THE UNIVERSITY OF AUCKLAND
FACULTY OF SCIENCE

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THE UNIVERSITY OF AUCKLAND
FACULTY OF SCIENCE

Faculty of Science
Food Science Handbook
2011

Contents

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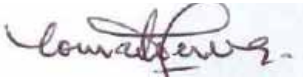
Welcome to Food Science

Food Science is the study of physical, chemical, biological and engineering properties of food and their effects on the sensory, nutritional, and storage aspects as well as safety. Therefore it interfaces with and draws upon many scientific disciplines. Today, consumers are seeking foods that are safer, tastier, more convenient, natural, healthy, good value and produced in more sustainable ways than ever before. Recent advancements in science and technology have opened new frontiers for the production and prolonging shelf life, providing convenience and health benefits, thus creating exciting and challenging opportunities to work. A basic or advanced qualification in food science will equip you to take up challenging positions within the food industry, research institutes and in the academic fields.

This handbook guides you through the various courses offered under the umbrella of Food Science at The University of Auckland. Qualified staff members are available to assist you in planning your career for a successful future.



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Introduction

What is Food Science?

Food Science is truly a multidisciplinary subject that involves the study of physical, chemical, biological and engineering properties of food and their effects on the sensory, nutritional, and storage aspects as well as safety. These properties are important to produce food products that are attractive, nutritious, easy to manufacture, safe to consume, and have a reasonably long shelf life. Therefore it interfaces with and draws upon many scientific disciplines. The Food Science course is designed to give students a fundamental understanding of the sciences and engineering principles involved.

Why study Food Science at The University of Auckland?

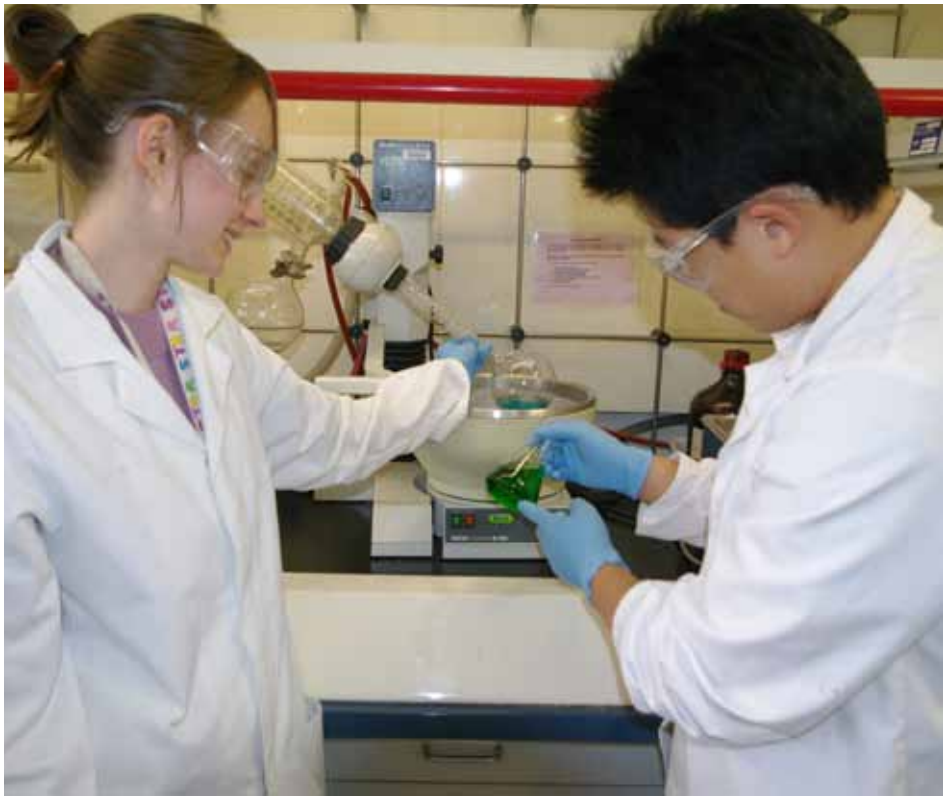
Food Science is well established at The University of Auckland. The University has excellent faculties of Science, Engineering and Medical and Health Sciences. Each of these faculties makes contributions to the teaching of Food Science at undergraduate and postgraduate levels. Strong links have been made with the food industry and Crown Research Institutes involved with food through joint research.

We have excellent laboratory facilities including analytical laboratories and a specially designed food processing laboratory, which is modelled on a modern food factory with clean-room facilities. We also have the best possible sensory evaluation facilities.

Graduates could find employment in the food industry (both national and international), Research Institutes, and government agencies in areas such as food manufacture, food safety, food analysis, new product development, sensory evaluation, food research and technical sales and marketing.

Our graduates are already employed in:

- Food industry
- Dairy industry
- Brewing
- Manufacturing companies
- Crown Research Institutes
- Government agencies
- Multinational food companies



Important dates

Closing dates for applications for admission in 2011	
1 December 2010	Deadline for new students to submit Application for Admission if 2011 programme includes Summer School courses. Application for Admission also closes 1 December for all students applying to Optometry and to Sport and Exercise Science.
8 December 2010	Deadline for new students to submit Application for Admission if 2011 programme includes Semester One and Semester Two courses only. If you are a new student, only one Application for Admission is required. This form is due on either 1 December or 8 December, depending on whether you want to take Summer School courses as well. Applications received after these dates may be accepted if there are places available.

Academic year 2011	
Summer School – 2011	
Lectures begin	Thursday 6 January
Auckland Anniversary Day	Monday 31 January
Deadline to withdraw from summer school courses	1 week before the end of lectures
Waitangi Day	Sunday 6 February
Lectures end	Friday 11 February
Study break/exams*	Monday 14 February - Wednesday 16 February
Summer School ends	Wednesday 16 February
Semester One – 2011	
Semester One begins	Monday 28 February
Mid-semester break/Easter	Monday 11 April - Tuesday 26 April
ANZAC Day	Monday 25 April
Graduation	Thursday 28 April - Friday 6 May
Deadline to withdraw from first semester courses	3 weeks before the end of lectures
Lectures end	Saturday 4 June
Study break/exams*	Saturday 4 June - Monday 27 June
Queen's Birthday	Monday 6 June
Semester One ends	Monday 27 June
Inter-semester break	Tuesday 28 June - Saturday 16 July
Semester Two – 2011	
Semester Two begins	Monday 18 July
Mid-semester break	Monday 29 August - Saturday 10 September
Graduation	Tuesday 20 September - Thursday 22 September
Deadline to withdraw from second semester courses	3 weeks before the end of lectures
Lectures end	Saturday 22 October
Study break/exams*	Saturday 22 October - Monday 14 November
Labour Day	Monday 24 October
Semester Two ends	Monday 14 November
Semester One – 2012	
Semester One begins	Monday 27 February 2012

* Aegrotat and Compassionate Applications must be submitted within 1 week of the date that the examination affected took place.

Deadline for withdrawal from double semester courses is three weeks before the end of lectures in the second semester.

General Education

What is General Education?

Courses in General Education are a distinctive feature of University of Auckland bachelors degrees. General Education is aimed at producing graduates with flexibility, critical thinking skills, and an appreciation and understanding of fields outside of their usual area of study. The General Education programme consists of high quality, intellectually challenging courses taught by some of the University's best teachers and researchers.

What must I take?

BSc students must take two General Education courses (30 points) in their degree. These can be taken at any time during the degree, but it may be preferable to take these in Year 2 and 3.

Students will choose General Education courses from schedules which list courses available to their particular degree. The schedules have been developed so that students will take General Education courses that allow them to explore areas of interest outside of their degree subjects. The General Education schedules are:

A) Music, Art and Contemporary Society
B) Humanities and Social Sciences
C) Business and Society
D) Life Sciences
E) Physical Sciences
F) Mathematical and Information Sciences
G) Communication
H) Languages

The courses available to BSc students will depend on the subjects in which they are enrolled. For example, students enrolled in a Chemisty programme will not be able to take General Education courses from Schedule E Physical Sciences.

In some cases, courses are available both as part of the General Education programme and as part of the portfolio of regular degree courses. If students are taking a dual purpose course as part of the General Education programme, they will enrol in the G version of the course (e.g. HISTORY 103G). The classes and programme of study will be the same for all students.

A General Education website, **www.auckland.ac.nz/generaleducation** can be accessed from the University webpage and enables students to view the courses available to them and provides the information needed for course selection.

Students are encouraged to seek advice on General Education in their degree from the Science Student Centre.

Admission and enrolment procedures

New Students

If you are not enrolled at The University of Auckland in 2010, apply online at www.auckland.ac.nz/apply now. If you are unable to access our website, please call 0800 61 62 63 or visit the Student Information Centre at 22 Princes Street, Auckland. This is open Monday to Friday from 8am–6pm and Saturday 9am–12noon during peak times.

Student Information Centre
Room 112
Level 1 (Ground Floor)
The ClockTower Building
22 Princes Street
Auckland City Campus

Phone: +64 9 923 1969
Fax: +64 9 367 7104
Email: studentinfo@auckland.ac.nz

The closing date for most undergraduate Science applications is 8 December 2010.

If you want to take courses at Summer School, or wish to apply to Sport and Exercise Science or the Bachelor of Optometry, applications close 1 December 2010.

Only one application is required.

After submitting your application:

Your application will be acknowledged by email. Your application will be assessed and, if successful, you will receive an "Offer of a place in a programme". You may receive a conditional offer, but final approval will be dependent on fulfilment of the conditions of admission to the University and the programme.

During the application process, you will be given a Net ID and password, which will allow you to access Student Services Online. Here you will be able to monitor the progress of your application and check if further documentation is required.

Once you have accepted an offer of place, you will gain access to the Enrolment module on Student Services Online. You can then proceed to enrol in courses online. Postgraduate students may need to contact their department for enrolment to be completed.

Returning Students

If you are currently enrolled at The University of Auckland in 2010, and would like to change your existing programme (for example MSc after completion of BSc(Hons)), you should apply using Student Services Online.

You will be able to enrol via Student Services Online, but if you would like help, please call 0800 61 62 63 or visit the Student Information Centre or the Faculty of Science Student Centre (Ground Floor, Building 301, 23 Symonds Street). Postgraduate students may need to contact their department for enrolment to be completed.

The University of Auckland will be open for enrolment from November 2010 to the end of February 2011. You are welcome to attend at any time during normal office hours to seek academic or enrolment advice or assistance in completing your enrolment.

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Undergraduate Enrolment - where to from here?

Enquire

Visit www.auckland.ac.nz or contact our student advisers for any information you need.
Phone: 0800 61 62 63 | **Email:** studentinfo@auckland.ac.nz
Student Information Centre: Room 112, ClockTower, 22 Princes St, Auckland

Apply for a place in a programme(s)

Do you have internet access, or can you come on to campus to our help labs?

Yes

- Log on to www.auckland.ac.nz
- Click on Apply Now.
- Complete the online Application for a place in your programme(s) of choice.
- You will receive an acknowledgement letter or email asking you to provide specific certified documents (and in some cases to complete other requirements*) before your application can be assessed. The letter or email will also tell you how to complete the next steps.

No

Phone: 0800 61 62 63
(or +64 9 923 1969 (if overseas)
Email: studentinfo@auckland.ac.nz

The ClockTower Call Centre will forward required information to you.

Offer

Your application will be assessed and, if successful, you will receive an "Offer of a place in a programme". This normally happens from mid January.**
You may receive a conditional offer but final approval will be dependent on fulfilment of the conditions of admission to the University and the programme.

Accept

Accept or decline your offer of a place in a programme online. Remember – you still need to enrol in your courses!

Enrol in your choice of courses

Enrol in courses via Student Services Online using your login and password. This system can be accessed from www.auckland.ac.nz

For help with choosing courses you can:

- talk to staff for advice and listen to talks on various programmes at Course Advice Day in late January/February 2011
- refer to www.science.auckland.ac.nz or to publications relating to your programme, or to The University of Auckland Calendar. For programme publications call 0800 61 62 63. The Calendar is for sale in bookshops or can be accessed from www.auckland.ac.nz Click on "Current Students" then "University Calendar" in the Quick Links box
- go online to check the timetable for your chosen courses
- for more information visit the Faculty of Science Student Centre, Ground Floor, Building 301, 23 Symonds Street
- or call 0800 61 62 63.

