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:

In 2017 $36,000 worth of Science Scholarships were given out

CUTTING-EDGE RESEARCH FACILITIES

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 FACULTY 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.
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The information contained in this handbook is correct at the time of printing (February 2018). However, it is subject to a continuous process of review and improvement. A new handbook is produced in August/September every year and students should use the latest handbook available. The University’s document of authority for information contained in this handbook is the 2018 University of Waikato Calendar.
Whether it’s adapting to climate change, turning waste into high-value products, improving treatment for diseases or developing technologies for the next generation, science contributes to almost every aspect of our lives.

The grand challenges facing society demand research that transcends disciplinary boundaries, requiring an increased flexibility in the ways we seek to understand the world and prepare our students for the future.

The School of Science offers flexible, innovative degrees that produce multi-skilled, adaptable graduates who are ready for the challenges of today and have the skills to tackle the obstacles of tomorrow.

Our students’ career prospects are limited only by their interests and imagination, and graduates find themselves employed throughout New Zealand and overseas in a wide range of well-paid, interesting and stimulating occupations.

Our staff have acquired national and international reputations in their subjects and place emphasis on maintaining a good balance between the growth areas of science and technological application.

Combined with some of the world’s most advanced lab equipment, our staff are well placed to address many of the challenges as outlined by New Zealand’s National Science Challenges and the UN’s Millennium Development Goals.

**Professor Chad Hewitt**  
**DEAN OF SCIENCE**
FACULTY CONTACTS

The Faculty Office is the first stop for advice on degree planning and enrolment queries.

DEAN
Professor Chad Hewitt
Room: FG.1.04
Phone: 07 838 4386
Email: chad.hewitt@waikato.ac.nz

ASSOCIATE DEAN (TEACHING & LEARNING)
Dr Alison Campbell
Room: F.G.06.D
Phone: 07 838 4582
Email: alison.campbell@waikato.ac.nz

ASSOCIATE DEAN (RESEARCH)
Professor Craig Cary
Room: TRU.G.23
Phone: 07 838 4593
Email: craig.cary@waikato.ac.nz

ASSOCIATE DEAN (POSTGRADUATE)
Associate Professor Michael Mucalo
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COOPERATIVE EDUCATION UNIT DIRECTOR
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Email: karsten.zegwaard@waikato.ac.nz

FACULTY REGISTRAR
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Phone: 07 838 4290
Email: hannah.tepuia@waikato.ac.nz

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Rewa Gilbert
Room: F.G.06A
Phone: 07 858 9384
Email: rewa.gilbert@waikato.ac.nz

FACULTY RECEPTIONIST
Julia Middleton
Room: FG.G.04
Phone: 07 838 4625
Email: julia.middleton@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 advanced.

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), Postgraduate diplomas and Graduate 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. Lab sessions for first-year students are normally assigned by the Faculty Office prior to the start of the first week of A Semester. 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 or 500 level. 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.

RESTRICITION:
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 Faculty of Computing & Mathematical Sciences and the Faculty of Science & Engineering with the exception of MATHS168 Preparatory Mathematics. Some Philosophy papers are also defined as Science papers. The Philosophy papers are PHILO102 Introduction to Logic and PHILO208 - Reason, Science and Pseudoscience.

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</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 &amp; Engineering (see Work placements)</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</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 iWaikato at i.waikato.ac.nz

You can also visit the Faculty Office 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

If you want to change your papers before you pay your fees, then you can call the Faculty Reception on 0800 438 254. The change can normally be made immediately and a new enrolment agreement sent within 24 hours.

If you need to make changes after you have paid your fees (i.e. after you become officially enrolled), you can apply to do a “change of enrolment” on iWaikato at i.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 Faculty Office.

HANDY TIPS
Here are some suggestions to help you get the most out of University life:
• Sign up for tutorials early, as places fill fast.
• If you wish to see a particular lecturer, check on times that he or she is available to students.
• Paper outlines and book lists can be obtained from the Catalogue of Papers online at papers.waikato.ac.nz/
FREQUENTLY ASKED QUESTIONS

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 Main Street, off Sunshine Ave, Te Rapa.

WHERE CAN I GET SUBJECT SPECIFIC ADVICE?
You can make an appointment with one of the First Year Mentors or contact the relevant convenor of your programme. Names of the subject convenors can be found in this handbook.

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 CHANGE MY PAPERS AFTER I AM ENROLLED?
You need to complete and submit a Change of Enrolment application online through your iWaikato account Click on Common Tasks > Change Enrolment and Re-Enrolment > Change of Enrolment, then follow the steps onscreen.

WHAT PAPERS SHOULD I TAKE NEXT YEAR?
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 Faculty Office staff by calling them on 0800 438 254, calling in to FG.G.04 or by emailing science@waikato.ac.nz.
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 penalties will likely be incurred. If you are not sure where you stand, please contact the Faculty 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; BIOMO101-18B) for each of the papers you are interested in. Use the Create a Timetable function to create your own personal timetable.

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.

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 in better in all your papers. The absolute minimum you need to be automatically eligible for re-entry is unrestricted passes (ie; 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:

- Chemistry
- Earth Sciences
- Ecology and Biodiversity
- Environmental Sciences
- Materials Science
- Molecular and Cellular Biology
- Psychology

BACHELOR OF SCIENCE (TECH) (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 your 200 level Science paper.

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

KEY
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 bachelor’s 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

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

KEY
- Compulsory paper
- Elective paper
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

ENGLISH LANGUAGE REQUIREMENTS FOR UNDERGRADUATE STUDY IN FCMS

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.

A TOEFL iBT score of 79-80 (with a writing score of 20) or an IELTS score of 6.0 or above (with at least 6.0 in the Writing band) or a PTE Academic overall score of 57 (and no less than 57 for Writing) is considered to be evidence of such competence. Other evidence is considered on a case-by-case basis.

Undergraduate students with less than 7.0 in IELTS or less than 100 in TOEFL iBT or less than 65 in PTE will be required to enrol in (and pass) the paper ARTSC104 Undergraduate Research Writing for ESL Students in their first semester of enrolment.

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 of the Pathways College English Language programme. A higher standard of English will be required of students wishing to enter graduate study programmes.

CODE

The University of Waikato has agreed to observe and be bound by the Code of Practice for the Pastoral Care of International Students. Copies of the Code are available from the New Zealand Ministry of Education website at 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

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.

<table>
<thead>
<tr>
<th>Y1</th>
<th>100 level</th>
<th>100 level</th>
<th>100 level</th>
<th>100 level</th>
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<th>100 level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y2</td>
<td>200 level</td>
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**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 Faculty Reception science@waikato.ac.nz

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

<table>
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<tr>
<th>Y1</th>
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**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, such as our mass spectrometers for investigating molecular structure. Putting into practice what you learn in your lectures is a major part of our BSc: you’ll gain hands-on experience with some of the most high-tech lab equipment available 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, laying a solid foundation for you to build on, even if you haven’t studied science before. 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. Options 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

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Key

- Major
- Compulsory
- Numeracy requirement
- Elective

Note: The third year of a BSc in Biological Science is offered as the final year of a Pathway programme in Tauranga in 2018 (see the Tauranga Prospectus for further details).

Details of the BSc in Computer Science are available from the Faculty of Computing and Mathematical Sciences.
UNDERGRADUATE STUDY

BSC MAJORS
Chemistry
Earth Sciences
Ecology and Biodiversity
Environmental Sciences
Materials Science
Molecular and Cellular Biology
Psychology

BSC MINORS
Animal Behaviour
Applied Physics
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 years gaining work experience and, in most cases, being paid for your efforts.

Note: Details of the BSc(Tech) in Computer Science is available from the Faculty 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
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.
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 Faculty or School of Studies 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

• Biotechnology  • Forensic Science
• Brewing  • Medicine
• Environmental Science  • Pharmaceuticals
• Food and Dairy  • 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

CONTACTS FOR CHEMISTRY

FIRST YEAR MENTOR
Professor Bill Henderson
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Email: bill.henderson@waikato.ac.nz

CONVENORS
Associate Professor Merilyn Manley-Harris &
Professor Bill Henderson
Room: E.3.19 Phone: 07 838 4384
Email: merilyn.harris@waikato.ac.nz
Room: E.3.21 Phone: 07 838 4656
Email: bill.henderson@waikato.ac.nz
### BSC DEGREE PLANNER

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### BSC(TECH) DEGREE PLANNER

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

**List B (Career Start)** Choose one of: SCIEN301, SCIEN303, SCIEN313, SCIEN314

**List C (Numeracy)** Choose two of: MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYS100 OR PHYS101 OR ENGEN110, MATHS2**, COMPX2**, STATS2XX, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, ENGEN201

**Key**

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

**Note:** CHEMY204 counts towards the BSc and BSc(Tech) numeracy requirement.
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 Faculty or School of Studies 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

CONTACTS FOR EARTH SCIENCES

FIRST YEAR MENTOR
Dr Hazel Needham
Room: E.1.09 Phone: 07 838 4383
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CONVENORS
Dr Vicki Moon
&
Dr Willem de Lange
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Email: vicki.moon@waikato.ac.nz
Room: DE.1.01 Phone: 07 837 9385
Email: willem.delange@waikato.ac.nz
### BSC DEGREE PLANNER

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**List A** Choose three of: BIOEB101, BIOEB102, BIOMO101, CHEMY100, CHEMY101, CHEMY102, ENGEN111, ENGEN112, ENGEN180, ENVSC101 APHYS111, PHILO102

**List B (Career Start)** Choose one of: SCIEN301, SCIEN303, SCIEN313, SCIEN314

**List C (Numeracy)** Choose two of: MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYS100 OR PHYS101 OR ENGEN110, MATHS2**, COMPX2**, STATS2XX, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, ENGEN201

**Key**
- Major
- Compulsory
- Numeracy requirement
- Elective
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 Faculty or School of Studies 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.

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

CONTACTS FOR ECOLOGY AND BIODIVERSITY

FIRST YEAR MENTOR
Ms Brydget Tulloch
Room: R.1.06 Phone: 07 837 9376
Email: brydget.tulloch@waikato.ac.nz

CONVENOR
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: BIOMO101, CHEMY100, CHEMY101, CHEMY102, EARTH101, EARTH102, ENGEN111, ENGEN112, ENGEN180, ENVSC101, APHYS111, PHILO102

**List B (Career Start)** Choose one of: SCIEN301, SCIEN303, SCIEN313, SCIEN314

**List C (Numeracy)** Choose two of: MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYS100 OR PHYS101 OR ENGEN110, MATHS2**, COMPX2**, STATS2XX, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, ENGEN201

**Key**

- **Major**
- **Compulsory**
- **Numeracy requirement**
- **Elective**
ENVIRONMENTAL SCIENCES

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

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 Faculty or School of Studies in which the student is enrolled.

To complete Environmental Sciences as a single major, students must gain 135 points including ENVSC101, EARTH102, 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, EARTH102, 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

CONTACTS FOR ENVIRONMENTAL SCIENCES

FIRST YEAR MENTOR AND CONVENOR
Dr Ian Duggan
Room: R.2.11 Phone: 07 838 4703
Email: ian.duggan@waikato.ac.nz
### BSC DEGREE PLANNER

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**List A** Choose three of: BIOEB101, BIOEB102, BIOMO101, CHEMY100, CHEMY101, CHEMY102, EARTH101, ENGEN111, ENGEN112, ENGEN180, APHYS111, PHILO102

**List B (Career Start)** Choose one of: SCIEN301, SCIEN303, SCIEN313, SCIEN314

**List C (Numeracy)** Choose two of: MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYS100 OR PHYS101 OR ENGEN110, MATHS2**, COMPX2**, STATS2**, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, 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**
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 Faculty or School of Studies 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

CONTACTS FOR MATERIALS SCIENCE

FIRST YEAR MENTOR
Dr Rob Torrens
Room: LSL.G.32 Phone: 07 838 4684
Email: rob.torrens@waikato.ac.nz

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

**Y1**
- ENGEN112
- CHEMY101
- 100 Science List A
- 100 Science List A
- 100 Science List A
- 100 Science List C
- Elective
- Elective

**Y2**
- ENGM211
- ENGME280
- CHEMY201 or CHEMY203
- ENGEN241
- 100 level or above List C
- Elective
- Elective
- Elective

**Y3**
- ENGM211
- ENGME312
- CHEMY301 or CHEMY303 or CHEMY 304
- SCIEN305
- List B Career Start
- Elective
- Elective
- Elective

BSC(TECH) DEGREE PLANNER

**Y1**
- ENGEN112
- CHEMY101
- 100 Science List A
- 100 Science List A
- 100 Science List A
- 100 Science List C
- Elective
- Elective

**Y2**
- ENGM211
- ENGME280
- CHEMY201 or CHEMY203
- ENGEN241
- SCIEN279
- 100 level or above List C
- Elective
- Elective
- Elective

**Y3**
- ENGM211
- ENGME312
- CHEMY301 or CHEMY303 or CHEMY 304
- SCIEN305
- SCIEN371 Science Work Placement
- Elective
- Elective
- Elective

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

List B (Career Start) Choose one of: SCIEN301, SCIEN303, SCIEN313, SCIEN314

List C (Numeracy) Choose two of: MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYSC100 OR PHYSC101 OR ENGEN110, MATHS2**, COMPX2**, STATS2**, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, ENGEN201

Key
- Major
- Compulsory
- Numeracy requirement
- Elective
MOLECULAR AND CELLULAR BIOLOGY

MOLECULAR AND CELLULAR BIOLOGY FOCUSES ON THE BROAD SUBJECT AREAS OF BIOCHEMISTRY, GENETICS, MICROBIOLOGY AND PHYSIOLOGY.

