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Faculty of Science  
Handbook



University of Technology, Sydney

1997

***Faculty of  
Science  
Handbook  
1997***

The University attempts to ensure that the information contained in this handbook is correct as at 2 December 1996. The University reserves the right to vary any matter described in the handbook at any time without notice.



**University of Technology, Sydney**

**Equal opportunity**

It is the policy of the University of Technology, Sydney to provide equal opportunity for all persons regardless of sex, race, marital status, family responsibilities, disability, sexual preference, age, political conviction or religious belief.

**Free speech**

The University supports the right to freedom of speech and the rights of its members to contribute to the diversity of views presented in our society.

**Non-discriminatory language**

UTS has adopted the use of non-discriminatory language as a key strategy in providing equal opportunity for all staff and students. Guidelines for the use of non-discriminatory language have been developed and all members of the University community are encouraged to use them.

**Editorial and production:**

Publications Branch,  
Corporate Responsibilities Unit

**Cover design:**

External Relations Unit

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# **General University information**

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## **PREFACE**

Welcome to the University of Technology, Sydney (UTS), the fourth largest university in New South Wales. UTS has a reputation for delivering quality higher education that meets the needs of the professions, the technologies and the community. It is a multicampus university operating at three major locations in the Sydney metropolitan area – Broadway, Kuring-gai and St Leonards – and offering over 80 undergraduate and 200 postgraduate courses to nearly 22,000 students.

The main work of course development and delivery at UTS is carried out by the Faculties of Business; Design, Architecture and Building; Education; Engineering; Humanities and Social Sciences; Law; Mathematical and Computing Sciences; Nursing; and Science; and the Institute for International Studies. Each of these is responsible for a range of programs across a number of key disciplines.

Every year UTS produces 10 faculty/institute handbooks containing information about all the courses and subjects offered at UTS, and including details of course content, attendance patterns, credit point requirements and combined degrees, plus important faculty and student information.

These handbooks are part of a suite of publications which includes the *UTS Calendar* and the postgraduate and undergraduate student handbooks. The *UTS Calendar* contains the University Act, By-law and Rules, a list of courses offered at the University, and other useful University information. Copies are held in the University's libraries and faculty offices, and may be purchased at the Co-op Bookshop. The student handbooks contain general information about application procedures, academic progression, assistance schemes, and services and facilities offered to students. You will be given a free copy of one of these when you enrol.

If you need more information about the University or its courses, you can contact the UTS Information Service or your faculty office. The University provides a whole range of services for students, and there are plenty of qualified people here to give you help and advice.

We hope you enjoy your time as a student at UTS, and wish you well in your studies.

## ADDRESSES AND TELEPHONE NUMBERS

### University of Technology, Sydney

#### Postal address

PO Box 123  
Broadway  
NSW 2007 Australia

#### Telephone

(02) 9514 2000  
International: +61 2 9514 2000  
Fax: (02) 9514 1551

#### World Wide Web

<http://www.uts.edu.au>

#### City campus

##### Broadway

- Building 1 (Tower Building)  
1 Broadway, Ultimo
- Building 2  
1 Broadway, Ultimo
- Building 3 (Bon Marche Building)  
Cnr Harris St and Broadway, Ultimo
- Building 4  
Cnr Thomas St and Harris St, Ultimo
- Building 6  
702–730 Harris St, Ultimo
- Broadway Terraces  
9, 11 and 13 Broadway, Ultimo
- Magic Pudding Childcare Centre  
Thomas St, Ultimo

##### Haymarket

- Building 5  
Cnr Quay St and Ultimo Rd, Ultimo

##### Blackfriars

- Cnr Blackfriars St and Buckland St,  
Chippendale
- Blackfriars Childrens Centre  
Buckland St, Chippendale

#### Smail Street

- 3 Smail St, Ultimo

#### Wembley House

- 839–847 George St, Sydney

#### Harris Street

- 645 Harris St, Ultimo

#### Student housing

- Bulga Ngurra  
23–27 Mountain St, Ultimo
- Geegal  
82–84 Ivy St, Ultimo

#### Kuring-gai campus

- Eton Rd, Lindfield  
(PO Box 222, Lindfield NSW 2070)

#### St Leonards campus

- Dunbar Building  
Cnr Pacific Highway and  
Westbourne St, Gore Hill
- Clinical Studies, Centenary Lecture  
Theatre and West Wing  
Reserve Rd, Royal North Shore Hospital
- Gore Hill Research Laboratories  
Royal North Shore Hospital

