps, microfilms etc)

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

SCIENCE AND ENGINEERING LIBRARIAN – CHERYL WARD OR DEBBY DADA
The Library, The University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand

Email: cheryl.ward@waikato.ac.nz or debby.dada@waikato.ac.nz
SCHOOL SUPPORT

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

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

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

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

SPECIAL CONSIDERATION FOR INTERNAL ASSESSMENT
Students should apply for Special Consideration if they are unable to complete an internal assessment item due to circumstance beyond their control or if their performance in an internal assessment item was seriously impaired.

Completed Special Consideration forms should be returned to the School of Science Office (E.2.20) together with supporting documentation within 72 hours of the deadline for the internal assessment item. Please note that medical certificates should be obtained from a registered medical or dental practitioner, midwife, registered psychologist or counsellor, depending on the circumstances, within 24 hours of the deadline.

If a student’s application for Special Consideration is approved, an estimated mark for the internal assessment item will be calculated at the end of the semester, based on their performance in comparable assessment items. In some circumstances, students may be offered the opportunity to complete an alternative assessment item instead.
SCIENCE HELP TUTORIALS
A team of successful Mentors are available to help you with subject specific areas within your paper.

TE PŪTAHI O TE MANAWA MĀORI - STUDENT SUPPORT SERVICE
Te Pūtahi o te Manawa is a support service available to all Māori Students doing papers in the School of Science and School of Engineering. This includes advice and support, whether study orientated or otherwise. Please drop in to the Student Success Coordinator’s office on the ground floor of F Block (F.G.06A) or use our contact details to make an appointment. And remember ‘Sooner is Better than Later’.

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

Attending these workshops can help ensure your success and those on offer include: Time Management; MS Word; MS Excel; Essay Writing; Exam Preparation; APA Referencing and others if needed.
Study Wānanga will help students heading into exams to prepare, review and revise over their paper content before the final exams. Our Student Success Coordinator will make contact when wānanga’s will be held during the year. Keep an eye on your emails and on the School Facebook page.

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

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

STEM STUDENT SUCCESS COORDINATOR
Ms Rewa Gilbert
Room: F.G.06A
Email: rewa.gilbert@waikato.ac.nz
UNIVERSITY SUPPORT

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

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

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

COMPLAINTS PROCEDURE
If you feel you have been unfairly disadvantaged, you should in the first instance consult the lecturer concerned. If the situation is not resolved you should then consult the relevant programme convenor.

Your next port of call should be the Dean of Science. Unresolved complaints should then be referred to the Associate Dean (Teaching and Learning). Students may also make a formal complaint to the office of the Vice-Chancellor if the situation has not been resolved.

Please also feel free to contact the Faculty Registrar if you feel that you have been unfairly disadvantaged in your dealings with staff in any part of the University.

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

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

DISABILITY SUPPORT SERVICES
Disability Support Services – Te Tari Kai Awhina Hauā provides you with access to a range of services, including lecture material, learning support, alternative examination arrangements, access to assistive technology, alternative formatting, ergonomic furniture, hearing equipment, specialist staffing and much more.

Contact the disability support staff by email disability@waikato.ac.nz to discuss any arrangements or accommodations you require.
DISABLED ACCESS IN THE SCHOOL OF SCIENCE
Disabled access to the blocks housing the School of Science & School of Engineering is by way of the lifts in D, F and FG Blocks. The ground floors of these blocks can be entered by ramps from the respective car park area.

DISCIPLINE POLICY
The University Discipline Regulations are set out in the 2019 University of Waikato Calendar and apply to misconduct, including cheating, plagiarism, misuse of computer facilities, or other breach of the University regulations. Plagiarism is unacknowledged copying or paraphrasing of someone else’s work, whether published or not. It may be heavily penalised and can even result in refusal of credit for the paper.

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

SPECIAL CONSIDERATION FOR IMPAIRED PERFORMANCE OR MISSED EXAMINATION
The Assessment and Graduation Office is responsible for the special consideration process for formal examinations only.

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

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

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

STUDENT HEALTH SERVICE
We have a team of qualified doctors and nurses on our Hamilton campus to look after your healthcare needs. Routine consultations and prescriptions are free if you enrol with Student Health Services. No appointment is necessary, simply drop in to see them or call on 07 838 4037.

MENTAL HEALTH AND WELLBEING
If you or a friend or classmate is feeling depressed, anxious or stressed and you aren’t sure where to get help, please contact our confidential 24/7 Student Crisis Hotline: 0800 841 140. The University of Waikato also employs a Mental Health Nurse, simply drop-in to the Student Health Service or call them on 07 838 4037.