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 Faculty or School of Studies 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, BIOMO305 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

CONTACTS FOR MOLECULAR AND CELLULAR BIOLOGY

FIRST YEAR MENTOR
Ms Brydget Tulloch
Room: R.1.06 Phone: 07 837 9376
Email: brydget.tulloch@waikato.ac.nz

CONVENOR
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, CHEMY101, CHEMY102, EARTH101, EARTH102, ENGEN111, ENGEN112, ENGEN180, APHYS111, PHILO102

### List B (Career Start) Choose one of:
- SCIEN301, SCIEN303, SCIEN313, SCIEN314

### List C (Numeracy) Choose two of:
- MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYSC100 OR PHYSIC101 OR ENGEN110, MATHS2**, COMPX2**, STATS2**, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, ENGEN201

### Key
- Major
- Compulsory
- Numeracy requirement
- Elective
PSYCHOLOGY

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 Faculty or School of Studies 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 PSYCH303, PSYCH304, PSYCH305, PSYCH306, PSYCH308, PSYCH309, PSYCH312 and PSYCH313.

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 30 points from PSYCH303, PSYCH304, PSYCH305, PSYCH306, PSYCH308, PSYCH309, PSYCH311, PSYCH312 and PSYCH313.

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

CONTACTS FOR PSYCHOLOGY

FIRST YEAR MENTOR AND CONVENOR
Professor Maryanne Garry
Room: J.1.17 Phone: 07 837 9556
Email: maryanne.garry@waikato.ac.nz
### BSC DEGREE PLANNER

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**List A** Choose three of: BIOEB101, BIOBE102, BIOMO101, CHEMY100, CHEMY101, CHEMY102, EARTH101, EARTH102, ENGEN111, ENGEN112, ENGEN180, APHYS111

**List B (Career Start)** Choose one of: SCIEN301, SCIEN303, SCIEN313, SCIEN314

**List C (Numeracy)** Choose two of: MATHS168, MATHS165, MATHS135, MATHS101 OR ENGEN184, MATHS102 OR ENGEN183, COMPX101 OR ENGEN103, STATS111 OR STATS121, PHYSC100 OR PHYSC101 OR ENGEN110, MATHS2**, COMPX2**, STATS2**, CHEMY202 OR CHEMY204, EARTH251 OR ENVPL202, ENGEN201

**PSYCH3** Choose four of: PSYCH303, PSYCH304, PSYCH305, PSYCH306, PSYCH308, PSYCH309, PSYCH311, PSYCH312 OR PSYCH313.

**Key**
- Major
- Compulsory
- Numeracy requirement
- Elective
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 Faculty Reception science@waikato.ac.nz

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.

100 Level | 200 Level | 300 Level
---|---|---
BIOEB102 | BIOEB200 | BIOEB203
PSYCH101 | PSYCH204 | BIOEB301

APPLIED PHYSICS
Applied Physics is designed for students who wish to gain knowledge of fundamental physics concepts as applied to chemistry, geophysics and the life sciences.

Note: To complete a minor in Applied Physics, students must gain 60 points consisting of APHYS111, APHYS211, APHYS212 and APHYS311.

100 Level | 200 Level | 300 Level
---|---|---
APHYS111 | APHYS211 | APHYS311
APHYS212 | APHYS212 | APHYS311
**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.*

**100 Level**
- BIOMO101
- CHEMY102

**200 Level**
- BIOMO201
- CHEMY201
- CHEMY202

**300 Level**
- CHEMY301

---

**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 at least 30 points above 100 level.*

**100 Level**
- CHEMY101
- CHEMY101

**200 Level**
- CHEMY201
- CHEMY202
- CHEMY203
- CHEMY204

**300 Level**
- CHEMY301
- CHEMY303
- CHEMY203
- CHEMY204
COASTAL PROCESSES

Coastal Processes involves identifying and evaluating processes and factors that contribute to the formation and evolution of coastal landforms, allows 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.

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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.

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</tbody>
</table>
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.

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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.

100 Level
- EARTH101

200 Level
- EARTH231
- EARTH241

300 Level
- EARTH331

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.

100 Level
- ENGEN112

200 Level
- ENGEN180
- ENGMP211

300 Level
- ENGMP311
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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SCIENCE PAPERS
100 LEVEL PAPERS

From 2018 all 100 and 200 level papers will be worth 15 points each.

APHYS111-18A (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. This paper provides a route into the applied physics minor.

Restricted Paper(s): PHYS100, PHYSC100
Assessment: Internal assessment/examination ratio 1:1

BIOEB101-18A (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.

Restriction(s): BIOL101, BIOL102
Assessment: Internal assessment/examination ratio 1:1

BIOEB102-18B (HAM)
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.

Equivalent Paper(s): BIOL102
Restricted Paper(s): BIOL102
Assessment: Internal assessment/examination ratio 1:1

BIOMO101-18B (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.

Equivalent Paper(s): BIOL101
Restricted Paper(s): BIOL101
Assessment: Internal assessment/examination ratio 1:1
CHEMY100-18A (HAM)
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.

Equivalent Paper(s): CHEM100
Restricted Paper(s): CHEM100
Assessment: Internal assessment/examination ratio 3:2

CHEMY101-18A/18C (HAM)
STRUCTURE AND SPECTROSCOPY
A theoretical and practical course covering aspects of analytical and inorganic chemistry. This course is required for the chemistry major.

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 1:1

CHEMY102-18B (HAM)
CHEMICAL REACTIVITY
A theoretical and practical course covering aspects of physical and organic chemistry. This course is required for the chemistry major.

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 1:1

COMPX101-18A/B (HAM)
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.

Equivalent Paper(s): COMP103
Restricted Paper(s): COMP103, ENGEN103, ENGG182
Assessment: Internal assessment/examination ratio: 2:1
EARTH101-18A (HAM) 
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.
Equivalent Paper(s): ERTH104
Restricted Paper(s): ERTH104
Assessment: Internal assessment/examination ratio 1:1

EARTH102-18B (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.
Equivalent Paper(s): ERTH103
Restricted Paper(s): ERTH103
Assessment: Internal assessment/examination ratio 1:1

ENGEN103-18A/B (HAM) 
ENGINEERING COMPUTING
This paper introduces computer programming in languages such as C# and Python. It provides the basis for the programming skills required in more advanced papers within the School of Engineering.
Restricted Paper(s): COMPX101, COMP103, ENGG182
Assessment: Internal assessment/examination ratio: 1:2

ENGEN111-18A (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.
Prerequisites: 16 credits at Level 3 in NCEA Physics.
Equivalent Paper(s): ENEL111
Restricted Paper(s): ENEL111
Assessment: Internal assessment/examination ratio: 1:1

ENGEN112-18B (HAM)
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.
Equivalent Paper(s): ENMP102
Restricted Paper(s): ENMP102
Assessment: Internal assessment/examination ratio 1:1
ENGEN180-18A (HAM)
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.

Equivalent Paper(s): ENGG180
Restricted Paper(s): ENGG180
Assessment: Internal assessment/examination ratio 1:1

ENGEN183-18A/B (HAM)
LINEAR ALGEBRA AND STATISTICS FOR ENGINEERS
A study of introductory statistics and the fundamental techniques of algebra including Gaussian elimination, vector and matrix algebra, complex numbers, eigenvalues and eigenvectors, as well as basic statistical notions and tools, with engineering applications.

Prerequisites: Any one of MATHS165, MATHS166, MATH165, MATH166, at least a B- grade in CAFS004 or FOUND007, or 16 credits at Level 3 in NCEA Calculus; or equivalent.

Restricted Paper(s): MATHS102, ENGG183
Assessment: Internal assessment/examination ratio: 1:1

ENGEN184-18A/B/S (HAM)
CALCULUS FOR ENGINEERS
A study of the fundamental techniques of calculus, including differentiation and integration for functions of one real variable, with engineering applications.

Prerequisites: At least a B- grade in MATHS165, MATH165, MATHS166, MATH166, CAFS004 or FOUND007; or a pass in MATHS102, MATH102, ENGEN183 or ENGG183; or 16 credits of NCEA Level 3 Calculus including at least 11 credits from AS91577, AS91578 and AS91579; or equivalent.

Restricted Paper(s): MATHS101, ENGG184
Assessment: Internal assessment/examination ratio: 1:1

ENVSC101-18B (HAM)
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.

Equivalent Paper(s): ENVS101
Restricted Paper(s): ENVS101
Assessment: Internal assessment/examination ratio 1:1
MATHS101-18A/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.
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: 1:1

MATHS102-18A/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.
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: 1:1

MATHS135-18B (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.
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: 1:1

MATHS165-18A/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.
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.
Equivalent Paper(s): MATH165
Restricted Paper(s): MATH165
Assessment: Internal assessment/examination ratio: 1:1
**MATHS168-18A/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 the required number of science papers for a BSc or BSc(Tech) or towards a supporting subject in Mathematics.

Equivalent Paper(s): MATH168

Restricted Paper(s): MATH168

Assessment: Internal assessment/examination ratio: 1:1

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**PHYSC100-18A (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.

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.

Equivalent Paper(s): PHYS100

Restricted Paper(s): PHYS100

Assessment: Internal assessment/examination ratio: 1:1

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**PHYSC101-18B (HAM)**

**PHYSICS FOR ENGINEERS AND SCIENTISTS**

This is a lecture and lab course covering fundamental physics concepts relevant to engineers and scientists. Topics include vectors, kinematics, force, work, energy, collisions, rotation, equilibrium, oscillations, waves, sound, electricity, magnetism, and light.

Prerequisites: (14 credits at Level 3 in NCEA Physics or PHYS100 or PHYSC100) and (14 credits at Level 3 in NCEA Calculus or one of MATH165, MATHS165, MATH101, MATHS101, MATH102 or MATHS102)

Equivalent Paper(s): PHYS103

Restricted Paper(s): PHYSC103

Assessment: Internal assessment/examination ratio: 1:1

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**PSYCH100-18A (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.

Restriction(s): PSYCH103

Assessment: Internal assessment/examination ratio: 3:2
**PSYCH101-18B (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.

**Equivalent Paper(s):** PSYC102

**Restricted Paper(s):** PSYC102

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

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**STATS111-18B (HAM) & 18A/B (TGA)**

**STATISTICS FOR SCIENCE**

This paper provides a first course in statistics for students in the Faculty of Science and 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.*

**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.

**Equivalent Paper(s):** STAT111

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

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

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**STATS121-18A (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.

**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, STAT160, STATS111, STAT121

**Assessment:** Internal assessment/examination ratio: 1:1
200 LEVEL PAPERS

APHYS211 (HAM)
EXPLORATION GEOPHYSICS
This paper will not be taught in 2018.