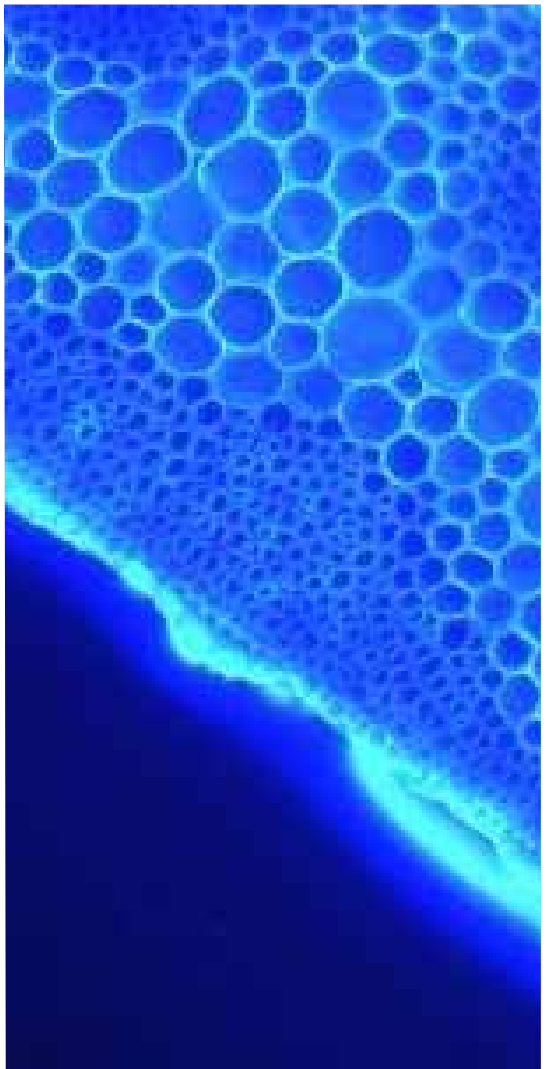
Pay your tuition fees.

You are now a University of Auckland student. Congratulations!

**For some programmes, you may be required to submit supplementary information (eg, a portfolio of work, referee reports, an online form) or to attend an interview/audition. If you have not already done this, any outstanding requirements will be explained in the acknowledgement letter – ensure that you follow them up as quickly as possible.*

***You can also check the status of your application online using your login and password (if you don't know these, check the instructions on your acknowledgement letter). If you are not offered a place in the programme(s) of your choice, you will receive a letter outlining alternative options. Please follow the advice on the letter or get in touch with the ClockTower Call Centre. Your final offer of a place is dependent both on you gaining admission to the University (which for school leavers may be dependent on your final school results) and assessment by the faculty offering the programme.*

Undergraduate programmes



BSc programme

The BSc consists of six semesters. Students will take a prescribed set of courses that will provide knowledge in a wide variety of fields suitable for the multidisciplinary subject of Food Science. The three parts of the programme are described below.

The Department of Chemistry at The University of Auckland features a custom-built Food Processing and Sensory Science Laboratory that enables students to learn and conduct research in a modern, first-rate facility.

Part I

The courses taken in Part I will give a good grounding in general science and cover basic concepts of biology, biochemistry and chemistry. Students are to take 90 points from the courses listed as well as one elective course worth 15 points plus a General Education course, approved for the BSc.

Part II

Courses of study in Part II will build on the knowledge and skills obtained in plant and animal biochemistry and chemistry of organic molecules. Here, the basic concepts of food science will be covered along with basic engineering processes and microbiology. The application of statistics to biological systems will be introduced. A General Education course should also be taken in the second year.

Part III

In the third year students will use the knowledge gained to understand the composition of foods, the chemical and physical properties of foods, food manufacture and changes that occur during processing and preservation. Human nutrition is introduced.

For further information on BSc degree, please contact:

Dr Bronwen Smith
Deputy Director of Food Science
Level 5, Room 531B
Phone: +64 9373 7599 Ext 82919
Email: b.smith@auckland.ac.nz

Part I courses

90 points from the courses listed below plus 15 points on an elective course which must be selected from the box below, plus 15 points in a General Education course.

BIOSCI 101
Essential Biology: From Genomes to Organisms
(15 Points) First Semester

An introduction to the structures and processes which are common to micro-organisms, animals and plants at the cellular, molecular and biochemical levels. Genetic principles and processes and an overview of evolution and evolutionary concepts are included. This course assumes a knowledge of NCEA Level 3 Biology and at least NCEA level 2 Chemistry.

Coordinator: Amanda Harper
Assessment: Incourse 60%, (Theory 40%, Practical 20%) Examination 40%
Textbook: Campbell NA et al. Biology (2005) 7thed., Benjamin Cummings

BIOSCI 106
Foundations of Biochemistry
(15 Points) Second Semester

Biochemical reactions as essential elements of life processes with reference to the genes that control them. Material covered includes the molecular structure and action of proteins, the synthesis and metabolism of carbohydrates and fats in the fed and starved states, and elements of enzymology, energetics, metabolism,nutrition and hormonal control in health,physical performace and disease. Reference will be made to specific biomedical examples where appropriate. This is a limited entry course. Students are strongly advised to complete BIOSCI 101 and CHEM 110 before enrolling in BIOSCI 106.

Coordinator: Libby Hitchings
Assessment: Incourse 60%, (Theory 40%, Practical 20%) Examination 40%
Recommended Textbook: Campbell, M.K., Farrell, S.O. Biochemistry 4th or 5th ed., Thomson

Possible electives:
BIOSCI 102, ENVSCI 101, MEDSCI 142, PSYCH 109, SCIGEN 101, SPORTSCI 206
Any Part I Mathematics course except MATHS 108, 150 or 153
Any Part I Computer Science course

BIOSCI 107
Biology for Biomedical Science: Cellular Processes & Development
(15 Points) First Semester

The cellular basis of mammalian form and function including embryology and development. Particular emphasis will be placed on the cellular components of the blood, neural, muscular, reproductive, immune and supporting systems and how they contribute to the structure and function of the body as a whole. This course assumes a knowledge of NCEA Level 3 Biology and at least NCEA Level 2 Chemistry.

Coordinator: Dr Mike Dennison
Assessment: Incourse 60%, (Theory 40%, Practical 20%) Examination 40%
Textbook: Campbell N, et al. Biology, 7th ed., Benjamin Cummings, Tortora and Grabowski, Principles of Anatomy and Physiology, 11th ed., Wiley

CHEM 110
Chemistry of the Living World
(15 Points) First Semester / Second Semester

A foundation for understanding the chemistry of life is laid by exploring the diversity and reactivity of organic compounds. A systematic study of reactivity focuses on the site and mechanism of reaction including application of chemical kinetics. A quantitative study of proton transfer reactions features control of pH of fluids in both living systems and the environment.

It is recommended that students with a limited background in chemistry take CHEM 150 prior to CHEM 110.

Coordinator: Dr Judy Brittain
Assessment: Final exam 50%; 2 one-hour tests 30%; laboratories 20%
Textbook: J McMurry, Fundamentals of Organic Chemistry, 6th or 5th ed., Thomson(Brooks/Cole)

CHEM 120
Chemistry of the Material World
(15 Points) Second Semester

The chemistry of the elements and their compounds is explored. The relationship between molecular structure and reactivity, the role of energy, concepts of bond formation and chemical equilibrium are discussed. Issues such as sustainability, energy and fuels, and the creation of new materials are also discussed.

It is recommended that students with a limited background in chemistry take CHEM 150 prior to CHEM 120.

Coordinator: Dr David Salter
Assessment: Final exam 50%; 2 one-hour Tests 30%; laboratories 20%
Textbook: M Silberberg, Chemistry: The Molecular Nature of Matter and Change, 4th ed, 2005, International Edition (McGraw-Hill)

PHYSICS 160
Physics for the Life Science
(15 Points) First / Second Semester

Designed for students intending to advance their studies in the life sciences. Topics covered will be especially relevant to biological systems: mechanics, thermal physics, wave motion, sound, light, electricity and instrumentation.This course requires a knowladge of physics and mathematics to at least NCEA Level 2.

Restriction: PHYSICS 120
Coordinators: Dr Rob Kruhlak, Dr Barry Brennan
Assessment: 60% exam, 40% course work (15% labs, 15% Assignments, 10% tests)
Textbook: Urone PP. Contemporary College Physic. Second Edition (Brooks/Cole)

Part II Courses

105 points from courses listed below plus 15 points in a General Education course.

BIOSCI 203
Biochemistry
(15 Points) Second Semester

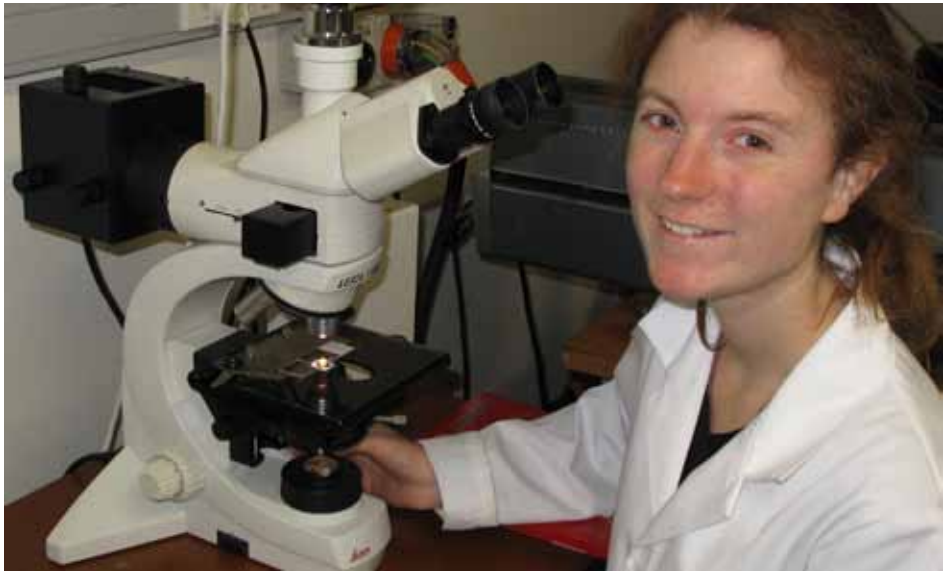
This course presents core areas of modern animal and plant biochemistry. Emphasis is on macromolecular (protein, enzyme and membrane) structure and function, central metabolism, including metabolic integration and control, and signal transduction in hormone action and vision. Plant biochemistry includes nitrogen fixation, photosynthesis and cell wall structure.

Prerequisites: BIOSCI 101, 106 and 15 points from CHEM 110, 122
Coordinator: Assoc. Prof. Tom Brittain
Assessment: Incourse 40%; Test 30% (25% Theory, 5% Practical) Practical 10% (attendance & write-up)
Textbooks: Berg et al., (2002) Biochemistry. 6th Edn. W.H. Freeman Lodish et al. (2004) Molecular Cell Biology, 6th Ed, Freeman

BIOSCI 204
Applied and Environmental Microbiology
(15 Points) First Semester

Functions and behaviour of micro-organisms (prokaryotes, eukaryotes, and viruses) as individuals and in communities. The fundamental role of micro-organisms in ecosystems. Application of microbial capabilities to biotechnology, food production, agriculture and industry. Methods for the isolation, culture, and study of micro-organisms.

Prerequisites: BIOSCI 101 and atleast 15 points from BIOSCI 102,106,107
Coordinator: To be Advised
Assessment: Incourse 50% (Theory 30%, Practical 20%), Examination 50%
Textbook: Prescott, Harvey, Klein (2005) Microbiology, 6th ed., McGraw-Hill



CHEM 230
Molecules for Life: Synthesis and Reactivity
(15 Points) Second Semester

Prerequisites: No formal prerequisites, but knowledge of organic chemistry and basic laboratory practice at the level covered in CHEM 110 will be assumed.

Students will build on their repertoire of fundamental reaction types that have previously been encountered with the introduction of new reactions and their application to more complex molecules of biological and medicinal importance. The laboratory course is an integral component of the course that emphasizes preparative chemistry and the use of modern spectroscopic methods for structure determination.

Coordinator: Dr Viji Sarojini
Assessment: Final exam 50%; test 20%; laboratories 30%
Textbook: J McMurry, Organic Chemistry, 7th ed. Brooks/Cole

CHEMMAT 211
Introduction to Process Engineering
(15 Points) First Semester

An engineering approach to process analysis is introduced. The course is designed to familiarise students with material balances on chemical processes and with energy balances that include physical and chemical changes.

Coordinator: Professor Mohammed Farid
Assessment: 70% Final Examination, 10% Assignments, 10% Tests, and 10% Laboratories
Textbook: Felder RM and Rousseau RW, Elementary Principles of Chemical Processes
Other references:
Himmelblau DM, Basic Principles and Calculations in Chemical Engineering; Sinnott RK, Chemical Engineering Volume; Reklaitis G V, Introduction to Material and Energy Balances.

ENGSCI 111
Mathematical Modelling 1
(15 Points) First Semester

The course covers Calculus and Linear Algebra with an emphasis on modelling. Students who have not done NCEA Level 3 Mathematics with Calculus or an equivalent course in Calculus should enroll for the two week Superstart course offered in late February. Details can be obtained towards the end of the year from the School of Engineering or the Mathematics Department.

Restrictions: MATHS 108, 150, 153

Consult the Department of Engineering Science for further information.

FOODSCI 201
Foundations of Food Science
(15 Points) Second Semester
The aim of this course is to give the student a general appreciation of the composition and structure of food. Material covered includes the molecular structure of the major food components and how they are altered by processing and preservation. Common foods will be studied in order to understand the complex relationships between food molecules and the physical structure of foods. Topical issues such as genetically modified foods and food irradiation will be included.