STUDYLINK SUPPORT
For help and advice on how best to use StudyLink services, please contact the Student Centre at info@waikato.ac.nz or call 0800 924 528 for free and confidential support.
STUDENT ENQUIRIES AND ESCALATION

We’re here to support you. If you have an enquiry and you’re not sure who to talk to, use the chart below to determine the order of contacts for you to escalate your issue.

SCHOOL RECEPTIONIST / FACULTY REGISTRAR

SENIOR TUTOR / LECTURER

PAPER COORDINATOR

SUBJECT CONVENOR

ASSISTANT DEAN (ACADEMIC)

DEAN
COMPUTING FACILITIES

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

**LSL.1.16** is open from 8am – 6pm (Monday to Friday). After hours swipe card access to LSL.1.16 is provided for graduate students only.

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

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

The order of priority for using the labs above is:

- Booked classes
- Graduates
- Undergraduates

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

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

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

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

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**STEM TECHNICAL SUPPORT GROUP**  
Phone: +64 7 858 5006  
Email: stem-help@waikato.ac.nz

**INFORMATION TECHNOLOGY SERVICE (ITS) SERVICE DESK**  
Phone: +64 7 838 4008
CODE OF CONDUCT

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

• Rigorous opposition to all forms of fraud, including misrepresentation and falsification of results.
• Observance of highest standards of safety in relation to themselves, co-workers and research participants.
• Maintenance of confidentiality where appropriate and full attribution of the sources of assistance and guidance.
• 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 attribution of authorship, including listing authors without their permission where this is relevant, attributing work to others who have not contributed to the research and failing to acknowledge work primarily produced by a student, trainee or associate.
• Other practices that deviate from those accepted within the research community for proposing, conducting or reporting research, such as intentional infringement of the University’s code of ethical behaviour.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

There is a lab safety folder in each lab which contains details of the hazards and safety requirements pertinent to the lab; 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 lab and; copies of Material Safety Data Sheets for any toxic or dangerous substances that may normally be used in the lab.

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

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

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

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

1. It is not permitted to eat or drink in laboratories.
2. Smoking is not permitted in any areas of the University campus.
3. Bare feet are not permitted in the Science & Engineering buildings. Jandals and sandals are not adequate foot protection in workshops and some laboratories. Beware – the vinyl flooring can become very slippery when wet.
4. Chemicals and equipment must not be taken for private use. Equipment taken out of the buildings for research use must be properly logged.
5. It is not permitted to carry out experimental work in laboratories after hours unless permitted by the lab safety supervisor, and at least one other person is in the building and knows you are there.
6. Card keys are issued through the School offices to research students and staff who need access to the buildings after normal working hours. Security staff are authorised to ask anyone who cannot produce a card key to leave at once. You must not lend your card key to anyone else; this may lead to your key being withdrawn. Visitors must be approved by the lab safety supervisor.
7. All visitors must report to the FG Link Reception FG.G.04, or relevant School for a visitors’ pass. You are responsible for anyone who visits you in the lab.
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 lab safety supervisor. Electrical equipment should be unplugged from the mains supply when not in use. All hoses must be securely fixed to equipment using approved clamps.

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

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

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

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

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

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

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

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

RESPONSIBILITIES

It is your responsibility to find out about any hazards associated with your lab 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 lab area has its own safety folder and instructions – make sure you are familiar with them.

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

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

THE CHAIR OF THE SCHOOL OCCUPATIONAL HEALTH AND SAFETY COMMITTEE

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

SCHOOL CHEMICAL SAFETY OFFICER

John Little
Phone: +64 7 838 4103
Email: john.little@waikato.ac.nz

SCHOOL FIELD TRIP HEALTH AND SAFETY OFFICER

Annie Barker
Phone: +64 7 838 4392
Email: annie.barker@waikato.ac.nz

EVACUATION OFFICER

Ivan Bell
Phone: +64 7 838 4117
Email: ivan.bell@waikato.ac.nz

LASER SAFETY OFFICER

Mr Viking Zhou
Phone: +64 7 838 4795
Email: wzhou@waikato.ac.nz

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

CONTACTS FOR EMERGENCY USE ARE:

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

UNIVERSITY SECURITY
Phone: +64 7 838 4444

EMERGENCY SERVICES
Phone: 111
# 2019 TEACHING AND ASSESSMENT PERIODS

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<th>State School dates</th>
<th>Week</th>
<th>Starting</th>
<th>Mon</th>
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