APHYS212-18B (HAM)
NUCLEAR AND PARTICLE PHYSICS
This paper will provide the student with an introduction to the theory of nuclear structure, nuclear decay and reactions, and elementary particle physics. Practical examples include radioactivity, radioisotope production, dating of materials using radioactive decay, sterilisation of food/equipment using radioactive sources, radioactive medical imaging techniques and radiotherapy.
Prerequisites: At least 15 points at 100 level in Physics or Applied Physics and MATHS165 or MATH165 or equivalent.
Assessment: Internal assessment/examination ratio: 1:1

BIOEB200-18B (HAM)
BEHAVIOURAL ECOLOGY & CONSERVATION
The 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.
Prerequisites: BIOEB102 or BIOL102
Restricted Paper(s): BIOL200
Assessment: Internal assessment/examination ratio 1:1

BIOEB201-18A (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.
Prerequisites: BIOEB101, BIOEB102 or BIOL102
Restricted Paper(s): BIOL201
Assessment: Internal assessment/examination ratio 1:1

BIOEB202-18B (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.
Prerequisites: BIOEB102 or BIOL102
Restricted Paper(s): BIOL212
Assessment: Internal assessment/examination ratio 1:1
BIOEB203-18A (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.

Prerequisites: BIOEB102 or BIOL102
Restricted Paper(s): BIOL234
Assessment: Internal assessment/examination ratio 1:1

BIOEB204-18B (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.

Prerequisites: BIOEB102 or BIOL102
Restricted Paper(s): BIOL223
Assessment: Internal assessment/examination ratio 1:1

BIOMO201-18A (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.

Prerequisites: BIOMO101 or BIOL101
Restricted Paper(s): BIOL251
Assessment: Internal assessment/examination ratio 1:1

BIOMO202-18B (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.

Prerequisites: BIOMO101 or BIOL101
Restricted Paper(s): BIOL210
Assessment: Internal assessment/examination ratio 1:1
BIOMO203-18A (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.  
**Prerequisites:** BIOEB101 or BIOL101  
**Restricted Paper(s):** BIOL241  
**Assessment:** Internal assessment/examination ratio 1:1

BIOMO204-18B (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.  
**Prerequisites:** BIOMO101, BIOL101 or SPLS103  
**Restricted Paper(s):** BIOL235  
**Assessment:** Internal assessment/examination ratio: 1:1

CHEMY201-18B (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.  
**Prerequisites:** CHEM112 or CHEMY102  
**Equivalent Paper(s):** CHEM212 and CHEM214 combined  
**Restricted Paper(s):** CHEM201, CHEM212, CHEM214, CHEM231  
**Assessment:** Internal assessment/examination ratio 1:1

CHEMY202-18B (HAM)  
**PHYSICAL CHEMISTRY**  
This course covers aspects of physical chemistry including thermodynamics and phase equilibria; chemical kinetics; conductance and electrochemistry.  
**Prerequisites:** CHEM112 or CHEMY102  
**Equivalent Paper(s):** CHEM212 and CHEM214 combined  
**Restricted Paper(s):** CHEM202, CHEM232, CHEM212, CHEM214, CHEMY201  
**Assessment:** Internal assessment/examination ratio 1:1
CHEMY203-18A (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.
Prerequisites: CHEMY101 or CHEM111
Equivalent Paper(s): CHEM211 and CHEM213 combined
Restricted Paper(s): CHEM203, CHEM211, CHEM213
Assessment: Internal assessment/examination ratio 1:1

CHEMY204-18A (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).
Prerequisites: CHEMY101 or CHEM111
Equivalent Paper(s): CHEM211 and CHEM213 combined
Restricted Paper(s): CHEM204, CHEM211, CHEM213, CHEM306, CHEMY203
Assessment: Internal assessment/examination ratio: 1:1

COMPX201-18A (HAM)
DATA STRUCTURES AND ALGORITHMS
This paper introduces programming with data structures using Java. Students learn how to program in Java and become familiar with the design, analysis, and application of commonly used data structures, including stacks, queues, lists, trees, and sets.
Prerequisites: COMPX102 or COMP104
Restricted Paper(s): COMP203, COMP241, COMPX241
Assessment: Internal assessment/examination ratio: 1:0

COMPX202-18B (HAM)
MOBILE COMPUTING AND SOFTWARE ARCHITECTURE
This paper covers object-oriented programming, primarily as seen in Java, but also touching on alternative approaches. It introduces software development methodologies and the use of support tools, particularly repositories and a testing framework. Project work starts with GUI development in Java and works through to the construction of mobile applications.
Prerequisites: COMP203 or COMPX201
Restricted Paper(s): COMP204, COMP242, COMPX242
Assessment: Internal assessment/examination ratio: 1:0
COMPX203-18A (HAM)

**COMPUTER SYSTEMS**
This paper provides an overview of the operation of computer systems. The central theme is the way in which the hardware and software co-operate to allow the execution of programs written in a high-level language.

**Prerequisites:** At least one of COMP104, COMPX102, (COMPX101 and ENGEN111), (COMP103 and ENEL111), (ENGEN103 and ENGEN111), or (ENGG182 and ENEL111)

**Restricted Paper(s):** COMP200

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

COMPX204-18B (HAM)

**PRACTICAL NETWORKING AND CYBER SECURITY**
This paper provides an overview of the technologies and protocols involved in computer communications and cyber security. Practical work includes network programming.

**Prerequisites:** COMPX102 or COMP104

**Restricted Paper(s):** COMP202

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

COMPX221-18A (HAM)

**PROGRAMMING FOR CREATIVE INDUSTRIES**
A fundamental grounding in object-oriented programming that uses processing software to creative visual outputs for creative industries.

**Prerequisites:** At least one of COMP103, COMPX101, ENGEN103, or ENGG182

**Restricted Paper(s):** COMP258

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

COMPX222-18B (HAM)

**INTERNET APPLICATIONS**
This paper provides a broad overview of the principles and technologies used in Internet Applications, with practical experience of client-side and server-side programming.

**Prerequisites:** At least one of COMP103, COMPX101, ENGEN103, or ENGG182

**Restricted Paper(s):** COMP233

**Assessment:** Internal assessment/examination ratio: 2:1

COMPX223-18A (HAM)

**DATABASE PRACTICE AND EXPERIENCE**
This paper approaches the subject of databases from a practical perspective - how to create a database and retrieve/update data, database creation and querying, using SQL will be introduced in lectures as you master practical skills associated with a commercial database product (Microsoft SQL Server). The paper also introduces Microsoft’s extension to SQL, Transact-SQL, which provides a user interface to SQL Server. This promotes both understanding and practice of the different tools used to build, access and maintain a database within a Client/Server database computing environment.

**Prerequisites:** COMP103 or COMPX101

**Restricted Paper(s):** COMP219

**Assessment:** Internal assessment/examination ratio: 1:0
COMPX241-18A (HAM)  
SOFTWARE ENGINEERING DEVELOPMENT
A fundamental grounding in object-oriented programming that uses processing software to creative visual outputs for creative industries.

Prerequisites: COMP104 or COMPX102
Restricted Paper(s): COMP203, COMP241, COMPX201
Assessment: Internal assessment/examination ratio: 1:0

COMPX242-18B (HAM)  
SOFTWARE ENGINEERING PROCESS
This paper covers object-oriented programming, primarily as seen in Java, but also touching on alternative approaches. It introduces software development methodologies and the use of support tools, particularly repositories and a testing framework. Project work starts with GUI development in Java and works through to the construction of mobile applications.

Prerequisites: COMP241 or COMPX241
Restricted Paper(s): COMP204, COMP242, COMPX202
Assessment: Internal assessment/examination ratio: 1:0

COMPX252-18A/B/S (HAM)  
INTERACTIVE COMPUTING
This paper provides an opportunity to explore several software applications in depth. It is based on an intensive lab programme, where students tailor their choices to their own needs and interests by selecting two themes from a set of modules.

Prerequisites: At least one of COMP103, COMP123, COMPX101, COMPX151, ENGEN103, or ENGG182
Restricted Paper(s): COMP278
Assessment: Internal assessment/examination ratio: 1:0

EARTH211-18A (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.

Prerequisites: EARTH102 or ERTH103
Restricted Paper(s): ERTH221
Assessment: Internal assessment/examination ratio 1:1
THE UNIVERSITY OF WAIKATO

EARTH221-18B (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.

Prerequisites: EARTH101, ENVSC101, ERTH104 or ENVS101
Restricted Paper(s): ERTH233, ERTH234
Assessment: Internal assessment/examination ratio 1:1

EARTH231-18A (HAM)
WATER RESOURCES, WEATHER AND CLIMATE
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.

Prerequisites: EARTH101, ENVSC101, ERTH103, ERTH104, ENVS101 or GEOG103
Restricted Paper(s): ERTH245
Assessment: Internal assessment/examination ratio 1:1

EARTH241-18B (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.

Prerequisites: EARTH101 or ENVSC101 or ERTH104 or ENVS101
Restricted Paper(s): ERTH242
Assessment: Internal assessment/examination ratio 1:1

EARTH251-18A (HAM)
SPATIAL ANALYSIS IN GEOSCIENCES
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.

Prerequisites: EARTH102 or ERTH103
Restricted Paper(s): ERTH222 and ERTH251
Assessment: Internal assessment/examination ratio: 1:1
ENGEN201-18B (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.
Prerequisites: ENGEN183, ENGG183 and ENGEN184 or ENGG184
Equivalent Paper(s): ENGG284, ENGG285
Restricted Paper(s): MATH251, MATH255, MATHS201, MATHS203
Assessment: Internal assessment/examination ratio: 1:1

ENGME280-18B (HAM)
DESIGN AND MANUFACTURING 1
This paper covers the fundamentals of engineering design and manufacture.
Prerequisites: ENGEN180 or ENGG180
Restricted Paper(s): ENGG282, ENMP215
Assessment: Internal assessment/examination ratio 1:0

ENGMP211-18A (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.
Prerequisites: 15 points at Level 100 in Chemistry or equivalent credit, or ENGEN112 or ENMP102
Restricted Paper(s): ENMP211
Assessment: Internal assessment/examination ratio 1:1

ENVPL202-18B (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.
Restricted Paper(s): ENV207, GEOG228
Assessment: Internal assessment/examination ratio: 1:0
ENVSC201-18B (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.

Restricted Paper(s): ERTH284, ERTH384
Assessment: Internal assessment/examination ratio 1:1

ENVSC202-18A (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.

Prerequisites: CHEM100, CHEM111, CHEM112, CHEMY100, CHEMY101 or CHEMY102
Restricted Paper(s): CHEM261
Assessment: Internal assessment/examination ratio: 1:1

MATHS201-18B (HAM)
CONTINUING CALCULUS
Calculus of Several Variables and its Applications. Vector calculus (Green's, Gauss’ and Stokes’ theorems). Taylor's Theorem in n dimensions. The gamma and beta functions.

Prerequisites: At least one of MATH101 or MATHS101 and MATH102 or MATHS102
Restricted Paper(s): MATH251, ENGG285, ENGEN201
Assessment: Internal assessment/examination ratio: 1:1

MATHS202-18A (HAM)
LINEAR ALGEBRA
A formal approach to linear algebra, with applications. Topics include: axioms of a vector space, linear independence, spanning sets and bases. Linear transformations, the Gram-Schmidt process.

Prerequisites: MATH102 or MATHS102
Equivalent Paper(s): MATH253
Assessment: Internal assessment/examination ratio: 1:1

MATHS203-18B (HAM)
DIFFERENTIAL EQUATIONS AND MODELLING

Prerequisites: (MATH101 or MATHS101) and (MATH102 or MATHS102)
Restricted Paper(s): ENGG284, ENGEN201, MATH255 and MATH259
Assessment: Internal assessment/examination ratio: 1:1
PSYCH203-18B (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.

Restricted Paper(s): PSYC230
Assessment: Internal assessment/examination ratio: 1:0

PSYCH204-18A (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.

Prerequisites: PSYCH100 or PSYC103
Restricted Paper(s): PSYC225 and PSYC226
Assessment: Internal assessment/examination ratio: 1:0

PSYCH211-18A (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.

Restricted Paper(s): PSYC208
Assessment: Internal assessment/examination ratio: 70:30

SCIEN279-18B (HAM)
PREPARATION FOR THE PROFESSIONAL WORKPLACE
This paper constitutes preparation for the scientific workplace, and include CV preparation, interview technique, career mentoring/direction, skill identification, organisational; management structures, self-assessment tools, and professional behaviour.