Prerequisites: At least 30 points from BIOSCI 101, 102, 106, 107, CHEM 110, 120, MEDSCI 142, PHYSICS 160, PSYCH 109

Coordinator: Dr Bronwen Smith
Assessment: Incourse 50% (20% laboratories, 15% assignments, 15% test), Exam 50%
Textbook: Potter NN, Hotchkiss JH Food Science, 5th ed., Aspen Publication

STATS 101
Introduction to Statistics
(15 Points) First / Second Semester

Statistics and the process of investigation, types of statistical study, tools for exploring and summarizing data, probability and distributions, estimation, confidence intervals to convey uncertainty, statistical significance (includes t-tests and p-values), quantitative variables and comparing groups (includes one-way analysis of variance), nonparametric methods, qualitative variables and tables of counts (includes chi-square test), relationships between quantitative variables (includes simple linear regression and correlation).

Restrictions: STATS 102, 107, 108, 191

Consult the Department of Statistics for further information.

Part III courses

FOODSCI 301, 302, BIOSCI 348, CHEMMAT 463 **plus 60 points from:** BIOSCI 358, CHEM 240, FOODSCI 303, 304, SCIGEN 201

FOODSCI 301
Food Quality Attributes
(15 Points) First Semester

Attributes that make food attractive, such as colour, flavour and texture, and how they alter during processing are studied. Texture measurement and sensory science are components of this course. Methods of studying food structure will be discussed. Lectures will be given on non-destructive testing of food.

Prerequisites: FOODSCI 201
Coordinator: Dr Bronwen Smith
Assessment: Incourse 50% (Theory 20%, Practical 30%), Examination 50%
Textbook: Fennema OR (Editor), Food Chemistry, Marcel Dekker Inc., NY, 2007

FOODSCI 302
Food Preservation
(15 Points) Second Semester

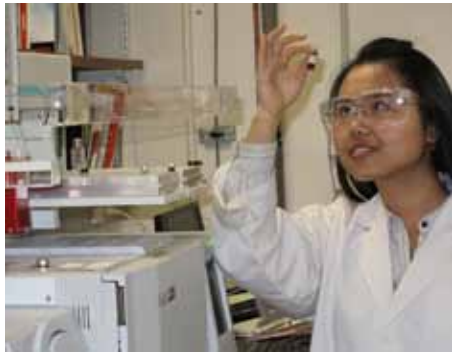
The fundamental principles of freezing and thawing, thermal processing and canning, fermentation and dehydration are studied. Consideration is also given to emerging technologies, with an eye to methods of most interest to New Zealand food industries. An overview of the major causes of food degradation, from microbiological to chemical, is presented. Methods of shelf-life testing are introduced with an emphasis on the maintenance of the nutritive value, safety of the food product and appeal to the consumer. Sampling of food is undertaken in this course.

Prerequisites: FOODSCI 201
Coordinator: Dr Bronwen Smith
Assessment: Incourse 45% (Theory 10%, Practical 35%), Examination 55%
Textbook: To be advised

FOODSCI 303
Sensory Science
(15 Points) First Semester

The course focuses on the principles and practices of sensory evaluation to assess sensory attributes of foods. Topics include human senses, perceptions and preferences of foods, psychophysical theory, threshold determination, scaling and methodologies for sensory evaluation (discrimination testing, descriptive analysis, acceptance and preference testing). Basic statistical concepts are also covered. Sampling of foods is an compulsory element in this course.

Coordinator: Dr Siew Young Quek
Assessment: Incourse 100% (Theory 30%, practical 70%)
Textbook: Lawless HT, Heymann H. Sensory Evaluation of Food Principles and Practices. Aspen Publishers Inc. Maryland. 1999., Meilgaard, M., Civille, G.V. and Carr, B.T. Sensory Evaluation Techniques, 3rd ed. CRC Press, Boca Raton, 1999.
Prerequisites: STATS 101 and FOODSCI 201
Corequisite: FOODSCI 301 or permission of Programme Director/course co-ordinator



FOODSCI 304
Food Product Development
(15 Points) Second Semester

Development and evaluation of new products from raw ingredients through a thorough understanding of the physical and chemical properties of materials. Sensory evaluation will be a component. Sampling of food products is therefore undertaken in this course.

Prerequisites: FOODSCI 301 and 303
Corequisite: FOODSCI 302 or permission of Programme Director/course co-ordinator

Coordinator: Dr Siew Young Quek
Assessment: Incourse 100% (Theory 35%, Practical 65%)
Textbook: To be advised

BIOSCI 348
Food and Beverage Microbiology
(15 points) Second Semester

Conventional and molecular approaches to the taxonomy, physiology and ecology of microbes including bacteria, archeae, viruses, yeasts, fungi and zoonotic parasites and pathogens. Unique biochemical pathways in microbes. Microbial agents having pathological importance in plants, animals and man. Food microbiology. Applied microbial ecology and waste water treatment. Biotechnological processes and renewable resource technology.

Prerequisites: 15 points from BIOSCI 204, MOLMED 201, MEDSCI 202
Restriction : BIOSCI 352

Coordinator: Dr Silas Villas-Boas
Assessment: Incourse 50% (Theory 30%, Practical 20%), Examination 50%
Textbook: To be advised

BIOSCI 358
Nutritional Science
(15 Points) Second Semester

The scientific basis of nutrition focusing on its biochemistry and physiology in health and disease. Nutritional aspects of carbohydrates, fats, proteins, vitamins and trace nutrients are covered in an integrated manner. The methodologies which underpin nutritional science and its applications are included. Reference will be made to a broad range of examples, and a number of specific nutritional topics of current interest will also be included.

Prerequisites: BIOSCI 203
Course Co-ordinator: Dr Sally Poppitt (Human Nutrition Unit)

Assessment: Incourse 50% (Practical 20%, Theory 30%) Examination 50%

Textbook: EE Zieglier and LJ Filer (editors), Present Knowledge in Nutrition, 7th ed., ILSI Press Washington DC., MC Linder (ed), Nutritional Biochemistry and Metabolism with Clinical Applications, 2nd ed., Prentice Hall Sydney.

CHEM 240
Measurement and Analysis in Chemistry and Health Sciences
(15 Points) First Semester

Prerequisites: No formal prerequisites, but knowledge of aspects of chemistry and laboratory practice at the level covered in CHEM 110 will be assumed. An understanding of basic mathematics at the level covered in MATHS 102 will also be assumed.

Restrictions: CHEM 243

An introduction to physico-chemical principles and techniques underlying a wide range of modern analytical methods used in chemistry and biomedical science. Topics include chromatographic methods for the separation of complex mixtures, application of modern electrochemical and spectroscopic techniques to analytical problems, and methods for assessing the reliability of results. Experiments illustrating these principles are an integral part of this course.

Coordinator: Assoc Prof Paul Kilmartin
Assessment: Final examination 50%; 1 test 15%; Assignments 10%; laboratories 25%
Textbook: DC Harris, Quantitative Chemical Analysis, 7th ed., Freeman

SCIGEN 201
Managing Science and Technology
(15 Points) First Semester, City and Tamaki

The course explores the environment within which science and technology operate. Issues explored include public policies and the organisation of science, science funding, innovation and team management.

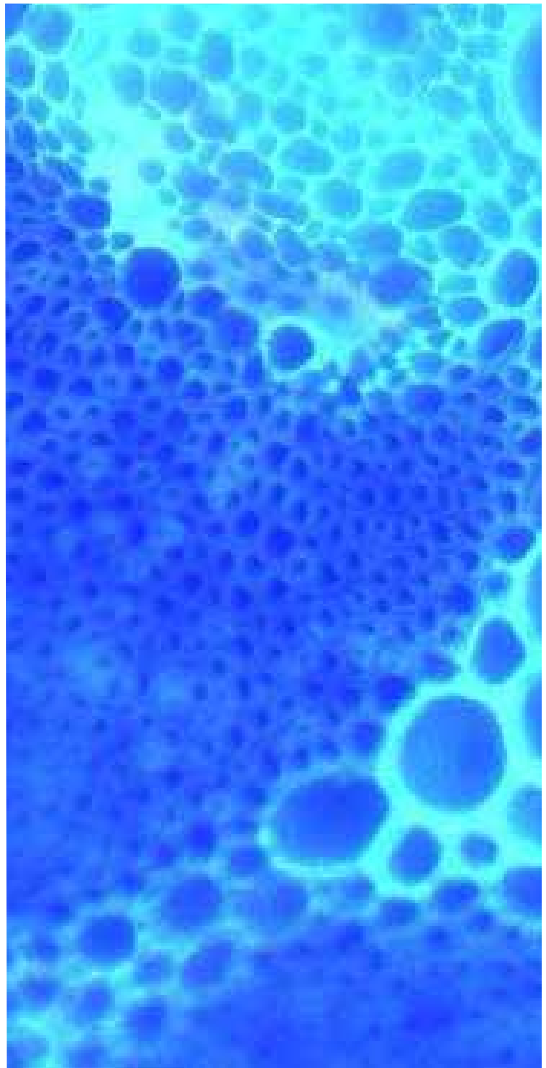
Coordinator: Dr William Smith
Assessment: Course work 40%, Exam 60%
Textbook: Required reading material provided at start of course.

CHEMMAT 463
Food Process Engineering
(15 Points) First Semester

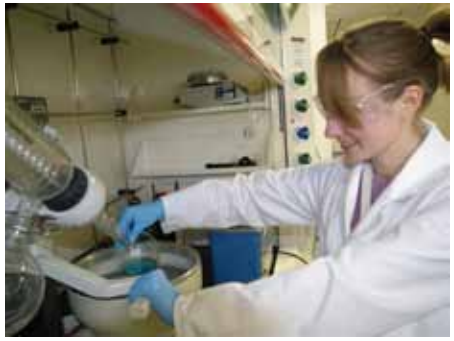
The textural and chemical properties of food are related to its ingredients and processing history, via the microstructure of the material. The course looks at food composition, the impact of processing techniques and the structures they impart as well as aspects of heat and mass transfer, generating hygienic processing and emerging technologies.

Coordinator: Dr Filipa Silva
Assessment: Exam 50%; assignments 40% (written work); project 10%
Textbook: Singh RP and Heldman DR, Food Process Engineering, Academic Press; Aguilera JM and Stanley DW, 1999, Microstructural Principles of Food Processing and Engineering, Aspen.

Postgraduate Programmes



Postgraduate programmes in Food Science



New Zealands's major exports in the dairy, meat, fish and horticultural sectors are usually subjected to further processing for added value. Food products must be safe, attractively packaged and meet the high standards of the international market place. Much of the science that underpins the technology of food processing derives from chemistry, the biological sciences, psychology and biophysics. Important contributions to the research base are also made from engineering and medicine. Involvement with food companies is an important part of the Food Science Programme. There are extensive interactions with government Crown Research Institutes which have major research programmes in food science. A PhD in Food Science is also available for suitably qualified students (see page 30).

Each year a proportion of Stage III students choose to move on to postgraduate studies. Students making this choice are often driven by the desire to participate in research and ultimately gain entry to a PhD. In our increasingly competitive job market the completion of a postgraduate programme is also a useful career move. BSc(Hons), PGDipSci and research MSc programmes are available.

The Postgraduate Diploma in Science is a one year programme and is the usual path for students intending to go on and complete a research MSc in Food Science. The research MSc is a one year programme consisting of a thesis. It is possible to enter into a PhD on completion of a research MSc with sufficiently high grades.

The BSc(Hons) year brings together the skills and knowledge accumulated in the previous three years in an integrated study of food. There will be an opportunity to put all this study into practice through an industrial internship. Industrial internships are available for selected students who will normally work in the Summer Semester at the end of the third or fourth year. The major component is a research project in food science. Projects may involve solving a problem for a food company, or researching a problem put forward by a scientist in a government research institute or at the University.

It is possible to apply directly for a PhD on completion of BSc(Hons) and this programme is a popular choice for good students seeking a faster path to the PhD degree. It is also a path for students intending to go on and complete an MSc in Food Science.

BSc(Hons) in Food Science

The one-year BSc(Hons) programme is an option for well prepared students wishing to study Food Science in greater depth than a BSc.

The BSc(Hons) can also provide a faster path to the PhD degree for students intending to perform advanced research.

The minimum requirement for entry into the BSc(Hons) in Food Science is a BSc degree with at least a B average in 90 points above Stage II, including at least 45 points in Food Science. A student who is within one course of completing a BSc and has passed the entry requirements stated above may, with the approval of the Director of Food Science enrol for BSc(Hons) provided that the remaining course is completed within 12 months of entry to this degree programme as long as it is not required for major. BSc(Hons) will only be awarded once the requirements for BSc have been completed.

BSc(Hons) is a one year full-time or two year part-time degree programme composed of four courses (60 points) and a research dissertation (60 points). The course FOODSCI 788 BSc Honours Dissertation in Food Science is compulsory.

Your research project will be supervised by one of the academic staff and you will normally be allocated the supervisor of your choice. Your project work will be carried out throughout the year and the results reported in a written dissertation. Assessment of your project and dissertation will be based on your input of work and effort and the quality of your written dissertation rather than on the results alone.

The research topics available for the BSc(Hons) project arise from the research programmes of the academic staff. These research programmes are described in detail in the Research Supervisors and Research Topics part of this handbook.

Students are required to consult the 2010 Calendar for detailed regulations for this degree.

Prerequisites:

Attain at least a B average in 90 points above Stage II, and have completed a Food Science major (refer to the University Calendar).