Restricted Paper(s): SCIE279
Assessment: Internal assessment/examination ratio: 1:0

STATS221-18A (HAM)
STATISTICAL DATA ANALYSIS
This paper introduces students to the R programming language which is used to investigate a collection of real data sets. Analysis of variance, multiple regression, non-parametric methods and time series are covered.

Prerequisites: One of STAT111, STAT121, STATS111, STATS121
Restricted Paper(s): STAT221
Assessment: Internal assessment/examination ratio: 1:1
STATS226-18B (HAM)

BAYESIAN STATISTICS

This paper introduces statistical methods from a Bayesian perspective, which provides a coherent approach to the problem of revising beliefs given relevant data. It is particularly relevant for data analytics, statistics, mathematics and computer science.

Prerequisites: At least one of MATH101, MATH102, MATHS101, MATHS102, STAT111, STAT121, STATS111, or STATS121.

Restricted Paper(s): STAT226

Assessment: Internal assessment/examination ratio: 1:1

STATS260-18C (ZUC) (HAM)

MANAGEMENT STATISTICS

An in-depth introduction to statistical thinking and concepts for managers. It includes understanding variability, problem-solving methods, the need for and use of data, analysing attribute or qualitative data, sampling estimation and margins of error, simple linear regression, multiple regression, forecasting and decision theory.

Restricted Paper(s): STAT160

Assessment: Internal assessment/examination ratio: 1:1
300 LEVEL PAPERS

These papers will only be on offer in 2018. These 300 level papers are worth 20 points each unless specified. For the new 300 level papers available from 2019, see Page 70.

BIOL310-18A (HAM)
ADVANCED GENETICS
A study of advanced microbial and eukaryotic genetics, DNA topology, nucleotide sequencing, regulation of gene expression, uses of recombinant DNA technology, and population genetics.
Prerequisites: BIOL210
Assessment: Internal assessment/examination ratio: 1:1

BIOL312-18A (HAM) & (TGA)
APPLIED TERRESTRIAL ECOLOGY
A course that explores ecological principles, ecosystem dynamics and functioning, restoration, conservation genetics, conservation ecology, forest ecosystems, pest control and protection of native species.
Prerequisites: BIOL212
Assessment: Internal assessment/examination ratio: 3:2

BIOL313-18A (HAM) & (TGA)
APPLIED 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.
Prerequisites: BIOL212
Assessment: Internal assessment/examination ratio: 1:1

BIOL314-18B (HAM) & (TGA)
MARINE BIOLOGY AND MONITORING
An introduction to the structure and function of marine ecosystems. This paper also covers 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 course.
Prerequisites: BIOL212
Assessment: Internal assessment/examination ratio: 1:1

BIOL324-18B (TGA)
AQUACULTURE REPRODUCTION AND EARLY LIFE STAGES
Students will study the underlying reproductive physiology and developmental biology of early life cycle strategies used by aquatic animal species. This knowledge will be examined for its use in the husbandry, breeding and production of species in aquaculture.
Prerequisites: BIOL234 or Aquaculture 1, Aquaculture 2, Diploma in Marine Studies Bay of Plenty Polytechnic.
Restricted Paper(s): BIOL224
Assessment: Internal assessment/examination ratio: 3:2
BIOL325-18A (HAM)

PLANT FUNCTION
An introduction to the discipline of plant physiological ecology and the interactions of plants with their environment. Includes an emphasis on practical techniques for measuring plant microclimate, photosynthesis and water use.

Prerequisites: BIOL223
Assessment: Internal assessment/examination ratio: 1:0

BIOL333-18B (HAM)

ADVANCED ANIMAL BEHAVIOUR
This paper examines the development, causation, function and evolutionary history of vertebrate and invertebrate behaviour. It applies behavioural information to conservation biology and animal welfare.

Prerequisites: BIOL234, BIOE102 or BIOL102
Assessment: Internal assessment/examination ratio: 1:1

BIOL335-18A (HAM)

MAMMALIAN PHYSIOLOGY
An examination of selected aspects of mammalian physiology, normally including the physiology of respiration, digestion, muscle, reproduction and lactation.

Prerequisites: BIOL234 or BIOL235
Assessment: Internal assessment/examination ratio: 1:1

BIOL338-18B (HAM)

ADVANCED ZOOLOGY
An examination of the evolutionary biology of animals, including structure, function and evolutionary adaptation of selected invertebrates and vertebrates.

Prerequisites: BIOL201 or BIOL234
Assessment: Internal assessment/examination ratio: 1:1

BIOL341-18B (HAM)

MICROBIAL PHYSIOLOGY AND ECOLOGY
A study of the physiology of bacteria with emphasis on their great metabolic diversity and on the unifying principles of energy generation. Includes Archaebacteria and bacteria of extreme environments.

Prerequisites: BIOL241
Assessment: Internal assessment/examination ratio: 1:1

BIOL351-18B (HAM)

ADVANCED BIOCHEMISTRY
This paper will examine mechanisms underlying cellular communication and trafficking of proteins between organelles, cellular stress responses, cell death, metabolic regulation in relation to control of enzyme activity and stability as well as human diseases (eg diabetes), mammalian vision, toxicology and inflammation.

Prerequisites: BIOL251
Assessment: Internal assessment/examination ratio: 1:1
BIOL362-18C (BLOCK) (HAM)
MOLECULAR BIOLOGY AND BIOTECHNIQUES
This paper examines the molecular biological technologies used to analyse and manipulate DNA, RNA and proteins. It includes coverage of the major recombinant DNA techniques during an intensive two-week course.
Prerequisites: BIOL210
Assessment: Internal assessment/examination ratio: 1:0

CHEM311-18B (HAM)
ANALYTICAL AND INORGANIC CHEMISTRY 2
A theoretical paper covering aspects of analytical and inorganic chemistry. This paper is required for the Chemistry major.
Prerequisites: CHEM211
Restricted Paper(s): CHEM303, CHEM306
Assessment: Internal assessment/examination ratio: 1:1

CHEM312-18A (HAM)
ORGANIC AND PHYSICAL CHEMISTRY 2
A theoretical paper covering aspects of organic and physical chemistry. This paper is required for the Chemistry major.
Prerequisites: CHEM212
Restricted Paper(s): CHEM301, CHEM302
Assessment: Internal assessment/examination ratio: 1:1

CHEM313-18B (HAM)
ANALYTICAL AND INORGANIC CHEMISTRY LAB 2
10 points
A lab paper in which the student will carry out independent, individual projects in analytical and physical chemistry. This paper is required for the Chemistry major.
Prerequisites: CHEM213
Corequisites: CHEM311
Restricted Paper(s): CHEM303, CHEM306
Assessment: Internal assessment/examination ratio: 1:0

CHEM314-18A (HAM)
ORGANIC AND PHYSICAL CHEMISTRY LAB 2
10 points
A lab paper in which the student will carry out independent, individual projects in organic and inorganic chemistry or a combined project. This paper is required for the Chemistry major.
Prerequisites: CHEM214
Corequisites: CHEM312
Restricted Paper(s): CHEM301, CHEM302
Assessment: Internal assessment/examination ratio: 1:0
ERTH321-18A (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.

Prerequisites: ERTH221

Assessment: Internal assessment/examination ratio: 3:2

ERTH322-18B (HAM)

SEDIMENTARY AND PETROLEUM GEOLOGY

A study of sedimentary processes, depositional environments, sedimentary basins and associated resources (petroleum and coal). Introduction to sequence stratigraphy, seismic reflection mapping and wireline logging as used in the petroleum exploration industry.

Prerequisites: ERTH222

Assessment: Internal assessment/examination ratio: 3:2

ERTH333-18B (HAM)

PEDOLOGY AND LAND EVALUATION

10 points

Soil genesis and spatial variability, quantitative soil survey and soil-landscape modelling, soil taxonomy, and the interpretation of soil and land data in a form applicable to land-use planning and management.

Prerequisites: ERTH233

Restricted Paper(s): ERTH331

Assessment: Internal assessment/examination ratio: 3:2

ERTH343-18A (HAM) & (TGA)

COASTAL GEOMORPHOLOGY AND MANAGEMENT

A study of the geomorphic development of coastal features. Topics include qualitative and semi-quantitative assessments of coastal hazards, impacts of sea-level rise, dredge spoil disposal, stability of coasts, coastal protection and mitigation of hazards.

Prerequisites: 40 points at 200 level in Earth Sciences or approved Geography papers.

Assessment: Internal assessment/examination ratio: 3:2
ERTH344-18A (HAM)  
COASTAL OCEANOGRAPHY AND ENGINEERING  
A study of water movement in estuarine and shelf environments. Methodologies for quantifying processes and responses for coastal planning and management. Evaluation of design conditions for engineering purposes. Introduction to numerical modelling.  
Prerequisites: ERTH242 or ERTH245  
Assessment: Internal assessment/examination ratio: 3:2

ERTH345-18A (HAM)  
CATCHMENT HYDROLOGY  
10 points  
A study of the measurement, analysis and modelling of surface hydrological processes at the catchment scale, emphasising river flow, evaporation, interception loss and hillslope runoff processes.  
Prerequisites: ERTH245 or ERTH246  
Restricted Paper(s): ERTH341  
Assessment: Internal assessment/examination ratio: 3:2

ERTH346-18B (HAM)  
FRESHWATER RESOURCES AND HAZARDS  
10 points  
Overview of freshwater resources and their analysis, with some emphasis on groundwater resources; introduction to hydrological hazards including flood hazard analysis and river contamination modelling.  
Prerequisites: ERTH245 or ERTH246  
Restricted Paper(s): ERTH341  
Assessment: Internal assessment/examination ratio: 3:2

ERTH352-18A (HAM)  
ENGINEERING GEOLOGY  
10 points  
Study of the nature and mechanics of soil instability, slope erosion processes and the physical properties of earth materials. Mitigation and avoidance of hazards resulting from slope instability and associated erosion processes.  
Prerequisites: ERTH251  
Assessment: Internal assessment/examination ratio: 3:2

PSYC307-18B (HAM) & (TGA)  
RESEARCH METHODS  
This paper introduces students to research theory and methods, making them critical consumers of psychological research. It is a prerequisite for entry into the Psychology graduate programme.  
Prerequisites: PSYC208 or PSYC211  
Assessment: Internal assessment/examination ratio: 1:0
PSYC314-18B (HAM) & (TGA)
BEHAVIOUR ANALYSIS
A study of theoretical, experimental and applied behaviour analysis. Lab work involving animals is required.
Prerequisites: PSYC225 or equivalent.
Assessment: Internal assessment/examination ratio: 2:1 or 1:2, whichever is more favourable for the student.

PSYC337-18B (HAM) & (TGA)
PSYCHOLOGICAL MEASUREMENT
This paper covers basic issues in psychological measurement applicable across a range of psychological specialities, with an emphasis on measures and strategies appropriate for the New Zealand and, where applicable, Māori context.
Prerequisites: PSYC208
Assessment: Internal assessment/examination ratio: 2:1 or 1:2, whichever is more favourable for the student.

PSYC338-18B (HAM) & (TGA)
ABNORMAL PSYCHOLOGY
This paper deals with the classification and treatment of the major classes of psychopathology.
Prerequisites: PSYC102 or PSYC103 or equivalent.
Assessment: Internal assessment/examination ratio: 1:1

PSYC340-18A (HAM)
APPLIED COGNITIVE PSYCHOLOGY
This paper covers theories and research into human attention, memory, cognitive workload, situation awareness, decision-making, and their application to transportation, product design, information technologies, and forensic psychology.
Prerequisites: PSYC230
Restriction(s): PSYC305
Assessment: Internal assessment/examination ratio: 1:0

PSYC341-18A (HAM)
VISUAL NEUROSCIENCE AND ITS APPLICATIONS
This paper examines some of the neural mechanisms underlying our sensations and perceptions, especially vision.
Prerequisites: PSYC226
Restriction(s): PSYC305
Assessment: Internal assessment/examination ratio: 1:0
SCIE300-18T (HAM)
SCIENCE COMMUNICATION
Students will investigate contemporary scientific topics; learning to source relevant information, assess its validity, draw conclusions and communicate their findings to a non-scientific audience.

Prerequisites: 30 points at 100 level in science papers.
Assessment: Internal assessment/examination ratio: 1:0

SCIE301-18A/B/C (HAM) & (TGA)
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. Project start and end dates should align with A, B, S or T semester dates.

Restricted Paper(s): BIOL307, CHEM304, ERTH311, ERTH312
Assessment: Internal assessment/examination ratio: 1:0

SCIE302-18A/B/C (HAM)
RESEARCH PROJECT
10 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. Project start and end dates should align with A, B, S or T semester dates.

Restricted Paper(s): BIOL307, CHEM304, ERTH311, ERTH312
Assessment: Internal assessment/examination ratio: 1:0

SCIEN305-18B (HAM)
SCIENCE AND MATAURANGA MĀORI
This paper will provide science graduates with an understanding of both scientific and Matauranga Māori perspectives on topical issues and the ability to apply these in a Vision Matauranga context.

Prerequisite(s): Students should have taken at least 60 points in 200-level Science papers.
Assessment: Internal assessment/examination ratio: 1:0
300 LEVEL PAPERS (AVAILABLE FROM 2019)

Please note these papers are subject to change.

BIOEB301 (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.

Note: It is recommended that students pass BIOEB200 first.
Restricted Paper(s): BIOL333
Assessment: Internal assessment/examination ratio 1:1

BIOEB302 (HAM)
ADVANCED ZOOLOGY
An examination of the evolutionary biology of animals, including structure, function and evolutionary adaptation of selected invertebrates and vertebrates.
Prerequisites: BIOEB201
Restricted Paper(s): BIOL338
Assessment: Internal assessment/examination ratio 1:1

BIOEB303 (HAM)
TERRESTRIAL ECOLOGY
A paper that explores ecological principles and ecosystem dynamics, functioning, restoration and conservation ecology of New Zealand forest ecosystems.
Prerequisites: BIOEB202
Restricted Paper(s): BIOL312
Assessment: Internal assessment/examination ratio 3:2

BIOEB304 (HAM)
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.
Prerequisites: BIOEB202
Restricted Paper(s): BIOL313
Assessment: Internal assessment/examination ratio 1:1

BIOEB305 (HAM)
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.
Prerequisites: BIOEB202
Restricted Paper(s): BIOL314
Assessment: Internal assessment/examination ratio 1:1
BIOEB306 (HAM)
**MOLECULAR ECOLOGY AND BIODIVERSITY**
This paper will examine how molecular ecology contributes to our knowledge of the earth’s ecosystems by providing knowledge of how molecular techniques (e.g. DNA barcoding) can be used to accurately assess levels of biodiversity as well as address ecological and evolutionary questions.

**Prerequisites:** BIOEB201  
**Assessment:** Internal assessment/examination ratio: 1:1

BIOEB307 (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.

**Prerequisites:** BIOEB204  
**Restricted Paper(s):** BIOL325  
**Assessment:** Internal assessment/examination ratio: 1:1

BIOMO301 (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.

**Prerequisites:** BIOMO201  
**Restricted Paper(s):** BIOL351  
**Assessment:** Internal assessment/examination ratio: 1:1

BIOMO302 (HAM)
**ADVANCED GENETICS**
This paper provides a knowledge of mammalian physiology and its application to research in health, exercise and primary production.

**Prerequisites:** BIOMO204  
**Restricted Paper(s):** BIOL310  
**Assessment:** Internal assessment/examination ratio: 1:1

BIOMO303 (HAM)
**ADVANCED MICROBIOLOGY**
This paper provides knowledge of microbial functions and the role of the microbiome in human and ecosystem health.

**Prerequisites:** BIOMO203  
**Restricted Paper(s):** BIOL341  
**Assessment:** Internal assessment/examination ratio: 1:1
BIOMO304 (HAM)

**APPLIED ANIMAL PHYSIOLOGY**

This paper provides a knowledge of mammalian physiology and its application to research in health, exercise and primary production.

**Prerequisites:** BIOMO204

**Restricted Paper(s):** BIOL335

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

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BIOMO305 (HAM)

**MOLECULAR BIOLOGY AND BIOTECHNIQUES**

This paper examines the molecular biological technologies used to analyse and manipulate DNA, RNA and proteins. It includes coverage of the major recombinant DNA techniques during an intensive two week course.

**Prerequisites:** BIOL210 or BIOMO202

**Restricted Paper(s):** BIOL362

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

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BIOMO306 (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.

**Prerequisites:** BIOMO202 and a further 15 points of 200-level BIOMO papers

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

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CHEMY301 (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.

**Prerequisites:** CHEMY201

**Restricted Paper(s):** CHEM301, CHEM312, CHEM314

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

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CHEMY302 (HAM)

**ADVANCED PHYSICAL CHEMISTRY**

This course covers advanced aspects of physical chemistry including quantum mechanics and spectroscopy; statistical thermodynamics; surface chemistry.

**Prerequisites:** CHEMY202

**Restricted Paper(s):** CHEM302, CHEM312, CHEM314

**Assessment:** Internal assessment/examination ratio 1:1
CHEMY303 (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.
Prerequisites: CHEMY203
Restricted Paper(s): CHEM303, CHEM311, CHEM313
Assessment: Internal assessment/examination ratio 1:1

CHEMY304 (HAM)
ADVANCED ANALYTICAL CHEMISTRY
This paper covers advanced aspects of analytical chemistry including electron impact mass spectrometry, inductively coupled plasma mass spectrometry, liquid and solid state NMR, introductory chemometrics, quality assurance and applications of synchrotron radiation.
Prerequisites: CHEMY204
Restricted Paper(s): CHEM306, CHEM311, CHEM313
Assessment: Internal assessment/examination ratio: 1:1

EARTH311 (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.
Prerequisites: EARTH211; EARTH251 is recommended.
Assessment: Internal assessment/examination ratio: 1:1

EARTH312 (HAM)
SEDIMENTARY AND PETROLEUM 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.
Prerequisites: EARTH211; EARTH251 is recommended.
Restricted Paper(s): ERTH322
Assessment: Internal assessment/examination ratio: 3:2
EARTH313 (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.  
Prerequisites: EARTH211 or EARTH221; EARTH251 is recommended.  
Restricted Paper(s): ERTH352  
Assessment: Internal assessment/examination ratio: 1:1

EARTH321 (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.  
Prerequisites: EARTH221  
Restricted Paper(s): ERTH333  
Assessment: Internal assessment/examination ratio: 3:2

EARTH322 (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).  
Prerequisites: EARTH221  
Restricted Paper(s): ERTH334 and ERTH345  
Assessment: Internal assessment/examination ratio: 3:2
EARTH331 (HAM)
WATER RESOURCES AND HAZARDS
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.
Prerequisites: EARTH231
Restricted Paper(s) ERTH246 and ERTH346
Assessment: Internal assessment/examination ratio: 3:2

EARTH341 (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.
Prerequisites: EARTH241
Assessment: Internal assessment/examination ratio: 3:2

EARTH342 (HAM)
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.
Prerequisites: EARTH241
Restricted Paper(s): ERTH343
Assessment: Internal assessment/examination ratio: 3:2

ENGMP311 (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.
Prerequisites: ENGMP211
Restricted Paper(s): ENMP311
Assessment: Internal assessment/examination ratio: 1:1

ENVPL303
ENVIRONMENTAL ASSESSMENT AND POLICY
Please consult the Faculty of Arts and Social Sciences Handbook for further information on this 300 level course, on offer in 2019.
ENVSC302
ENVIRONMENTAL GEOCHEMISTRY
Prerequisites: CHEM361
Restricted Paper(s): CHEM309 or ENVSC202
Assessment: Internal assessment/examination ratio: 1:0

PSYCH303
INFANT AND CHILD DEVELOPMENT

PSYCH304
BEHAVIOUR ANALYSIS

PSYCH305
PSYCHOLOGICAL SCIENCE: PUTTING THEORY INTO PRACTICE

PSYCH308
ABNORMAL PSYCHOLOGY

PSYCH309
MEMORY AND COGNITION

PSYCH311
PSYCHOLOGICAL RESEARCH METHODS

PSYCH312
INDIVIDUAL DIFFERENCES AND MEASUREMENT

SCIEN301 (HAM)
CAPSTONE PROJECT
This paper satisfies the University requirement for an Industry, Employer and Community Engagement paper. Students complete an interdisciplinary group project on a topic of relevance to the scientific community and/or the wider public. In most cases it is expected that groups will be formed with students from different majors to facilitate the development of an interdisciplinary perspective and to refine a student’s communication skills.
Prerequisites: Minimum of 120 points in science
Restricted Paper(s): SCIEN303, SCIEN312, SCIEN313, SCIEN314
Assessment: Internal assessment/examination ratio: 1:0
SCIEN303-19A/B (HAM)

UNDERGRADUATE RESEARCH PROJECT
15 points
This paper satisfies the University requirement for an Industry, Employer and Community Engagement paper. Students will complete a supervised independent research project that normally involves the collection/generation of new research data. This paper is primarily targeted at students who intend to undertake postgraduate research [BSc(Hons), MSc, MSc(Research)] after the completion of their BSc.
Prerequisites: Entry into the paper is at the discretion of the paper coordinator.
Restricted Paper(s): BIOL307, CHEM304, ERTH311, ERTH312, SCIE301, SCIE302
Assessment: Internal assessment/examination ratio: 1:0

SCIEN305-19A/B (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.
Prerequisites: No te reo prerequisites; students should have at least 60 points in 200-level Science papers.
Assessment: Internal assessment/examination ratio: 1:0

SCIEN313-19S (HAM)

UNDERGRADUATE RESEARCH PROJECT
30 points
This paper satisfies the University requirement for an Industry, Employer and Community Engagement paper. Students will complete a supervised independent research project that normally involves the collection/generation of new research data. This paper is primarily targeted at students who intend to undertake postgraduate research [BSc(Hons), MSc, MSc(Research)] after the completion of their BSc.
Prerequisites: Entry into the paper is at the discretion of the paper coordinator.
Restricted Paper(s): BIOL307, CHEM304, ERTH311, ERTH312, SCIE303, SCIE301, SCIE302
Assessment: Internal assessment/examination ratio: 1:0

SCIEN314-19S (HAM)

SCIENCE ENTREPRENEURSHIP
30 points
This paper satisfies the University requirement for an Industry, Employer and Community Engagement paper. Students will complete a supervised innovation development project based on their own "bright idea" for a novel science-based business.
Prerequisites: Entry into the paper is at the discretion of the paper coordinator.
Assessment: Internal assessment/examination ratio: 1:0

SCIEN371-19S (HAM)

SCIENCE WORK PLACEMENT
30 points
This paper satisfies the University requirement for an Industry, Employer and Community Engagement paper. This paper provides a full-immersion, authentic work experience that is relevant to a student’s study, in a professional workplace.
Prerequisites: SCIEN279
Restricted Paper(s): SCIE371, SCIE372, SCIE373, and SCIE374
Assessment: Internal assessment/examination ratio: 1:0
GRADUATE STUDY
INTRODUCTION

The School of Science brings together the former Departments of Biological Sciences, Chemistry and Earth Sciences into a cohesive cross-disciplinary unit providing greater opportunities in teaching and research. The grand challenges facing society currently require research that transcends disciplinary boundaries, requiring an increased flexibility in the ways we seek to understand the world and the ways we prepare students for the future.

For more information on our activities, visit sci.waikato.ac.nz

GRADUATE AND POSTGRADUATE QUALIFICATIONS SUMMARY

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.

INTERNATIONAL STUDENT 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 IELTS (academic stream) overall score of 6.5 with at least 6.0 in the Writing band OR successfully complete The University of Waikato Pathways College English Language level 8 with a B grade or higher or a TOEFL iBT score of 90 (with a writing score of 22).

What follows is a brief description of each qualification. Precise details of the regulations can be found in the 2018 University of Waikato Calendar.
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 at least a 30 point dissertation (e.g. CHEM591).

BSC(HONS) DEGREE PLANNER (Example: CHEMISTRY) 120 points 1 year

| 60 or 90 points of 500 level taught papers. | 60 or 30 point dissertation. |

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

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

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 1 year 120 points
MASTERS QUALIFICATIONS

MASTER OF SCIENCE (MSC)
The MSc is a degree that is customised to provide excellent career opportunities and a great background for further study.