Requirements:

- At least 30 points from FOODSCI 704, 706-710
- Up to 30 points from MEDSCI 709, 710, BIOSCI 741 or other courses approved by the programme director
- 60 points FOODSCI 788 BSc(Hons) Dissertation in Food Science

A candidate for BSc(Hons) must achieve a GPA average of 3.5 (B-) or above to be awarded this degree. A student who completes the BSc(Hons) year but does not attain the minimum grade for honours may apply to credit the 700 level courses towards a Postgraduate Diploma in Science.

For further information on the BSc(Hons) degree, please contact:

Associate Prof. Yacine Hemar
Postgraduate Coordinator
Building 301, Level 4, Room 437
Phone: 373 7599 ext 89676
Email: y.hemar@auckland.ac.nz

PGDipSci (Food Science)

Postgraduate Diploma in Science - Food Science

The PGDipSci in Food Science is a one year taught coursework programme comprising core courses, and elective courses. A dissertation which is based on a short research project may be taken. Assessment for the taught component is by a combination of coursework, assignments and final examination.

Prerequisite:

A relevant Bachelor's degree in Science, Technology (or an approved equivalent) and evidence of a satisfactory level of competence in relevant subject areas.

Requirements:

- 60 points from FOODSCI 703, 704, 707, 708
- 60 points from approved 600 and 700 level courses.

MSc (Food Science)

Master of Science - Food Science

This MSc degree follows from a BSc(Hons) or PGDipSci in Food Science and takes 1 year to complete. A thesis based on a research project is required. Assessment is by thesis examination.

Prerequisite:
A PGDipSci or a BSc(Hons) in Food Science with a B grade over 90 points, of which at least 75 points must be at 700 level.

Requirements:
A thesis (120 points, FOODSCI 796), based on a research project on some aspect of food science.

Note: Selection for the PGDipSci in Food Science and MSc in Food Science programmes will be based on academic merit, but a professional interest in food science or food technology will be taken into account.

Application procedure

BSc(Hons) in Food Science or PGDipSci in Food Science or MSc in Food Science

BSc(Hons) in Food Science or PGDipSci in Food Science or MSc in Food Science. Complete the Registration of Interest form in the Handbook on page 25 and submit it to the Postgraduate Coordinator A/Prof Yacine Hemar, as soon as possible. You will need to arrange an interview with him by phoning ext 89676. Bring your full CV, academic record/transcript and other relevant material to the interview.

The number of places available in these programmes is limited, and those accepted will be notified in early December or until the class is filled. Students must apply for admission to the BSc(Hons) or PGDipSci or MSc programme on-line using nDeva. Individual programmes of study for PGDipSci in Food Science and MSc in Food Science must be approved by the Postgraduate Coordinator

Postgraduate Coordinator:
Associate Professor Yacine Hemar
Building 301, Level 4, Room 437

Phone: 373 7599 ext 89676
Email: y.hemar@auckland.ac.nz

Registration of Interest

Fill out this form and send it with your CV and academic transcript to the Programme Director at the mailing address on the back cover. (Note that you also need to apply separately, online via nDeva, for admission to the University)

Programme applied for (please tick):

◯ BSc (Hons) in Food Science ◯ Master of Science in Food Science

◯ Postgraduate Diploma in Science (Food Science)

Family Name: _____ Given Names: _____

ID Number: _____

Address for correspondence:

_____

_____

_____

_____

_____

Phone: _____ Fax: _____

Email: _____

First Degree / Qualification and Specialisation:

_____

Current Status / Employment:

_____

Current Programme (if you are still studying):

_____

References:
The names and addresses, with email and facsimile details if available, of 2 people who are prepared to act as referees, at least one of whom can comment on your University work or relevant experience.

1. _____

_____

_____

2. _____

_____

_____

Continued over

Statement of Interest

Brief reasons for taking this Programme

Declaration:

I authorise The University of Auckland to collect, use, and disclose personal information about me in accordance with the Privacy Act 1993. I authorise any agency holding the source of any information I have provided to release that information to The University of Auckland upon request.

Signed: Date:

Postgraduate Enrolment - where to from here?

Enquire

Visit www.auckland.ac.nz or contact our student advisers for any information you need.
Phone: 0800 61 62 63 | **Email:** studentinfo@auckland.ac.nz
Student Information Centre: Room 112, ClockTower, 22 Princes St, Auckland

Apply for a place in a programme(s)

Do you have internet access, or can you come on to campus to our help labs?

Yes

- Log on to www.auckland.ac.nz
- Click on Apply Now
- Complete the online Application for a place in your programme(s) of choice.
- New students will receive an acknowledgement email including Net ID and password details for accessing Student Services Online (the online enrolment system)
- Applications will require details of the courses you intend to study towards your postgraduate qualification. If these details are required by the programme you are applying for, you will be asked to complete those details.

No

Phone: 0800 61 62 63
(or +64 9 923 1969 if overseas)

Email: studentinfo@auckland.ac.nz

The ClockTower Call Centre will forward required information to you.

Offer

Your programme(s) will be assessed by the relevant department and the Faculty of Science and if accepted, an offer email will be sent to you.

To see the status of your application(s), log on to www.auckland.ac.nz and click on Apply Now. Select "Apply for admission to the University", and log in to Student Services Online.

Accept

- Accept or decline your offer of a place in a programme online. Remember – you still need to enrol in your courses!

Enrol in your choice of courses

Enrol in courses via Student Services Online using your login and password.

For help with choosing courses you can:

- refer to www.science.auckland.ac.nz or to publications relating to your programme, or to The University of Auckland Calendar. For programme publications call 0800 61 62 63. The Calendar is for sale in bookshops or can be accessed from www.auckland.ac.nz Click on "Current Students" then "University Calendar" in the Quick Links box
- go online to check the timetable for your chosen courses
- for more information visit the Faculty of Science Student Centre, Ground Floor, Building 301, 23 Symonds Street
  Phone: 64 9 373 7599 ext 87020 | **Email:** scifac@auckland.ac.nz
- or call 0800 61 62 63.

Pay your tuition fees.

You are now a University of Auckland student. Congratulations!

Postgraduate courses in Food Science

FOODSCI 610
Special Topics
(15 Points) First Semester

Prerequisite: Permission of Programme Coordinator

FOODSCI 691
Not available in 2011

FOODSCI 691A & B
PG Diploma Dissertation (Food Science)
(30 Points) First and Second Semesters

Prerequisite: Permission of Programme Coordinator

To complete this course students must enrol in either FOODSCI 691 A and B, or FOODSCI 691 (one semester)

FOODSCI 703
Food Processing
(15 Points) First Semester

Prerequisite: Permission of Programme Coordinator

Preservation of food by standard methods including freezing, dehydration and thermal processing. New developments in food preservation. Unit operations, mass and energy balance, and heat transfer are covered. Chemical and physical changes food undergoes during processing.

FOODSCI 704
Food Biotechnology
(15 Points) Second Semester

Prerequisite: Permission of Programme Coordinator

Bioprocess engineering fundamentals, fermentation processes, fermenter design and operation, bioseparations, food biotechnology.

FOODSCI 705
Project in Food Science
(15 Points) Second Semester

Prerequisite: Permission of Programme Coordinator
Restriction: FOODSCI 691

FOODSCI 706
Food Safety
(15 Points) First Semester

Prerequisite: Permission of Programme Coordinator

The understanding of the changing regulations that apply to the New Zealand food industry is of paramount importance. The Food Amendment Act of 1996 which allows the Australia New Zealand Joint Food Standards Agreement to come into force will be examined in detail. HACCP and risk management plans will be generated.

FOODSCI 707
Food Science
(15 Points) First Semester

Prerequisite: Permission of Programme Co-ordinator

Chemical, biological and physical aspects of foods. The decomposition of food due to lipid oxidation, enzymic and non-enzymic browning. Emulsions and foams. Integrated study of selected basic foods.

FOODSCI 708
Advanced Food Science
(15 Points) Second Semester

Prerequisite: Permission of Programme Coordinator

The functions and properties of food additives. Food attributes including colour, flavour and texture. Sensory science. Introduction to the Food Regulations. Interaction of macromolecules.

FOODSCI 709 A & B
Selected Topics In Food Science and Technology
(15 Points) First and Second Semesters

Note: Consult the Coordinator of Food Science

Modules will be organised by the staff and invited lecturers. Topics offered will usually be based on the specialist interests of the lecturers, although controversial issues may be included (for example, genetically modified food, irradiated food). Students may be required to participate actively by contributing seminars. Topics may vary from year to year.

FOODSCI 710
Industrial Internship
(15 Points) First, Second, or Summer Semester

Prerequisite: Permission of Programme Director
Note: Consult the Director of Food Science

The industrial internship is an opportunity for students to experience the food industry at first hand. While the placement would normally be in New Zealand, overseas internships are possible. The student will work in the food organisation on a defined project under the supervision of a suitably qualified person. A detailed written report on the assignment must be submitted.

FOODSCI 788
FOODSCI 788 A & B
BSc(Hons) Dissertation in Food Science
(60 Points) First and Second Semesters

Restriction: FOODSCI 789

Note: Consult the Director of Food Science

A research proposal will be prepared on the dissertation topic. Students will be required to present a overview of the proposal in a seminar. Students will participate in the critical analysis of scientific papers. The student will carry out an original piece of research. The results will be presented and discussed in a dissertation. A seminar on the research will be given To complete this course students must enrol in FOODSCI 788 A and B.

FOODSCI 796 A & B
MSc Thesis in Food Science
(120 Points) First and Second Semesters

Prerequisite: Permission of Programme Director

To complete this course students must enrol in FOODSCI 796 A and B.

For all approvals for PG courses consult
Associate Prof. Yacine Hemar
Postgraduate Coordinator
Building 301, Level 4, Room 437
Phone: 373 7599 ext 89676
Email: y.hemar@auckland.ac.nz

PhD in Food Science

The PhD degree comprises a programme of advanced study and research, the results of which are presented in a thesis. The thesis is a formal and systematic exposition of a coherent piece of research work carried out over the period of registration. It shall be an original contribution to the field of study and is required to meet internationally recognised standards for such work (PhD Statute). Enquiries relating to the administration of the PhD degree and the associated procedures should be directed to: Graduate Centre (ClockTower, East Wing; telephone: 373 7599 ext 86899; postgraduate@auckland.ac.nz).

Entry to PhD

The normal requirement for admission to the PhD is an Honours degree with 2nd class honours division 1 or better, either MSc, BSc(Hons), or BTech. Candidates with overseas qualifications should consult the Department for advice and assessment of their qualifications. Candidates may be required to enrol in one or more courses concurrent with research work to complement either their research work or their background in the subject.

Financial Assistance

This may be offered in the form of a PhD fellowship associated with a specific research project, or teaching duties within the department. Note that financial assistance available from the department is extremely limited, and all candidates are strongly encouraged to apply to all external sources of PhD funding for which they are eligible.

Application, Admission and Enrolment

Please visit the Postgraduate Admission section of the Postgraduate Students website (www.auckland.ac.nz) for information on applying, registering and enrolling for a PhD.

The University of Auckland invites you to develop and submit your Expression of Interest (EOI) online. This process makes the submission of an EOI straightforward and provides you with a clear channel for enquiring about doctoral study and acquiring a supervisor. The online EOI allows for inclusion of sufficient information to enable us to assess you as a potential doctoral candidate and subsequently advise you appropriately. This process is outlined at www.science.auckland.ac.nz/uoa/science/for/pg/phd.cfm

If you are applying for the Doctoral programme, you will also need to supply:

- two academic references (if you have not studied at The University of Auckland before)
- a statement of research intent (approximately 500 words; this should be developed in conjunction with your proposed supervisor)
- the name/s of your proposed supervisor/s.

For further information, please contact:

PhD Coordinator

Dr Gordon Miskelly
Phone 373 7599 ext 88338
Email: g.miskelly@auckland.ac.nz

Current research

Food research conducted at The University of Auckland covers a wide range of topics and extends beyond the University environment. Some projects are located in industry while other are carried out jointly at government research laboratories and at the University. Flexibility is important. Communication is also important. Graduate students are given opportunities to improve their skills by presenting seminars and research reports during their course of study.

Members of the Food Science Research Group maintain active collaborative research programmes with scientists in other parts of New Zealand as well as internationally. We have made a particular effort to organise joint research and development projects with people from the South Pacific and the Pacific Rim.

The research group brings a wide range of disciplines to bear on food science problems. There are scientists from Engineering, Physics, Chemistry, Plant Science, Microbiology and Human Nutrition as well as Food Science, participating in the research programme. This means some exciting cross-disciplinary research and development projects can be organised. Such projects give the graduate knowledge of more than one discipline and frequently the cross-fertilisation of ideas leads to an important breakthrough.

Through industry we have access to modern food processing equipment. Through the University and government research institutes we have access to modern scientific techniques including solid-state and solution NMR, SEM, TEM, DSC, GC-MS, HPLC-MS and HPLC with diode array detector. Of equal importance, students have access to pilot plant equipment. A major new fermentation facility has also been opened recently at The University of Auckland.

While the research programme is particularly strong in the areas of the chemical and physical changes that occur as a result of improving engineering processes, and the postharvest changes in plant cell walls (dietary fibre), we believe we can offer a wide range of research and development projects that will suit graduates with different career paths.