To enrol in an MSc you must have completed (or almost completed) a bachelors degree with a major in the relevant subject and attained good enough grades for advanced study. If you have a bachelors degree in a non-relevant subject, and then have completed an appropriate Graduate Diploma, you may be accepted into an MSc. The degree may be awarded with or without honours.

If you have a BSc(Hons) or PGDip you may be eligible to enter directly into the second year of the MSc.

The degree normally requires 180 points and is completed over an 18-month period. The degree consists of taught papers and a research component which could include research methods papers and/or a dissertation.

MSC DEGREE PLANNER 1.5 years 180 points

- Thesis of at least 60 points
- 120 points of taught papers

MASTER OF SCIENCE (RESEARCH) (MSC(RESEARCH))
The MSc(Research) is an internationally recognised qualification, valued for its flexibility and general excellence in education and training.

To enrol in an MSc(Research) you must have completed (or almost completed) a bachelors degree with a major in the relevant subject and attained good enough grades for advanced study. If you have a bachelors degree in a non-relevant subject, and then have completed an appropriate Graduate Diploma, you may be accepted into an MSc(Research).

If you have a BSc(Hons) or PGDip you may be eligible to enter a one-year MSc(Research) requiring 120 points; the normal route to enrol in an MSc (Research) is to substitute a Postgraduate Diploma (PGDip) for the first year of MSc(Research) study.

The MSc(Research) is a two-year degree, consisting of 240 points at 500 level. The normal pattern is to gain 120 points in the first year, then complete a 120 point thesis in the second. 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.

The degree may be awarded with or without honours. To be eligible for honours, you must complete the requirements of the degree and submit your thesis in no more than two years of full-time study (or the equivalent for part-time enrolment).

MSC(RESEARCH) DEGREE PLANNER 2 years 240 points

- Thesis of at least 90 points
- 120 points of taught papers
MASTER OF SCIENCE (TECHNOLOGY) (MSC(TECH))

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

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 two-year degree, consisting of 240 points off taught papers including ENMP585 and ENMP586 and a thesis that reports the results of an investigation relating to some applied or industrial study.

MSC(TECH) DEGREE PLANNER 2 years 240 points

- Thesis of at least 90 points
- 90 points of taught papers including ENMP585 and ENMP586

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 two-year degree, consisting of a minimum of 90 points in taught papers at 500 level and a maximum 90 point thesis. The balance of thesis papers to taught papers may be altered subject to permission from the Postgraduate Convenor.

MENVSCI DEGREE PLANNER 1.5 years 180 points

- Thesis of at least 90 points
- 90 points of taught papers

Please enquire with the Faculty Office about other graduate qualification options.
**HIGHER RESEARCH DEGREES**

**DOCTOR OF PHILOSOPHY (PHD)**

To enrol for a PhD you normally need an honours or masters degree with first or second class honours (first division).

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.

PhD application closing dates are 1 March, 1 July and 1 November annually. Applications must be completed online and received by midnight (NZ time) on the deadline of the application round for which you are applying. Please note that paper applications cannot be accepted. If your online application to enrol arrives after one of these closing dates, your application will be considered in the following application round. All incomplete or incorrect applications are unable to be considered further.

Visit [waikato.ac.nz/study/apply/higher-research-degrees-application-process](http://waikato.ac.nz/study/apply/higher-research-degrees-application-process)

**MASTER OF PHILOSOPHY (MPHIL)**

To enrol for a MPhil you normally need an honours or masters degree with first or second class (first division) honours. 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 Faculty Postgraduate Research Committee representative. Copies of progress reports are sent to candidates. PhD candidates are encouraged to discuss progress reports with their supervisory panel first, before submission.

CHANGES TO CONDITIONS OF ENROLMENT

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

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

EXAMINATION

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

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

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

Note: This is an attempt to summarise processes related to Higher Degrees enrolment.
FULL-TIME VS PART-TIME

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

A part-time student is defined as one who is enrolled in papers less than or equal to 90 points. To qualify for honours, part-time students must complete 240 points within four calendar years of first enrolment in the degree. Part-time students will normally enrol in a thesis with the weighting of 60 points over two of the years. Part-time candidates seeking the award of honours should consult with the Faculty Registrar. For part-time enrolment, the deadline will be the corresponding date in the year in which the enrolment adds up to 24 months full-time (240 points).

For example: A 1 August enrolment for 60 points a year will require a July submission four years from first enrolment.

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

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

TAUGHT 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.
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 Faculty undertakes to make a decision on any application within 10 working days.

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

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

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.

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.
INTRODUCTION TO BIOLOGICAL SCIENCES

With biology as a great start to your career, our graduates have secured positions around the world, testimony to the international standing of our degrees.

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 Biology 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. These include lakes management, freshwater ecology, urban restoration, medical microbiology and Antarctic ecosystems. This funding also supports a variety of student and collaborative projects, together with scholarships and postgraduate opportunities.

Research units and facilities 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).

ECOLOGY AND BIODIVERSITY POSTGRADUATE CONVENOR
Professor Ian McDonald
Room: R.2.20
Email: ian.mcdonald@waikato.ac.nz

MOLECULAR AND CELLULAR BIOLOGY POSTGRADUATE CONVENOR
Dr Linda Peters
Room: CD.2.03
Email: linda.peters@waikato.ac.nz

CAREER OPPORTUNITIES
The skills students will gain from this programme can lead to work in a variety of roles including:

- Animal Behaviour Scientist
- Biosecurity Officer
- Environmental Scientist
- Food Biochemist
- Marine Biologist
- Plant Pathologist/Physiologist
- Quality Assurance Officer
- Zoologist
BIOLOGICAL SCIENCES STAFF

PROFESSORS

Vic Arcus vic.arcus@waikato.ac.nz
BSc, MSc Waikato, PhD Cambridge
Molecular biology; structural biology; and protein engineering.

Chris Battershill chris.battershill@waikato.ac.nz
BSc MSc(Hons) PhD Auckland
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.

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.

Ian Hawes ian.hawes@waikato.ac.nz
BSc (Hons) Liverpool PhD CNZ
Aquatic Photosynthesis; Cyanobacteria, Alge; and Antarctic Aquatic Ecosystems.

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

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.

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.

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.
ASSOCIATE PROFESSORS

**Michael Clearwater** michael.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.

**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.

**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.

SENIOR LECTURERS

**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.

**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.

**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.

**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.
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.

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).

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.

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.

LECTURER
Clare Browne clare.browne@waikato.ac.nz
BSc, MSc, PhD Waikato
Animal behaviour and welfare; learning in animals; communication; detection dogs, particularly conservation detection dogs and companion animal behaviour.

SENIOR RESEARCH FELLOWS
Moritz Lehmann moritz.lehmann@waikato.ac.nz
BSc(Hons) Newcastle, MSc York, PhD Dalhousie
My primary area of research is water quality of lakes and coastal oceans. I use coupled hydrodynamic-ecological models and observations from a variety of sources to understand water quality dynamics at a range of time and space scales. My research is applied and problem driven and has applications from the restoration of individual lakes to climate-change adaptation.

Chris Lusk chris.lusk@waikato.ac.nz
BSc Massey, PhD, Auckland
Plant ecology; forest ecology; forest dynamics; plant functional ecology; plant physiological ecology.

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.
RESEARCH FELLOW
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.

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.
INTRODUCTION TO CHEMISTRY

Chemistry is fundamental to our understanding of all branches of science and for a wide range of industries. A degree in Chemistry from the University of Waikato means you’ll gain an excellent grasp of Chemistry theory, supported by a strong emphasis on practical expertise.

The School of Science covers a wide range of specialist areas in chemistry including interface between chemistry and the other sciences, such as analytical chemistry, geochemistry, environmental chemistry, forensic science, industrial chemistry, materials chemistry and biochemistry. Chemistry forms a major growth area in modern science for research.

Employers recognise Waikato Chemistry 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. There is a shortage of Chemistry graduates in New Zealand and overseas and a critical shortage of qualified Chemistry teachers.

Prospective graduate students should contact the Postgraduate Convenor or the academic staff who work in an area of interest. Sometimes staff may have a student scholarship associated with grants obtained as part of their research, so it is worthwhile asking about these opportunities.

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

CAREER OPPORTUNITIES
The skills students will gain from this programme can lead to work in a variety of roles including:

- Biochemist
- Biosecurity Officer
- Chemical Technologist
- Environmental Technologist
- Food Technologist
- Forensic Scientist
- Marine Studies
CHEMISTRY STAFF

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.

ASSOCIATE PROFESSORS
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.

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.

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.

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.

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

SENIOR LECTURERS
Adam Hartland adam.hartland@waikato.ac.nz
BSc(Hons), PhD Birmingham
All aspects of trace element and isotope biogeochemistry. In particular: Interactions between dissolved organic matter, nanoparticles and trace metals and feedbacks with the terrestrial carbon cycle. Chemistry of honey; prebiotic carbohydrates; analysis of various substrates using a variety of chromatographic and spectroscopic techniques; structure and chemistry of biochars.

LECTURER
Megan Grainger megan.grainger@waikato.ac.nz
BSc, MSc, PhD Waikato
Honey research with a particular interest in Manuka honey, HPLC analysis using UV, RI and fluorescence detection for detection of a wide range of analytes, analysis of various matrices by inductively couple plasma (ICP) for trace element determination, including laser ablation for sample introduction of solid samples.
The School of Science approach to Earth Science is uniquely placed to offer a thorough grounding in all aspects of Earth Sciences. We are situated close to both North Island coasts, a short drive from the active Taupo Volcanic Zone, at the heart of the richest New Zealand farming region, and have New Zealand’s longest river on our doorstep.

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

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

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

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

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

EARTH SCIENCES POSTGRADUATE CONVENOR
Dr Julia Mullarney
Room: EF.1.01
Email: julia.mullarney@waikato.ac.nz

CAREER OPPORTUNITIES
The skills students will gain from this programme can lead to work in a variety of roles including:

- Earth Scientist
- Exploration Geologist
- Groundwater Scientist
- Volcanologist
- Water Resource Management
EARTH SCIENCES STAFF

PROFESSORS

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.

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.

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).

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

ASSOCIATE PROFESSORS

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 hydroclimatic forecasting.

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.
SENIOR LECTURERS

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

Bethany Fox beth.fox@waikato.ac.nz
BSc(Hons) Open University, MA Cambridge, PhD Otago
Reconstruction of past climate, especially temperature, precipitation and atmospheric carbon dioxide levels; past global change; palaeomagnetism; evolution of lake system; understanding past atmosphere/ocean dynamics.

LECTURER

Willem de Lange willem.delange@waikato.ac.nz
MSc, 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.

Vicki Moon vicki.moon@waikato.ac.nz
MSc, 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.

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.

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.
INTRODUCTION TO ENVIRONMENTAL SCIENCES

Environmental Sciences is the interdisciplinary study of the environment and how we manage it. It draws on all the sciences, particularly ecology and earth sciences.

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

A key feature of this degree is the development of scientific and interdisciplinary (cross-faculty) research skills, including collection and analysis of data and critical review of the relevant literature.

Study an MEnvSci 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 may also mean exciting collaborations with local, national and international companies and organisations.

For detailed information students should contact the Environmental Sciences Postgraduate Convenor or go to calendar.waikato.ac.nz/regulations/masters/menvsci.html

ENVIRONMENTAL SCIENCES POSTGRADUATE CONVENOR

Associate Professor Kevin Collier

Room: R.2.16
Email: kevin.collier@waikato.ac.nz

CAREER OPPORTUNITIES

The skills students will gain from this programme can lead to work in a variety of roles including:

- Agricultural Advisor
- Coastal Resource Manager
- Consent Planner
- Volcanologist
- Environmental Analyst
- Hydrologist
- Oceanographer
RESEARCH UNITS AND CENTRES

COASTAL MARINE GROUP
Director: Professor Chris Battershill
Phone: +64 7 838 4893
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
Acting Director: Professor Chad Hewitt
Phone: +64 7 838 4386
Email: chad.hewitt@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

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: Dr Barry O’Brien
Phone: +64 7 858 4179
Email: barry.obrien@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: Associate 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: allan.hogg@waikato.ac.nz
Web: radiocarbondating.com

WAIKATO STABLE ISOPOE 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
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.

BIOL503-18A (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: 1:0

BIOL560-18A (HAM)
FRESHWATER ECOLOGY
A critical examination of issues including pollution, conservation, and utilisation, that freshwater ecosystems face 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: 3:7

BIOL561-18B (HAM)
AQUATIC ECOSYSTEM MODELLING
This paper examines the different types of models that may be applicable in aquatic ecosystem modelling, including statistical, empirical, and process-based models. The key steps to setting up a model application are covered as well as the limitations and pitfalls of each type of model. Applications of the models are demonstrated for different lake ecosystems, with students having an opportunity to apply the models to questions of relevance to aquatic ecosystem managers.

Paper coordinator(s): Dr Moritz Lehmann
Prerequisite paper(s): BSc, BIOL313 or equivalent third-year ecology unit
Assessment: Internal assessment/examination ratio: 1:0

BIOL562-18C (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: 3:7
BIOL564-18B (HAM)

RESTORATION ECOLOGY

Aspects of health, vitality, resilience and restoration of ecosystems. Topics covered include restoration principles, theory and practice; lake restoration; river and stream restoration; wetland restoration; and forest restoration.

**Paper coordinator(s):** Associate Professor Kevin Collier  
**Prerequisite paper(s):** BSc, BIOL312 or BIOL325 or equivalent  
**Corequisite paper(s):** BIOL570  
**Restriction paper(s):** BIOL515  
**Assessment:** Internal assessment/examination ratio: 1:1

BIOL565-18A (HAM)

MOLECULAR ECOLOGY

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

**Paper coordinator(s):** Dr Chrissen Gemmill  
**Prerequisite paper(s):** BSc, at least one of the following papers: BIOL310, BIOL312, BIOL313, BIOL326, BIOL338, BIOL341 or equivalent  
**Restriction paper(s):** BIOL522  
**Assessment:** Internal assessment/examination ratio: 3:7

BIOL570-18A (HAM)

PLANT ECOLOGY

Contemporary and advanced topics in plant ecology, including the structure and functioning of plant communities, species and community distribution theory, vegetation dynamics, vegetation surveying and data analysis.

**Paper coordinator(s):** Dr Chris Lusk  
**Prerequisite paper(s):** BIOL312 or BIOL325  
**Corequisite paper(s):** BIOL571  
**Restriction paper(s):** BIOL521  
**Assessment:** Internal assessment/examination ratio: 1:1

BIOL571-18B (HAM)

PLANT FUNCTION

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: 1:1
BIOL572-18B (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 Clare Browne
Prerequisite paper(s): BSc, BIOL333 or equivalent
Restriction paper(s): BIOL533
Assessment: Internal assessment/examination ratio: 1:1

BIOL573-18A (HAM)
CONSERVATION BIOLOGY
The purpose of this paper is to explore the general principles of conservation biology, with special reference to threatened species, aquatic animals and plants.

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: 1:1

BIOL574-18A (HAM)
MAMMALIAN PHYSIOLOGY
This paper examines selected topics in the physiology of humans and other mammals. Students will develop an understanding of physiological control systems and the integration of structure and function. We will discuss issues related to health and disease in the context of molecular, systems and behavioural physiology.

Paper coordinator(s): Dr Pawel Olszewski
Prerequisite paper(s): BSc, BIOL335 (or external equivalent)
Restriction paper(s): BIOL539
Assessment: Internal assessment/examination ratio: 2:3

BIOL575-18B (HAM)
APPLIED TOPICS IN PHYSIOLOGY
This paper examines selected topics in animal physiology with particular emphasis on applicability of physiology research in the biomedical and agricultural setting. University, hospital and industry-based lecturers contribute to this class, helping students to develop an understanding of the application of physiological knowledge and principles to commercial and medical technologies.

Paper coordinator(s): Dr Pawel Olszewski
Prerequisite paper(s): BSc, BIOL335 (or external equivalent)
Restriction paper(s): BIOL539
Assessment: Internal assessment/examination ratio: 2:3
BIOL567-18A (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 Nicholas Ling
Prerequisite paper(s): BSc
Restriction paper(s): BIOL538
Assessment: Internal assessment/examination ratio: 1:1

BIOL577-18B (BLK)

AQUATIC TOXICOLOGY
This paper provides an introduction to specified topics in aquatic toxicology including toxicology analysis and bioaccumulation. Critical evaluation of selected readings from the scientific literature will provide a theoretical framework for the specified topics and an introduction to recent research in those fields. Students will develop an understanding of ecological impacts of water-borne contaminants and methods for the bioassay of toxicant effects.

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

BIOL587-18A (HAM)

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

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

BIOL581-18B (HAM)

MICROBIAL ECOLOGY
Molecular microbial ecology, stable isotopes in microbial ecology, metagenomics, biogeography, and other current topics in microbial ecology.

Paper coordinator(s): Professor Ian McDonald
Prerequisite paper(s): BSc, BIOL341 or equivalent
Restriction paper(s): BIOL541
Assessment: Internal assessment/examination ratio: 1:0
BIOL582-18A (HAM)  
BIOMOLECULAR STRUCTURE AND FUNCTION  
An in-depth examination of biomolecular structure and function using selected examples from the biochemistry literature.  
Paper coordinator(s): Professor Vic Arcus  
Prerequisite paper(s): BSc, BIOL351, CHEM312 or equivalent  
Restriction paper(s): BIOL551  
Assessment: Internal assessment/examination ratio: 1:4

BIOL583-18B (HAM)  
MOLECULAR BIOCHEMISTRY AND METABOLISM  
An in-depth examination of molecular biochemistry and metabolism using selected examples from biochemistry literature.  
Paper coordinator(s): Dr Ryan Martinus  
Prerequisite paper(s): BSc, BIOL351, CHEM312 or equivalent  
Restriction paper(s): BIOL551  
Assessment: Internal assessment/examination ratio: 1:4

BIOL584-18A(HAM)  
MOLECULAR GENETICS  
This paper explores how molecular biology and bioinformatic research contribute to our understanding of molecular genetics. Subjects covered in this course will include molecular technologies, comparative genomics and evolution, epigenetics, genetic diversity, genetic diseases, pharmacogenomics and personalised medicine.  
Paper coordinator(s): Dr Linda Peters  
Prerequisite paper(s): BSc, BIOL310 or equivalent  
Restriction paper(s): BIOL550  
Assessment: Internal assessment/examination ratio: 2:3

BIOL585-18B (HAM)  
HUMAN GENETICS  
This paper explores the genetics of human evolution, adaptation and disease. The topics will extend from classical population genetics into contemporary areas of molecular biology and bioinformatics. Particular attention will be paid to key genetic changes that occurred during hominid evolution, polymorphic variations and disease susceptibility in humans and the role of somatic mutations in cancer.  
Paper coordinator(s): Dr Linda Peters  
Prerequisite paper(s): BSc, BIOL310 or equivalent  
Restriction paper(s): BIOL510  
Assessment: Internal assessment/examination ratio: 2:3
BIOL588-18A/B (HAM)

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

Paper coordinator(s): Dr Linda Peters
Prerequisite paper(s): BSc or equivalent
Restriction paper(s): BIOL555
Assessment: Internal assessment/examination ratio: 1:0

BIOL590-18C/D (HAM)

DIRECTED STUDY
May involve a literature review, the preparation of a proposal or a preliminary investigation. Generally a research paper will be required, but there will be no formal examination.

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

CHEM511-18A (HAM)

ADVANCED ORGANIC CHEMISTRY (STRUCTURAL CHARACTERISATION)
Use of NMR spectroscopy and mass spectrometry for structural characterisation of organic molecules. This course will have a practical section using instrumentation.

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

CHEM514-18A (HAM)

SPECIAL TOPICS IN CHEMISTRY A
An advanced study of topics relating to staff members’ areas of research expertise, which may have organic, inorganic, physical, analytical or environmental themes.

Paper coordinator(s): Associate Professor Graham Saunders
Prerequisite paper(s): Three of CHEM301, CHEM302, CHEM303 and CHEM306
Restriction paper(s): CHEM504
Assessment: Internal assessment/examination ratio: 1:0

CHEM517-18A (HAM)

APPLIED AND ENVIRONMENTAL ANALYTICAL CHEMISTRY A
A critical examination of analytical methodologies for organic substances, e.g. pesticides, with special reference to the commercial context.

Paper coordinator(s): Associate Professor Michèle Prinsep
Prerequisite paper(s): CHEM204 or CHEM306
Restriction paper(s): CHEM507
Assessment: Internal assessment/examination ratio: 0:1
CHEM521-18B (HAM)
ADVANCED ORGANIC CHEMISTRY
An advanced study of carbohydrate and natural product chemistry.

Paper coordinator(s): Associate Professor Michèle Prinsep
Prerequisite paper(s): CHEM301
Restriction paper(s): CHEM501
Assessment: Internal assessment/examination ratio: 0:1

CHEM522-18B (HAM)
COMPUTATIONAL CHEMISTRY
A practical introduction to modern computational chemistry and its increasing use in modern chemical research.

Paper coordinator(s): Associate Professor Joseph Lane
Prerequisite paper(s): CHEM111 and CHEM112. CHEM312 is also recommended
Restriction paper(s): CHEM502
Assessment: Internal assessment/examination ratio: 1:0

CHEM523-18B (HAM)
INORGANIC MATERIALS CHEMISTRY
A study of inorganic materials.

Paper coordinator(s): Associate Professor Michael Mucalo
Prerequisite paper(s): CHEM303 or CHEM311
Restriction paper(s): CHEM503
Assessment: Internal assessment/examination ratio: 1:4

CHEM524-18B (HAM)
STRUCTURAL CHARACTERISATION TECHNIQUES
An introduction to x-ray crystallography and solid state NMR.

Paper coordinator(s): Associate Professor Graham Saunders
Prerequisite paper(s): CHEM311 and CHEM312
Assessment: Internal assessment/examination ratio: 1:1

CHEM527-18B (HAM)
APPLIED AND ENVIRONMENTAL ANALYTICAL CHEMISTRY B
An advanced study of instrumental analytical techniques for organic and inorganic compounds and comparison of their efficacies.

Paper coordinator(s): Dr Megan Grainger
Prerequisite paper(s): CHEM311
Restriction paper(s): CHEM507
Assessment: Internal assessment/examination ratio: 3:7
CHEM589-18A/B/C/S (HAM)
DIRECTED STUDY
May involve a literature review or the preparation of a proposal.

Paper coordinator(s): Associate Professor Michèle Prinsep
Assessment: Internal assessment/examination ratio: 1:0

CHEM590-18C (HAM)
DIRECTED STUDY
30 points
This paper allows an in-depth study of a specific topic.

Paper coordinator(s): Associate Professor Michèle Prinsep
Assessment: Internal assessment/examination ratio: 1:0

COMP555-18B (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): Associate Professor Tony McGregor
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
Assessment: Internal assessment/examination ratio: 1:0

ERTH512-18A/C (HAM)
SPECIAL TOPIC
Guided individual study on an aspect of Earth Sciences. By arrangement, and with the approval of the Postgraduate Convenor of Earth Sciences.

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

ERTH513-18A/B/C (HAM)
SPECIAL TOPIC
Guided individual study on an aspect of Earth Sciences. By arrangement, and with the approval of the Postgraduate Convenor of Earth Sciences.