Research Supervisors and Research Topics

Associate Professor Bob Anderson
MSc, PhD (Auck), FNZIC, FRSC, CChem
Honorary Associate Professor in Food Science
Department of Chemistry

RESEARCH

Mechanistic studies on the free radical chemistry of compounds related to health issues are the main focus of the research topics offered. Use is made of the Department's fast reaction facility to generate radical species in aqueous solution on the short timescale (μs) and to follow their subsequent reactions in real time (ms-s)by time-resolved spectrophotometry and conductivity. Complementary product analysis and DNA damage studies are undertaken using steady-state -radiolysis with analytical and molecular biology techniques.

REACTIONS OF ANTIOXIDANTS WITH BIO-RADICALS

Research is on mechanisms by which certain dietary compounds and endogenous compounds can act as antioxidants in undergoing fast electron transfer reactions, with DNA and membrane component radicals, such as linolenic acid, resulting in chemical repair. Test compounds include vitamins, polyhydroxyphenols and compounds found in the brain. These studies relate to the possible prevention of cancer, heart disease and neurological disorders. Also, DNA-targeted antioxidant compounds are studied as a novel approach to repair normal tissue damage through electron transfer to DNA radicals. Molecular biology techniques are used to assess DNA damage.

Topics

I) New approaches to the radiolytic release of cytotoxins from prodrugs.

II) Radical parameters controlling the activity of new bioreductive drugs.

Topics

I) Antioxidants in the fast chemical repair of fatty acid radicals.

II) Electron transfer from antioxidants in the fast chemical repair of DNA radicals.

III) Prevention of DNA strand breaks and base damage by antioxidants.

SELECTED PUBLICATIONS

Shinde, S.S., Maroz, A., Hay, M.P., Patterson, A.V., Denny, W.A. and Anderson, R.F. Characterization of radicals formed following enzymatic one-electron reduction of 3-substituted 1,2,4-benzotriazine 1,4-dioxide anticancer compounds (tirapazamine), J. Am. Chem. Soc., 2010, 132, 2591-2599.

Maroz, A., Shinde, S.S., Franzblau, S.G., Ma, Z., Denny, W.A., Palmer, B.C. and Anderson, R.F. Release of nitrite from the antitubercular nitroimidazole drug PA-824 and analogues upon one-electron reduction in protic, non-aqueous solvent. Org. Biomol. Chem.,2010, 8, 413-418.

Maroz, A., Anderson, R.F., Smith, R.A.J. and Murphy, M.P. Reactivity of ubiquinone and ubiquinol with superoxide and hydroperoxyl radical: implications for in vivo antioxidant activity. Free Rad. Biol. Med.,2009, 46, 105-109.

Shinde, S.S., Maroz, A., Hay, M.P. and Anderson, R.F. One-electron reduction potential of the neutral guanyl radical in the GC base pair of duplex DNA. J. Am. Chem. Soc.,2009, 131, 5203-5207.

Maroz, A., Kelso, G.F., Smith, R.A.J., Ware, D.C. and Anderson, R.F.Pulse radiolysis investigation on the mechanism of the catalytic action of Mn(II)-pentaaza-macrocycle compounds as superoxide dismutase mimetics. J. Phys. Chem. A., 2008, 112, 4929-4935.

Professor Mohammed Mehdi Farid
BSc(Bagdad), MSc PhD (Wales)
M/AIChE, MISES, MANZSES
Department of Chemical and Materials Engineering

Published more than 230 papers, in international high quality journals and refereed conferences, 6 patents, 7 books (including the famous book published in 2010) and 12 chapters in books. More than 50% of these publications are on food engineering.

1. Head of the Food Research Cluster in the Faculty of Engineering (since 2003) comprising nine senior academic staff members from the Department of Chemical and Materials Engineering and the Department of Food Science.
2. New Zealand representative in the International Association of Engineering and Food (IAEF), which supports the International Congress on Engineering and Food, ICEF.
3. Fellow of the Institution of Chemical Engineers, London (FIChemE) and member of food international societies such as the Institute of Food Technologies, USA and Food Engineering Association of New Zealand (FEANZ).
4. Member of the Editorial Board of Journal of Food Engineering, Recent Patents on Food Nutrition and Agricultural, and the International Review of Chemical Engineering.
5. Presented, for the first time in the literatures, the theoretical analysis of sterilisation of food in plastic pouches using computational fluid dynamics (CFD). The 26 papers and a book we have published on the subject during the period (1998-2003) on sterilisation using CFD also show how vitamin destruction can be theoretically predicted.
6. Developed a unified theory that describes most drying methods such as freeze drying, steam drying, spray drying, as well as frying and freezing (please see the list of the most influential publications in Chemical Engineering Science, Chemical Engineering Processing and journal of Food Engineering).
7. Invented a new method of cooking meat patties based on ohmic heating (International Patent No: WO 02/102215 A1). The new technology has been widely publicised in New Zealand (including the 6.00pm Channel One news). There has been exchange of visits with staff from McDonalds Research Canter in Chicago, who showed significant interest in the technology

SELECTED PUBLICATIONS

2009 Farid, M.M. "Pressure Assisted Thermal Sterilization or Pasteurization Methods and Apparatus. New Zealand Patent No 562341 granted in 8 October, 2009.

2009 Farid, M.M. and Behzadi, s. "Method of Biodiesel Preparation" International Patent WO2007/049979 A1, 3 May, 2007, US Patent 2009/0038209, Feb., 2009 and PCT/NZ 2006/000277.

2010 Gin, B and Farid, M.M. ;The use of PCM panels to improve storage condition of frozen food" accepted for publication in the Journal of Food Engineering.

2009 Farid, M.M. and Alkhafaji, S. "Determination of an effective treatment temperature of chemical and biological reactions", Food Bioprocess Technology, DOI 10.1007/S11947-009-0289-5.

2008 Nazir, S. and Farid, M.M. "Modelling of ice removal in fluidized bed freeze concentration of apple juice" AIChE Journal, 54, 11, 2999-3006.

2008 Alkhafaji, S. and Farid, M.M. "Modelling the

Inactivation of Escherichia coli ATCC 25922 Using Pulsed Electric Field", Innovative Food Science and Emerging Technologies, 9, 448-454.

2008 Wimalaratne, S.K. and Farid M.M., "Pressure assisted thermal sterilization", Trans IChemE, Part C, Food and Bioproducts Processing, 85(C4), 1-5.

2008.Habib, B. A. and M. M. Farid. Freeze concentration of milk and saline solutions in a liquid-solid fluidized bed - Part II: Modeling of ice removal, Chemical Engineering and Processing, 47, 539-547.

Associate Professor Yacine Hemar
MPhil, PhD (Univ. Louis Pasteur) and Habilitation to Direct Research (HDR) (Univ. Strasbourg)

FOOD PHYSICS
Level 4, Room 437, ext 89676
Email: y.hemar@auckland.ac.nz

CURRENT PROJECTS

My research interests are related to the physical-chemical characterisation of food systems such as proteins and polysaccharides and their mixtures in solution, gel or emulsion states. Of specific interest the Structure-Function properties of biopolymer networks, and how these properties are affected by different stressors, such as shear, heat, pH etc... Some of the research activities are reported below:.

MILK PROTEIN, POLYSACCHARIDES & MILK PROTEIN-POLYSACCHARIDE INTERACTIONS

The aim of this activity is to characterise the physico-chemical characterisation of proteins and polysaccharides and their mixtures, using a battery of analytical methods, including rheology and scattering techniques. The characterisation exercise is performed with the view of relating the microscopic properties to the macroscopic mechanical behaviour of these systems.

ENCAPSULATION, RELEASE, AND DIGESTION OF BIOACTIVES

We are currently investigating the use of different technologies for the encapsulation and the target release of food bioactives. The physical behaviour of the encapsulating system and the release kinetics of the bioactive during digestion are investigated in-vitro under simulated gastrointestinal conditions. This activity is part of a broader research area on the "rheo-physiology of structured foods".

NOVEL PROCESS TECHNOLOGIES

We are interested by the effect of Novel Process Technologies, such as High Hydrostatic Pressure, Pulsed Electric Field and Ultrasound on the physico-chemical properties of food systems. We are also currently developing methodologies to the real-time in-situ investigation of food-based systems when subjected to the stresses (electro-mechanical, pressure, cavitation effects etc...) resulting from the application of these Processes.

DEVELOPMENT OF LIGHT SCATTERING TECHNIQUES TO CHARACTERISE FOOD SYSTEMS

In the recent years we developed Diffusing Wave Spectroscopy (DWS) as a particle sizing method for concentrated dispersions. In addition, we have used DWS to measure the micro-rheological, high-frequency, behaviour of biopolymer systems, and to investigate the mechanical behaviour of fluids under shear. Currently we are extending this capability to Multiple Speckle Diffusing-Wave Spectroscopy (MSDWS), a CCD-Camera based technique, for the study of non-ergodic media.

SELECTED PUBLICATIONS

Day, L., Xu, M., Øiseth, S. K., Lundin, L., Hemar, Y. (2010). Dynamic rheological properties of plant cell-wall particle dispersions. Colloids and Surfaces B: Biointerfaces, 81: 461–467

Hemar, Y., Liu, L. H., Meunier, N., Woonton B. W. (2010). The effect of high hydrostatic pressure on the flow behaviour of skim milk-gelatin mixtures. Innovative Food Science & Emerging Technologies, 11: 432-440.

Hemar, Y., Cheng, L. J., Oliver, C. M., Sanguansri, L., Augustin, M. A. (2010). Encapsulation of resveratrol Using water-in-oil-in-water double emulsions. Food Biophysics, 5: 120-127

Cucheval, A.S.B., Vincent, R. R., Hemar, Y., Otter, D.Williams, M.A.K. (2009). Multiple particle tracking investigations of acid milk gels using tracer particles with designed surface chemistries and comparison with diffusing wave spectroscopy studies. Langmuir, 25: 11827-11834.

Augustin, M.A., Hemar, Y. (2009). Nano- and micro-structured assemblies for encapsulation of food ingredients. Chemical Society Reviews, 38: 902-912.

Raudsepp, A., Callaghan, P., Hemar. Y. (2008). A study of the nonlinear rheology of complex fluids using diffusing wave spectroscopy. Journal of Rheology, 52:1113-1129.

Professor Philip J Harris
MA, PhD (Camb), Plant Science
School of Biological Sciences

RESEARCH

My research focuses on plant cell walls (dietary fibre), and uses a variety of chemical, biochemical and immunocytochemical techniques. Several of the projects are focused on investigating the cell walls of monocotyledons, many of which are important food plants.

SELECTED PUBLICATIONS

Harris, P.J., and Trethewey, J.A.K. (2010). The distribution of ester-linked ferulic acid in the cell walls of angiosperms. Phytochemistry Reviews 9:19-33.

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Bootten, T.J., Harris, P.J., Melton, L.D., and Newman, R.H. (2009). Solid-state 13C NMR study of a composite of tobacco xyloglucan and Gluconacetobacter xylinus cellulose: molecular interactions between the component polysaccharides. Biomacromolecules 10:2961-2967.

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Associate Professor Paul Kilmartin
BA BSc(Hons) (Well), STB (Rome), MTH (Syd), PhD (Auck), MNZIC, MNZIFST
Department of Chemistry

RESEARCH

A research focus on organic electrochemistry extends into areas of wine oxidation and nanostructured conducting polymers. Research projects are offered in the following areas:

RED WINE MICRO-OXYGENATION

The use of micro-oxygenation of wines is being studied for its effects on the polyphenol content and sensory development of red wines. New methods for oxygen delivery involving dense polymer membranes and electrochemical micro-oxygenation at glassy carbon rods are being developed. The effects of micro-oxygenation upon reduced aromas in Pinot noir wines is a further focus along with a further studies of wine oxidation processes.

STABILITY OF SAUVIGNON BLANC AROMAS

The stability of Sauvignon blanc aromas in relation to polyphenol oxidation is being examined, along with the effect of added antioxidants (glutathione, SO2, ascorbic acid). In addition to model wine studies, a novel electrochemical technique is being applied to study the interaction of oxidised wine components with antioxidants and aroma compounds.

CONDUCTING POLYMERS AS ANTIOXIDANTS

This research is being undertaken in collaboration with members of The University of Auckland Polymer Electronics Research Centre (PERC). The ability of conducting polymers to act as antioxidants is being examined through the use of free radical scavenging tests, and for their application as packaging materials.

CONDUCTING POLYMER CHEMICAL SENSING ELEMENTS

A further PERC project involves research into the use of conducting polymers as redox mediators for antioxidants in electrochemical sensors (e.g. for ascorbic acid and SO2 in wines). The group at Auckland has recently developed nanostructured conducting polymers with excellent responses for ascorbic acid oxidation.

SELECTED PUBLICATIONS

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Professor Laurence Melton
MSc (Auck), PhD (Simon Fraser)
FRSC, FAIC, FNZIC, FNZIFST,FIAFST

RESEARCH

Two major research interests are the interaction of food components and plant cell walls (dietary fibres).

How do different molecules interact and what the consequences?

How do changes in plant cell walls alter the texture of fruit and vegetables on processing?

CURRENT PROJECTS

PROTEIN-POLYSACCHARIDE INTERACTIONS

There are four projects studying the interactions of the molecular level of an individual protein and a single polysaccharide. These projects are part of the Riddet Centre of Research Excellence in Food science research programme.Techniques used include isothermal titration calorimetry,analytical ultra-centrifugation,surface plasmon resonance, MADITOF-mass spectrometry following enzymatric degradation,X-ray crytallpgraphy, nuclear magnetic resonance(NMR),computer modelling.

INTERACTION OF FOOD COMPONENTS

The interaction of casein and liposomes containing various antioxidants is being studied in cojunction with scientists at the Plant and Food Research Institute. Antioxidant activity of the lipid- soluble material is measured and small angle neutron scattering is being done to understand how the molecules are arranged. Light scattering and rheology are also done.

PLANT CELL WALLS AND TEXTURE

The influence of plant cell wall on the texture of different apple varieties at different stages of fruit developement and ripening is being

investigated. This is part of a Plant and Food Research Institute research programme. Three other student projects have been on vegetable cell wall,. Solid-state NMR, electron microscopy, rheology, atomic force microscopy, sugar composition analysis are among the methods used.

SELECTED PUBLICATIONS

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Dr. Filipa Vinagre M. Silva
BEng (Hons), MEng (USA), PhD Food Sc & Eng (Portugal)
Fellow NZIFST

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RESEARCH

Current research interests are in Food Process Engineering, in particular studying the effects of new food preservation technologies such as high pressure, on food safety and quality aspects and shelf-life, and the design of proper pasteurization processes. Additionally, would like to pursue research work with plants and their biological activities:

1. Effect of non-thermal food pasteurization (e.g. high pressure processing), packaging and storage on food safety and quality.
2. Postharvest technology for fresh and minimally processed fruit, vegetables and herbs: effect of packaging (e.g modified atmosphere packaging) and refrigerated distribution on quality and shelf-life.

Biological activities and nutraceutical characteristics of plant extracts: determination of antioxidant properties and benefits to neurodegenerative and age related diseases such as Alzheimer; determination of antifungal and antibacterial properties.

SELECTED PUBLICATIONS

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Professor Conrad Perera
BSc (Cey); MSc (Mysore) PhD (Oregon St) FNZIFST
Director Food Science Programmes

RESEARCH

Chemistry and technology of processing of food products, with special emphasis on functional foods. Transfer of technology to industry by way of national and international consultancies. Minimal processing of fruit and vegetable products. Functional foods such as soy isoflavones and vitamin D and changes during processing. Development of novel methods of processing including energy efficient methods of drying.

CURRENT PROJECTS

DEHYDRATION
Edible coatings for dried fruit pieces

POSTHARVEST TECHNOLOGY
Study of the effect of 1-Methylcyclopropene on the quality of fresh-cut fruits and vegetables Metabolic Stress Disinfestation and Disinfection as an alternative for Bromide in postharvest.

FOOD CHEMISTRY
Incorporation of functional ingredients into bread and their interactions during bread making. Extraction and chemical modification of fish gelation and functional properties

FUNCTIONAL FOODS
Effect of processing on soy isoflavones, and vitamin D2 from mushrooms and its bioavailability.

SELECTED PUBLICATIONS

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Dr Siew Young Quek
BSc NU, Malaysia, PhD (Birm, UK)
Lecturer in Food Science
Department of Chemistry

RESEARCH

FOOD SCIENCE & FOOD PROCESSING

My primary research interests are in the areas of food science and processing with focus on fats and oils, fruits and seafood as listed below:

LIPID AND ANTIOXIDANT

CLipid and Antioxidant

Characterization of fat and oils from plant and marine sources, stability of fat and oils and their relations to antioxidant and processing methods; antioxidant in plant foods, emulsion properties and stability; roles of sterol and protein on the lipid bilayer of liposome; synthesis of omega 3 fatty acids.

FOOD PROCESSING

Soild-phase microextraction (SPME) and characterization of flavor compounds; quality of food during processing e.g. thermal treatment, high pressure processing and pulse electric field; post-harvest and minimally processing of fruit.

FOOD WASTE UTILISATION

Extraction and separation of bioactives/ functional ingredients such as carotene, omega 3 fatty acids, vitamin E, phenolics and gelatine from food by-products (both seafood and plants); utilisation of food waste for water treatment; biodegradable food packaging/coating from whey protein.

MICROENCAPSULATION OF FUNCTIONAL INGREDIENTS

Microencapsulation of functional food ingredients e.g. phytosterols, omega-3 fatty acids, flavours, essential oils; interaction with food components and their release characteristics.

FUNCTIONAL FOOD PRODUCT DEVELOPMENT

Development of functional foods; sensory evaluation and shelf life of food products; interaction of ingredients and the relation to sensory and physical properties.

SELECTED PUBLICATIONS

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Dr Bronwen Smith
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RESEARCH

The microstructure of plant foods or any food is of special interest particularly the composition of plant cell walls since these comprise a large component of the food we eat and contribute to the texture and fibre component of the diet. The architecture of cell walls remains a challenge as does understanding the effects of its composition in terms of human health. Cell wall integrity is important during fruit ripening and in maintaining fruit and vegetable quality. Understanding the processes of cell wall control is therefore important in determining successful preservation and storage techniques. Food microstructure is also important in understanding the functionality of food components in human health and well-being.

SELECTED PUBLICATIONS

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Dr Ralph Stevenson
MSc(Hons) PhD (Auck), Research Fellow
Auckland Cancer Society Research Centre
Honorary Lecturer in Food Science

RESEARCH

Flavour is a significant component of the overall quality of foodstuffs. Volatile flavour compounds, perceived in the olfactory epithelium, make eating pleasurable and thus may be considered the most important aspect of flavour. Most foods contain several hundred volatile constituents at ppm or ppb levels, and a number of those will contribute to the overall odour/aroma. Our research deals with:

- investigations into the flavour volatiles of dairy products
- investigations into the flavour volatiles in fruit
- developing methods for using new flavour volatile sampling techniques such as solid-phase microextraction (SPME)

SELECTED PUBLICATIONS

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Student services

Academic honesty, cheating and plagiarism

Cheating is viewed as a serious academic offence by The University of Auckland. The University will not tolerate cheating, or assisting others to cheat. Penalties are set by the Discipline Committee of the Senate and may include suspension or expulsion from the University.

What is cheating?

Cheating, in the context of University coursework and examinations, is the act of attempting to gain an unfair advantage by violating the principle that lies behind all University work – that of intellectual and scholarly integrity.

Work students submit for grading – in coursework and examinations – must ultimately be their own work, reflecting each student's learning and performance. To cheat is to be intellectually dishonest by passing off as your own, work that has been done by someone else. It is also unjust in that it devalues the grades and qualifications gained legitimately by other students.

All staff and students have a responsibility to prevent, discourage and report cheating.

Examples of forms of cheating

- Copying from another student during a test or examination, whether or not there is collusion between the students involved.
- Using the work of other scholars or students when preparing coursework and pretending it is your own by not acknowledging where it came from. This is called plagiarism. Course coordinators, lecturers or tutors are the appropriate people with whom you should discuss how to use and acknowledge the work of others appropriately.
- Making up or fabricating data in research assignments, or the writing up of laboratory reports.
- Impersonating someone else in a test or examination, or arranging such impersonation.
- Submitting the same, or a substantially similar, assignment that you have done, for assessment in more than one course.
- Misrepresenting disability, temporary illness/injury or exceptional circumstances beyond one's control, then claiming special conditions.
- Using Material obtained from commercial essay or assignment services, including web-based sources.

Group work

On the whole, the University requires assessment of the work of individual students. On those rare occasions where the work of a group of students is assessed, group members need to make sure that the workload is shared equally. Course coordinators will determine their own procedures for dealing with cases where the final piece of work reflects unequal participation and effort.

Student support

Typically students cheat because they are having difficulty managing workloads, feel that the course content is too difficult or experience difficulties with the language of the course. None of these reasons are justification for cheating. There are many people and services at the University to assist students. Options of people to approach include:

- the course convenor/coordinator, lecturer, tutorial head, lab demonstrator
- Head of Department
- faculty-level official
- Student Learning Centre or Library staff
- AUSA or other students' association representatives
- health and counselling services staff.

Students should also consult the University's major academic referencing resource: www.cite.auckland.ac.nz

The following website provides further information about the key principles and practices underlying academic honesty, and related resources: www.auckland.ac.nz/honesty

Careers

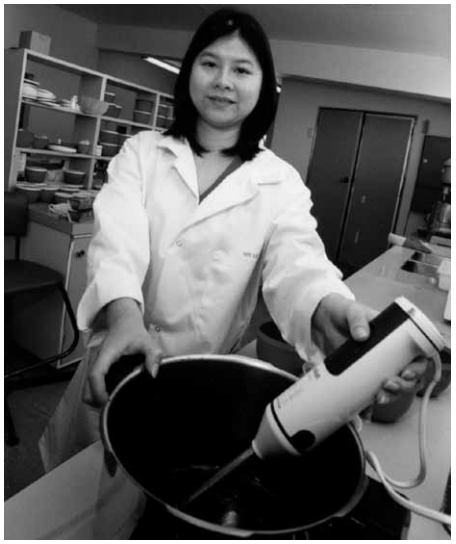
Careers advice

A science degree from The University of Auckland will give you a foundation of knowledge and skills that can lead to a wide range of career opportunities. Our graduates begin their careers in research organisations, local government, central government, universities, commerce and industry, international and community organisations. You may begin your career in a science position, or in a position that is not directly science related but where your science knowledge and skills are of benefit.

University Careers Services can assist you with your career planning and job search throughout the course of your studies. Their website - www.auckland.ac.nz/careers - contains a wealth of invaluable career resources. University Careers Services provides assistance to science students through careers information and advice, job search and career research workshops in the Careers Service, plus seminars and a drop-in service at a variety of times and locations in the Science faculty.

For job vacancies, career events, information on internships and current graduate career opportunities, as well as information about employer presentations on campus, visit www.auckland.ac.nz/careerhub.

University Careers Services is located in The ClockTower, 22 Princes Street, and at Tāmaki Campus. For information about opening hours, please see www.auckland.ac.nz/careers.



My Le Quach *combined Food Science and Biotechnology. She says "these degrees really helped me learn about applied science as opposed to focusing on pure science". She grew up in Mt Roskill and chose to study at The University of Auckland because it was close to home. For My Le the highlights of studying Food Science and Biotechnology at The University of Auckland were being able to complete a broad range of science projects including sensory science and to be able to meet people from the food industry. My Le is working for Old Fashioned Foods where she does the work she enjoys most, which is developing new food products. This gives her the opportunity to combine her knowledge of Food Science with her creative flair. To quote her*

"Do not follow in the footprints of others, go ahead and make your own path and leave a trail".

Selina Banda *works as a consultant on legislation of food products for Cerebos Greggs. With so many challenges occurring because of closer economic ties with Australia in the laws concerning food and food hygiene, the company needs a full time employee to keep them up to date. Selina did her studies in Food Science part time while working as a laboratory technician. For her research project she found ways of keeping fruit bars firm longer while maintaining their natural food ingredients. Selina believes "Success is setting goals for oneself and achieving them. Gaining knowledge is essential to achieve goals that you think may be out of your reach".*

Information Commons

Designed as information hubs, the Information Commons give you computer access and learning support, as well as proving group and individual study areas. You'll find these facilities at our City, Grafton and Epsom campuses.

Use one of the Information Commons computers or laptops to access your coursework through Cecil (the University's e-learning system), send email and browse the Internet, and to complete coursework using MS Office, Adobe Master Collectionand other software. You can retrieve information from the library databases, e-journals, e-books and electronic course materials - including recommended readings. You also have access to printers, scanners and photocopiers. Wireless networking technology is available.

At the Kate Edger Information Commons on the City Campus you will find computer training rooms, the Student Learning Centre, a Disabilities Resource room, the Library's Short Loan service and the English Language Self-Access Centre (ELSAC).

The IC Helpdesks provide walk-in, roaming, email and telephone support with all aspects of student computing resources and services. If you want to develop your IT and information literacy you can attend a training course, use electronic resources on the Library and Information Commons web sites or ask a staff member for help.

Information Commons
Phone: +64 9 373 7599 ext 82333
Email: ichelpdesk@auckland.ac.nz
www.information-commons.auckland.ac.nz

Student Learning Centre

The Student Learning Centre facilitates the development of effective academic learning and performance skills for all students enrolled at the University. Qualified tutors of the Centre provide learning instruction, advice and support through workshops, individual consultations, and online resources.

Skills areas covered include:

- Learning skills, eg, reading, note-taking, learning styles
- Writing skills, eg, question analysis, planning and structuring, summarizing and paraphrasing, referencing, editing.

  - Thinking Skills, eg, critical thinking, constructing arguments

  - Test and exam skills, eg, multi-choice and short answer questions, exam essays, exam sitting strategies

- Self-management skills, eg, time/workload management, motivation, academic assertiveness
- Computer skills, eg, MS Word/Excel/ PowerPoint; SPSS; EndNote
- Mathematics and Statistics support for specific credit courses
- Support for students with English as an Additional Language (EAL), eg, sentence structure, paragraph writing, academic style

The Centre caters for the academic needs of Māori students through its Te Puni Wananga programme, and for the needs of Pacific students through the Fale Pasifika programme. In addition, the SLC has specialist tutors who can provide assessment, instruction, and support for students with specific learning disabilities.