Paper coordinator(s): Dr Julia Mullarney
Assessment: Internal assessment/examination ratio: 1:0
ERTH524-18A (HAM)  
**VOLCANIC PROCESSES AND HAZARDS**  
A study of volcanic landforms, physical characteristics of volcanic deposits, processes associated with the eruption, transport and deposition of volcanic products, tephrochronology, and volcanic hazards in active volcanic regions.  
*Paper coordinator(s):* Dr Adrian Pittari  
*Prerequisite paper(s):* ERTH321  
*Restriction paper(s):* ERTH521  
*Assessment:* Internal assessment/examination ratio: 3:2

ERTH525-18A (HAM)  
**HYDROTHERMAL MINERAL & ENERGY SYSTEMS IN NEW ZEALAND**  
A study of geochemical approaches and methods to solve various problems in the Earth Sciences including volcanic environments, with particular attention to hydrothermal systems, geothermal energy, and the formation of hydrothermal ore deposits.  
*Paper coordinator(s):* Dr Shaun Barker  
*Prerequisite paper(s):* Either ERTH321 or ERTH322  
*Restriction paper(s):* ERTH521  
*Assessment:* Internal assessment/examination ratio: 1:0

ERTH528-18A (HAM)  
**QUATERNARY: PAST ENVIRONMENTS**  
This paper examines environmental change during the Quaternary – the last 2.6 million years – and analyses some important methods and evidence used in reconstructing past environments using a stratigraphic framework and geochronology. The paper usually includes a two-day workshop in mid-May, held at the GNS Science National Isotope Centre, Lower Hutt.  
*Paper coordinator(s):* Professor David Lowe  
*Prerequisite paper(s):* 40 points at 300 level in Earth Sciences. ERTH321 and ERTH322 are highly recommended.  
*Restriction paper(s):* ERTH523  
*Assessment:* Internal assessment/examination ratio: 3:2

ERTH533-18B (HAM)  
**SOIL AND GREENHOUSE GASES**  
This paper examines the role that soils and their management play in the production and consumption of the greenhouse gases including a specific focus on the importance of soil carbon.  
*Paper coordinator(s):* Professor Louis Schipper  
*Prerequisite paper(s):* ERTH334  
*Restriction paper(s):* ERTH531  
*Assessment:* Internal assessment/examination ratio: 3:2
ERTH535-18A (HAM)
LAND AND SOIL EVALUATION
This paper examines how soil and land may be evaluated to provide an improved understanding of sustainable land management, taking into account productivity and environmental goals.

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

ERTH547-18B (HAM)
INTRODUCTION TO HYDROLOGICAL MODELLING
This course comprises a directed research project specific to each student. A given project will cover some aspect of hydrological modelling, which might be themed on groundwater modelling, simulating water resource systems, analysis of hydrological time series, model formulation, optimal water resource usage, or hydrological forecasting.

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

ERTH548-18A (HAM)
ECOHYDROLOGY
Ecohydrology is the interdisciplinary study of the interactions between water and ecosystems. It views water, carbon and energy as essential ingredients for living systems, and recognises that ecosystems may modify the hydrological systems of which they are a part. This paper bridges hydrology, soil science, ecology, and climate science.

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

ERTH552-18B (HAM)
ROCK SLOPE ENGINEERING
This paper considers rock mechanics within engineering geology, including the strength of intact rocks and rock joints; engineering geological hazards; slope stability modelling; and an applied site investigation project.

Paper coordinator(s): Dr Vicki Moon
Prerequisite paper(s): ERTH352
Restriction paper(s): ERTH551
Assessment: Internal assessment/examination ratio: 3:2
**ERTH562-18A (HAM)**

**COASTAL SEDIMENTATION 1**

This paper addresses modern contentious issues of coastal sedimentation and sedimentary processes within a range of sedimentary environments. Both fundamental and applied contexts are examined.

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

**ERTH563-18A (HAM)**

**COASTAL AND ESTUARINE PROCESSES**

This paper provides an understanding of processes controlling movement of water in the ocean, including longwaves, baroclinic and barotropic circulation, wind-driven processes, surf-zone waves and currents, and nearbed currents in the coastal ocean.

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

**ERTH564-18C (HAM)**

**COASTAL & FRESHWATER MODELLING: PHYSICAL APPROACHES**

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

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

**ERTH590-18A/B/Y (HAM)**

**DIRECTED STUDY**

**30 points**

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

**Paper coordinator(s):** Dr Julia Mullarney  
**Assessment:** Internal assessment/examination ratio: 1:0
SCIE501-18B (HAM)  
RESEARCH METHODS IN THE SCIENCES  
This paper will enable students to develop the necessary communication skills and familiarity with research methods to allow them to progress to the thesis component of a Masters degree in the sciences, or to extend communication and research skills to those not taking a full research degree.  

Paper coordinator(s): Associate Professor Michael Mucalo  
Restriction paper(s): A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (e.g., BIOLS01, ERTH501)  
Assessment: Internal assessment/examination ratio: 1:0
DISSEMINATIONS AND THESSES FOR MENVSCI, MSC, MSC (TECH), MSC(RESEARCH)

BIOL591-18C (HAM) – Biological Sciences Dissertation 30 points
BIOL592-18C (HAM) – Biological Sciences Dissertation 60 points
BIOL593-18C (HAM) – Biological Sciences Thesis 90 points
BIOL594-18C (HAM) – Biological Sciences Thesis 120 points
BIOL595-18C (HAM) – Biological Sciences Thesis 150 points

CHEM591-18C (HAM) – Chemistry Dissertation 30 points
CHEM592-18C (HAM) – Chemistry Dissertation 60 points
CHEM593-18C (HAM) – Chemistry Thesis 90 points
CHEM594-18C (HAM) – Chemistry Thesis 120 points
CHEM595-18C (HAM) – Chemistry Thesis 150 points

ERTH591-18C (HAM) – Earth Sciences Dissertation 30 points
ERTH592-18C (HAM) – Earth Sciences Dissertation 60 points
ERTH593-18C (HAM) – Earth Sciences Thesis 90 points
ERTH594-18C (HAM) – Earth Sciences Thesis 120 points
ERTH595-18C (HAM) – Earth Sciences Thesis 150 points

PHYS591-18C (HAM) – Physics Dissertation 30 points
PHYS592-18C (HAM) – Physics Dissertation 60 points
PHYS593-18C (HAM) – Physics Thesis 90 points
PHYS594-18C (HAM) – Physics Thesis 120 points

THESES FOR MPHIL

BIOL800-18C (HAM) – Biological Sciences MPhil Thesis 120 points
CHEM800-18C (HAM) – Chemistry MPhil Thesis 120 points
ERTH800-18C (HAM) – Earth Sciences MPhil Thesis 120 points
PHYS800-18C (HAM) – Physics MPhil Thesis 120 points

THESES FOR PHD

BIOL900-18C (HAM) – Biological Sciences PhD Thesis 120 points
CHEM900-18C (HAM) – Chemistry PhD Thesis 120 points
ERTH900-18C (HAM) – Earth Sciences PhD Thesis 120 points
PHYS900-18C (HAM) – Physics PhD Thesis 120 points
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.

The School of Science assists high achieving school leavers wishing to study at Waikato by offering:

- First year scholarships as well as many awards and prizes at different year levels,
- Dean’s awards for the top 10 students in Levels 100, 200 and 300;
- Opportunities for excellent undergraduates to work during the summer in research labs; and
- Summer School papers to assist those wanting to accelerate their progress through a degree.
UNDERGRADUATE AND POSTGRADUATE SCHOLARSHIPS

SCIENCE ADMISSION FEES SCHOLARSHIP
UP TO $4,000
For school leavers who are intending to enrol full-time (120 points) in the first year of a Bachelor of Science or Bachelor of Science(Technology) in the Faculty of Science & Engineering and are performing well academically in their final year of secondary school.

SCIENCE AND ENGINEERING MASTERS FEES AWARDS
UP TO $2,000
For students enrolling full-time in the first year MSc (research), MSc, MSc (Tech) ME or MEnvSci programme in the School of Science. 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.
Associate Professor Michael Mucalo is the Faculty representative for the Scholarships Committee and can also be contacted for advice.

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%). 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.

SCHOLARSHIPS OFFICE
The Scholarships Office is located in W Block and provides advice and administration services and information about available scholarships.
The University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand
Phone: +64 7 838 4489
Email: scholarships@waikato.ac.nz
Web: waikato.ac.nz/scholarships/
UNIVERSITY OF WAIKATO AND OTHER SCHOLARSHIPS

SIR EDMUND HILLARY SCHOLARSHIP PROGRAMME FULL FEES
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.

THE VICE-CHANCELLOR’S ACADEMIC EXCELLENCE SCHOOL LEAVER SCHOLARSHIP
$5,000 towards fees or accommodation, awarded to students in their first year of study who gain NCEA level 3 Certificate with an Excellence endorsement*, University Entrance and meet the criteria for entry to their programme and in their first year are enrolled in a full-time programme.

THE UNIVERSITY OF WAIKATO ACADEMIC MERIT SCHOOL LEAVER SCHOLARSHIP
$3,000 towards fees or accommodation, awarded to students in their first year of study who gain NCEA level 3 Certificate with an Merit endorsement*, University Entrance and meet the criteria for entry to their programme and in their first year are enrolled in a full-time programme.

Your eligibility for the school leaver scholarship will be assessed when the University receives the NCEA results (*or equivalent in CIE or IB).

UNIVERSITY OF WAIKATO MASTERS RESEARCH 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 B+ (75%).

Application forms are available from the Scholarships website waikato.ac.nz/scholarships

UNIVERSITY OF WAIKATO TAUGHT POSTGRADUATE FEES SCHOLARSHIP
The University of Waikato established the Taught Postgraduate Fees 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.
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 liaison
• 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
The Library, The University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand

Phone: +64 7 837 9132
Email: cheryl.ward@waikato.ac.nz
FACULTY SUPPORT

AFTER-HOURS ACCESS
After-hours access to the Faculty 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 FSEN Faculty Office is 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 Faculty of Science and Engineering. This includes advice and support, whether study orientated or otherwise. Please drop in to the support 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. Student Success Coordinator will make contact to when wānanga will be held during the year.

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 Mānawa/Māori Science Support presence. This provides another forum where students can communicate with kaitiaki/mentors and the Student Support 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 COMPLAINTS PROCEDURE
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 (Postgraduate). Appeals may also be made to the office of the Vice-Chancellor.

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

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.

The Students with Disability Handbook provides comprehensive information about access arrangements and support available at the University. 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 Faculty of Science & 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 2018 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 Faculties, 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.

STUDYLINK SUPPORT
Contact our StudyLink Liaison Officer for help and advice on how best to use StudyLink services. Email nadine.hayes@waikato.ac.nz or call 07 838 4790 for free and confidential support.
COMPUTING FACILITIES

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

**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 within the Faculty has designated areas for graduate students and their research studies. These areas are equipped with specialised software and computing facilities for research purposes.

*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.*

**STEM TECHNICAL SUPPORT GROUP**
Phone: +64 07 858 5006
Email: stem-help@waikato.ac.nz

**INFORMATION TECHNOLOGY SERVICE (ITS) SERVICE DESK**
Phone: +64 07 838 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 ascription of authorship, including listing authors without their permission where this is relevant, attributing work to others who have not contributed to the research and failing to acknowledge work primarily produced by a student, trainee or associate.
- Other practices that deviate from those accepted within the research community for proposing, conducting or reporting research, such as intentional infringement of the University’s code of ethical behaviour.

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

1. Footwear must be worn inside all Faculty of Science & 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 Faculty Office, or a 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 Faculty. 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 Faculty Office 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. Faculty policy relating to field trips and industrial site visits can be viewed on the intranet (info.sci.waikato.ac.nz)

16. Only authorised users may drive University vehicles. Consult your School to obtain the necessary authorisation. University vehicles cannot be used for personal purposes.

**RESPONSIBILITIES**

It is your responsibility to find out about any hazards associated with your 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 FACULTY OCCUPATIONAL HEALTH AND SAFETY COMMITTEE
Shelley Catlin
Phone: +64 7 838 4292
Email: shelley.catlin@waikato.ac.nz

FACULTY CHEMICAL SAFETY OFFICER
John Little
Phone: +64 7 838 4103
Email: john.little@waikato.ac.nz

FACULTY 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

RADIATION SUBCOMMITTEE CHAIRPERSON
Associate Professor Johan Verbeek
Phone: +64 7 838 4947
Email: johan.verbeek@waikato.ac.nz

LASER SAFETY CHAIRPERSON
Associate Professor Rainer Kün nemeyer
Phone: +64 7 838 4630
Email: rainer.kunnemeyer@waikato.ac.nz

Sources of Health and Safety information in the Faculty 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 Faculty of Science & Engineering Tearoom. Many staff in the Faculty hold current first aid certificates; these are listed in the internal phone book: phonebook.waikato.ac.nz

CONTACTS FOR EMERGENCY USE ARE:

CHEMICAL EMERGENCIES
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UNIVERSITY SECURITY
Phone: +64 7 838 4444

EMERGENCY SERVICES
Phone: 111
## 2018 TEACHING AND ASSESSMENT PERIODS

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<th>Week</th>
<th>Starting</th>
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<th>Wed</th>
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