It is necessary to register with the SLC to utilise its services; this costs $10 for the calendar year.

Improve your English language skills

All first-year students are required to undertake an assessment that enables us to identify your level of academic English. This free assessment is available via DELNA.

Diagnostic English Language Needs Assessment (DELNA)

DELNA is only available to students who have accepted a place and enrolled at The University of Auckland. It cannot be used to exclude you from a particular programme and the results do not appear on your academic record.

The screening is a 30 minute compulsory assessment that includes a vocabulary task and a text editing task. It enables us to quickly identify whether or not you need assistance with the demands of academic English. If you do require assistance, you will undertake the second part of the assessment.

You should book your screening assessment during Orientation Week or the first week of semester by going online to: www.delna.auckland.ac.nz/booking

The diagnosis is only necessary if your screening results suggest you need assistance with academic English language skills. This two-hour assessment includes a listening, reading and writing task. It enables us to recommend appropriate English language enrichment options.

If you do need to improve your skills, you will be invited to discuss your needs with the DELNA Language Adviser and guided to sources of effective English language enrichment within the University.

For more information visit
www.delna.auckland.ac.nz

English Language Self Access Centre (ELSAC)

ELSAC is the place where you can:

- Get advice about your particular English language needs for university study
- Use a huge variety of English language resources
- Come any time for as long as you like, Monday to Friday between 9am and 5pm. Visit the ELSAC space, real and virtual, and chat to Siew, Rebecca or Penny — we're all experienced English language teachers.

ELSAC services are free for as long as you are enrolled at The University of Auckland.

ELSAC
Level 1, Kate Edger Information Commons
Phone: +64 9 373 7599 ext 82134
Email: elsac@auckland.ac.nz
For more information visit
www.elsac.auckland.ac.nz

WAVE student support service

The W.A.V.E Department exists to provide a support network, a voice and services to improve the quality of student life at The University of Auckland. W.A.V.E is an acronym to describe the four major areas that the department works in: Student Welfare, Student Advocacy, Student Voice and Student Education.

If a student is unhappy about something at the University or needs help sorting out a problem, the dedicated W.A.V.E. team is there to help.

Welfare

Hardship Grants

If a student need help with food, accommodation, travel or medical costs they can apply for an AUSA Hardship Financial Assistance Grant. The Welfare Officer also provides emergency food parcels for students in need.

Contact: welfare@ausa.or.nz

Parents Space

There is a dedicated kitchen and study area for students to use, with or without your children, at AUSA House on 4 Alfred Street. The resources that are available include; port-a-cot, high chair, change table, TV/Stereo, computer & printer, children's toys & books, kitchen facilities, study spaces and lounge chairs.

Contact: spro@ausa.org.nz

Advocacy

The Student Advocacy team have the skills and dedication to ensure that students are treated fairly and with respect while you study at The University of Auckland. The Student Advocates offer prompt, confidential and quality support to any student who has an academic grievance or any other concern about the University services. We also provide general legal advice on issues within the wider community, such as tenancy and employment.

Contact: wave.manager@ausa.org.nz

Voice

Voice is another term for Student Representation. Student representation exists at all levels throughout the University and is coordinated through the W.A.V.E department. This ensures that students are represented at every level possible at the University. A Class Rep is a student who volunteers at the start of each semester to represent the interests of the students in their courses to the lecturers.

Contact: classreps@ausa.org.nz

Sci-Space

Sci-Space is a friendly, casual drop in centre for students where you will find the Student Resource Centre, Mathematics and Statistics tutorial assistance and a spacious, informal area where you can study or catch up with friends to chat or have a snack.

The Student Resource Centre distributes and sells course books.

Located behind the Student Resource Centre, you will find the Tutorial Assistance Area, a teaching and learning environment for mathematics and statistics students where tutors, identified by their coloured sashes, are available to assist with any difficulties you may have with assignments or understanding lectures. Tutors are usually available between 10.00am and 4.00pm on weekdays during term time. The space, furnished

with round tables, is peer based, promotes student-initiated learning and fosters information sharing.

On the other side of the Student Resource Centre is a large, comfortable area equipped with tables, chairs and a microwave, providing a friendly environment in which to relax between lectures.

You will find Sci-Space in Room G16, Ground Floor Science Centre, Building 303.

VOICE is student representation - Class Reps and students on University committees. WAVE offers class rep training, class party funding, a class rep handbook and quarterly newsletters. They also organize the election, training and support of University Committee Reps. University committees set the direction for The University of Auckland, drafting policy and regulations. You can have your say through student committee reps. Check out their website at www.ausa.org.nz/wave for more details!

The **EDUCATION** Vice President (EVP) acts on wider educational issues that affect you. This may include submissions to the University and to central Government. Their role involves bringing concerns about education matters to the wider community.

WAVE is located in AUSA House, 4 Alfred Street (across from the General Library).

Phone: +64 9 309 0789 ext 251
Email: advocate@auckland.ac.nz
Web: www.auckland.ac.nz/wave

Facilities and support for all students

Refer to the General University Prospectus or the University website **www.auckland.ac.nz** for a more extensive list of services in place for students.

Applications for Aegrotat and Compassionate Consideration

An application may be made for aegrotat or compassionate consideration, by candidates who may have been prevented from being present at an examination, or who consider that their preparation for or performance in an examination has been seriously impaired by temporary illness or injury or exceptional circumstances beyond their control. This also applies to tests, but not assignments.

Application forms are available online, or from the relevant campus University Health Services and Examinations Office.

The application form must be submitted to the University Health Services within one week of the date the examination affected took place, or if more than one examination has been affected, then within one week of the last of those examinations.

Following the decision of Senate on an application of Aegrotat or Compassionate Consideration, a student will be informed in writing of the final decision. If the application is declined, students have four weeks in which to apply for reconsideration of the decision.

Student support services

Service	Location	Phone
Accommodation and Conference Services	O'Rorke Hall, 16 Mount Street	+64 9 373 7599 accom@auckland.ac.nz www.auckland.ac.nz/accommodation
Careers Centre	Room 001, The ClockTower	+64 9 373 7599 ext 88727 careers@auckland.ac.nz www.auckland.ac.nz/careers
Early Childcare Services	28 Park Avenue, Grafton	+64 9 373 7599 ext 85894
Chaplain's Office	18 Princes Street	+64 9 373 7599 ext 87732 chapelsec@auckland.ac.nz
Disability Services	Room 036, The ClockTower (south wing)	+64 9 373 7599 ext 82936 disabilities@auckland.ac.nz
Mediator's Office		+64 9 373 7599 ext 88905 mediation@auckland.ac.nz www.auckland.ac.nz/mediation
Equity Office	Level 1, The ClockTower (East Wing)	+64 9 373 7599 ext 84923 www.eo.auckland.ac.nz
Student Finance	Room 108, The ClockTower	+64 9 373 7599 ext 84422
Health Services (including counselling)	Level 3, Student Commons	+ 64 9 373 7599 ext 87681
Dental Services	Level 3, Student Commons	+64 9 373 7599 ext 83860
International Students' Information Centre	Auckland International Old Choral Hall	+64 9 373 7513 int-questions@auckland.ac.nz www.auckland.ac.nz/international
Recreation Centre	Building 314, 17 Symonds Street	+64 9 373 7599 ext 84788 www.auckland.ac.nz/recreation
Scholarships Office	Room 012, The ClockTower	+64 9 373 7599 ext 87494 scholarships@auckland.ac.nz www.auckland.ac.nz/scholarships
Student Advocacy Network	AUSA House 3 Alfred Street	+64 9 309 0789 ext advocate@auckland.ac.nz www.auckland.ac.nz/wave
Student Information Centre	Room 112, The ClockTower	0800 61 62 63 +64 9 373 7599 ext 88199 studentinfo@auckland.ac.nz
Student Learning Centre	Level 3 Information Commons	+64 9 373 7599 ext 88850 slc@auckland.ac.nz www.slc.auckland.ac.nz
Student loans and allowances	StudyLink	0800 88 99 00 www.studylink.govt.nz
SciSpace	G16, Ground Floor, Building 303	+64 9 373 7599 ext 85510 www.science.auckland.ac.nz/scispace
Students' Association	AUSA, 4 Alfred Street	+64 9 309 0789 ausa@auckland.ac.nz www.ausa.auckland.ac.nz
University Book Shop (UBS)	Kate Edger Building	+64 9 306 2700 www.ubsbooks.co.nz

University Library Te Tumu Herenga

The University Library consists of the General Library and 12 subject-specific libraries with over 2.2 million volumes, a world-class digital library collection, 4700 study spaces with 1100 of those providing access to computer.

General Library

Most science serials are now available electronically. The majority of the science book collection is shelved on Level M where you will also find printed serial collections for biology, marine science, chemistry, computer science, food science, geology, physics, mathematics and statistics. Geography, computer science and psychology serials are shelved with the book collection.

Tāmaki Library has resources in computer science, physics, psychology and sport and exercise science.

Leigh Marine Research Laboratory Library has marine science resources.

Courses, tours and training

Tours and hands-on courses will give you the confidence to use the University Library, its Information Commons service and all its resources. If you are a new student, the following courses are recommended:

- Library and Resources Overview: an introduction to the University Library resources and services.
- Database Searching: how to choose and use databases.
- Uni IT Essentials: covers University IT facilities, Netaccount and NetID, Cecil, Webmail, wireless and other electronic resources.

To book a Library course visit
www.library.auckland.ac.nz/booking

Services

Visit the subject librarians in Science Information Services on level M. Consultation sessions are available during visits made by the Subject Librarian to the Departments.

Other Library services include Ask a Librarian Service, Enquiry Desk, Information Commons Help Desk, Inter-Campus Library Delivery Service, Interlibrary Loan and Document Delivery and the Short Loan Collection.

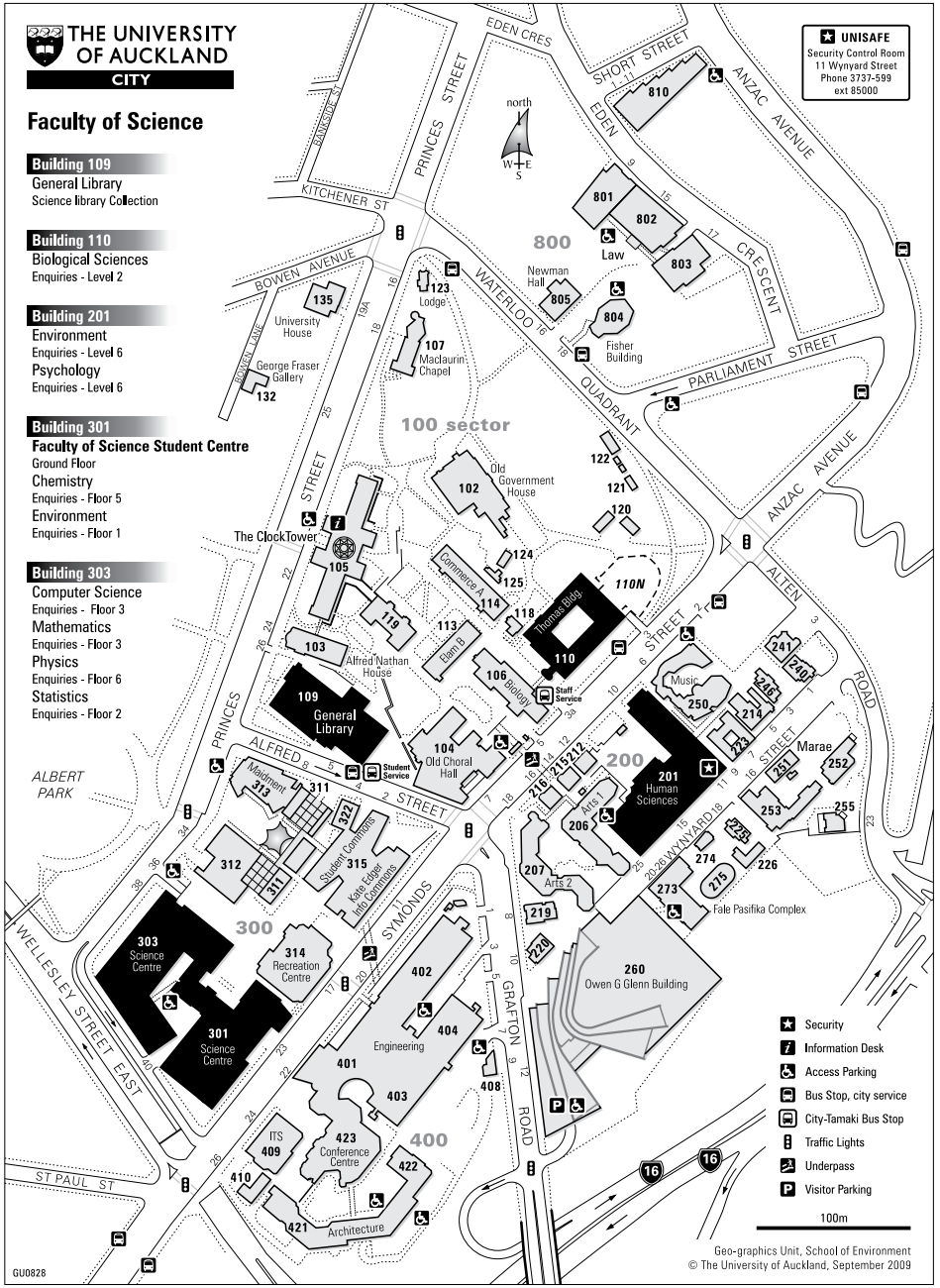
Subject Librarians

Visit the subject librarians in Science Information Services on Level M. Consultation sessions are available during visits made by the Subject Librarian to the Departments.

Borrowing and accessing resources

Your student ID card is your Library card. Use it to access the photocopiers, printers and to borrow items. You also have 24-hour access via the Library website.

General Library
5 Alfred Street, City Campus
Phone: 373 7599 ext 88044
www.library.auckland.ac.nz


THE UNIVERSITY OF AUCKLAND
CITY
Faculty of Science
Building 109
General Library
Science library Collection
Building 110
Biological Sciences
Enquiries - Level 2
Building 201
Environment
Enquiries - Level 6
Psychology
Enquiries - Level 6
Building 301
Faculty of Science Student Centre
Ground Floor
Chemistry
Enquiries - Floor 5
Environment
Enquiries - Floor 1
Building 303
Computer Science
Enquiries - Floor 3
Mathematics
Enquiries - Floor 3
Physics
Enquiries - Floor 6
Statistics
Enquiries - Floor 2
UNISAFE
Security Control Room
11 Wynyard Street
Phone 3737-599
ext 85000
north
EDEN CRES
SHORT STREET
ANZAC AVENUE
PRINCES STREET
KITCHENER ST
BOWEN AVENUE
WATERLOO QUADRANT
PARLIAMENT STREET
CRESCENT
800
Law
Newman Hall
Fisher Building
Lodge
University House
George Fraser Gallery
Maclaurin Chapel
100 sector
Old Government House
The ClockTower
Commerce A
Commerce B
Thomas Bldg
110N
Alfred Nathan House
Biology
Staff Service
Music
Marae
ALTEN ROAD
PRINCES STREET
ALFRED STREET
General Library
Student Service
Old Choral Hall
Human Sciences
Arts 1
Arts 2
ALBERT PARK
Maidment
Student Commons
Kate Edger Info Commons
SYMONDS STREET
WELLESLEY STREET EAST
300
Science Centre
Recreation Centre
Engineering
400
Conference Centre
Architecture
ITS
ST PAUL ST
GRAFTON ROAD
Owen G Glenn Building
Fale Pasifika Complex
WYNYARD
200
Security
Information Desk
Access Parking
Bus Stop, city service
City-Tamaki Bus Stop
Traffic Lights
Underpass
Visitor Parking
100m
Geo-graphics Unit, School of Environment
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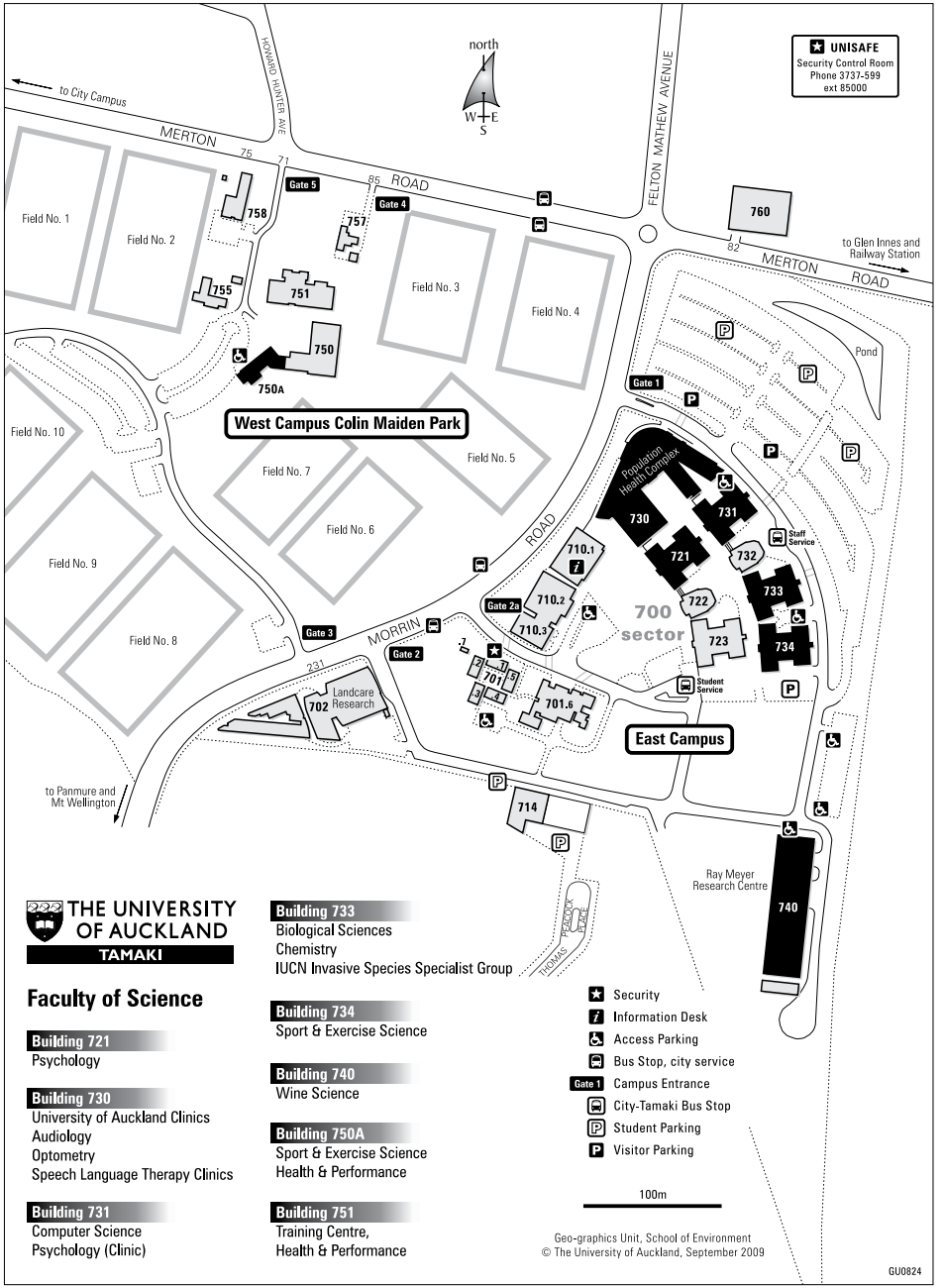
UNISAFE
Security Control Room
Phone 3737-599
ext 85000
north
to City Campus
MERTON ROAD
HOWARD HUNTER AVE
FELTON MATHEW AVENUE
to Glen Innes and Railway Station
Field No. 1
Field No. 2
Field No. 3
Field No. 4
Field No. 5
Field No. 6
Field No. 7
Field No. 8
Field No. 9
Field No. 10
Gate 1
Gate 2
Gate 2a
Gate 3
Gate 4
Gate 5
West Campus Colin Maiden Park
Pond
Population Health Complex
730
731
732
721
722
733
734
723
700 sector
710.1
710.2
710.3
701
701.6
Staff Service
Student Service
East Campus
MORRIN ROAD
Landcare Research
702
to Panmure and Mt Wellington
714
740
Ray Meyer Research Centre
THOMAS BLOCK PLACE
THE UNIVERSITY OF AUCKLAND
TAMAKI
Faculty of Science
Building 721
Psychology
Building 730
University of Auckland Clinics
Audiology
Optometry
Speech Language Therapy Clinics
Building 731
Computer Science
Psychology (Clinic)
Building 733
Biological Sciences
Chemistry
IUCN Invasive Species Specialist Group
Building 734
Sport & Exercise Science
Building 740
Wine Science
Building 750A
Sport & Exercise Science
Health & Performance
Building 751
Training Centre,
Health & Performance
Security
Information Desk
Access Parking
Bus Stop, city service
Campus Entrance
City-Tamaki Bus Stop
Student Parking
Visitor Parking
100m
Geo-graphics Unit, School of Environment
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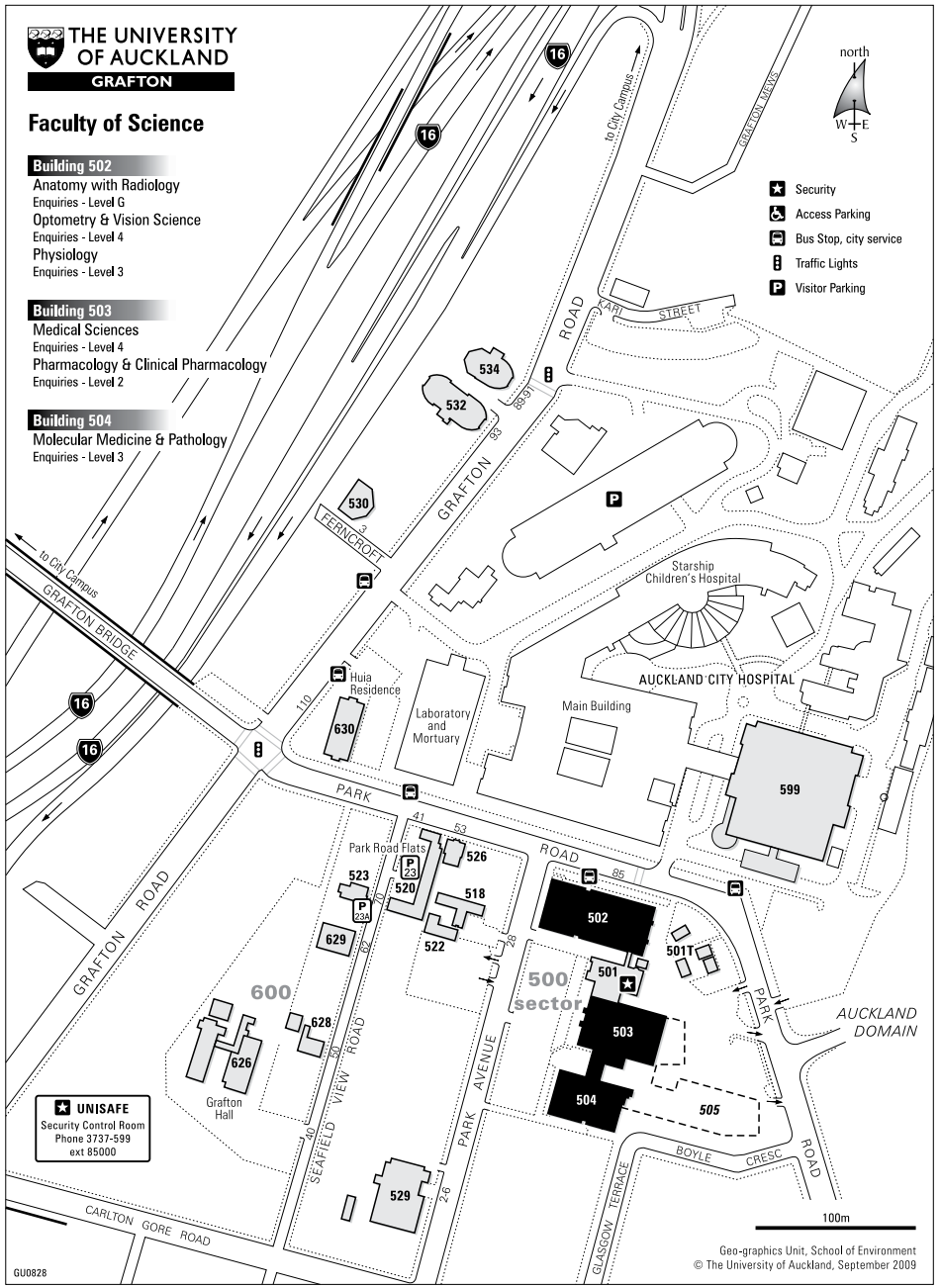
THE UNIVERSITY OF AUCKLAND
GRAFTON
Faculty of Science
Building 502
Anatomy with Radiology
Enquiries - Level G
Optometry & Vision Science
Enquiries - Level 4
Physiology
Enquiries - Level 3
Building 503
Medical Sciences
Enquiries - Level 4
Pharmacology & Clinical Pharmacology
Enquiries - Level 2
Building 504
Molecular Medicine & Pathology
Enquiries - Level 3
north
Security
Access Parking
Bus Stop, city service
Traffic Lights
Visitor Parking
to City Campus
GRAFTON BRIDGE
GRAFTON ROAD
PARK ROAD
CARLTON GORE ROAD
SEAFIELD VIEW ROAD
PARK AVENUE
BOYLE CRESC
GLASGOW TERRACE
FERNCROFT
CARI STREET
GRAFTON MEWS
Starship Children's Hospital
AUCKLAND CITY HOSPITAL
Main Building
Laboratory and Mortuary
Huia Residence
Park Road Flats
Grafton Hall
AUCKLAND DOMAIN
500 sector
600
UNISAFE
Security Control Room
Phone 3737-599
ext 85000
100m
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Notes