#### Yarrawood conference and research centre

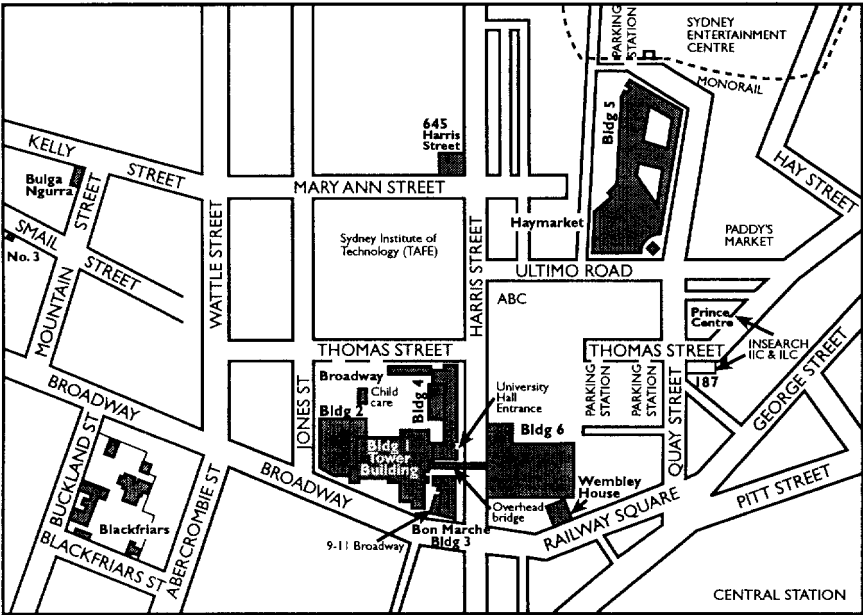
- Hawkesbury Rd  
Yarramundi NSW 2753

#### Stroud Field Station

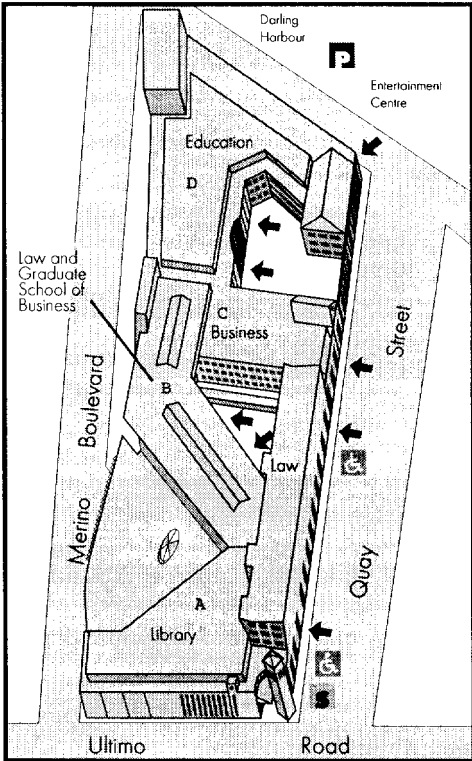
- Lot AFP 161894  
The Bucketts Way  
Booral NSW 2425

# CAMPUS MAPS

## City campus



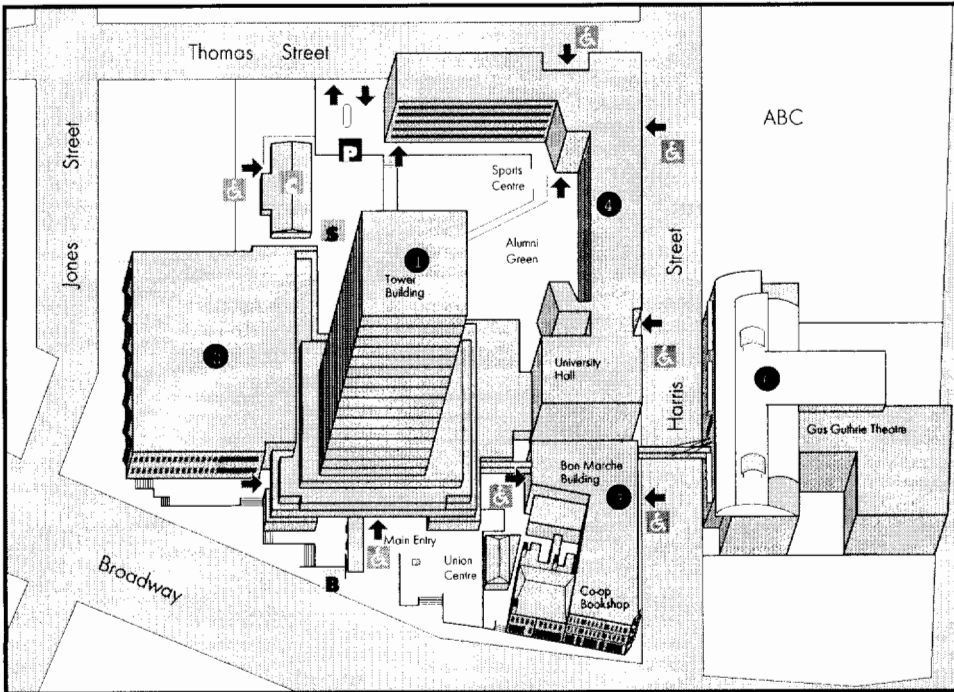
## Haymarket



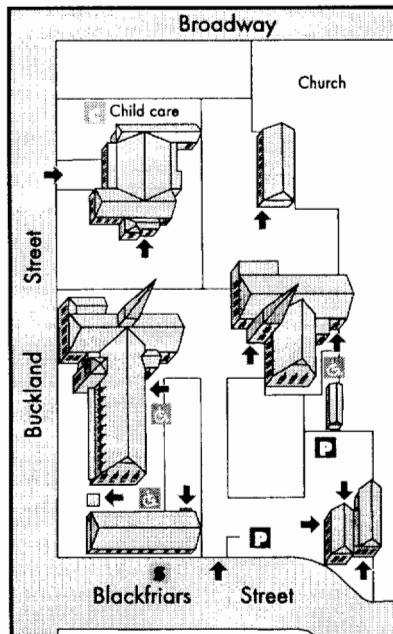
KEY	
	Entry/Exit
	Disabled access
	Main bus stop
	UTS shuttle bus
	Parking
	Building numbers
	Child care



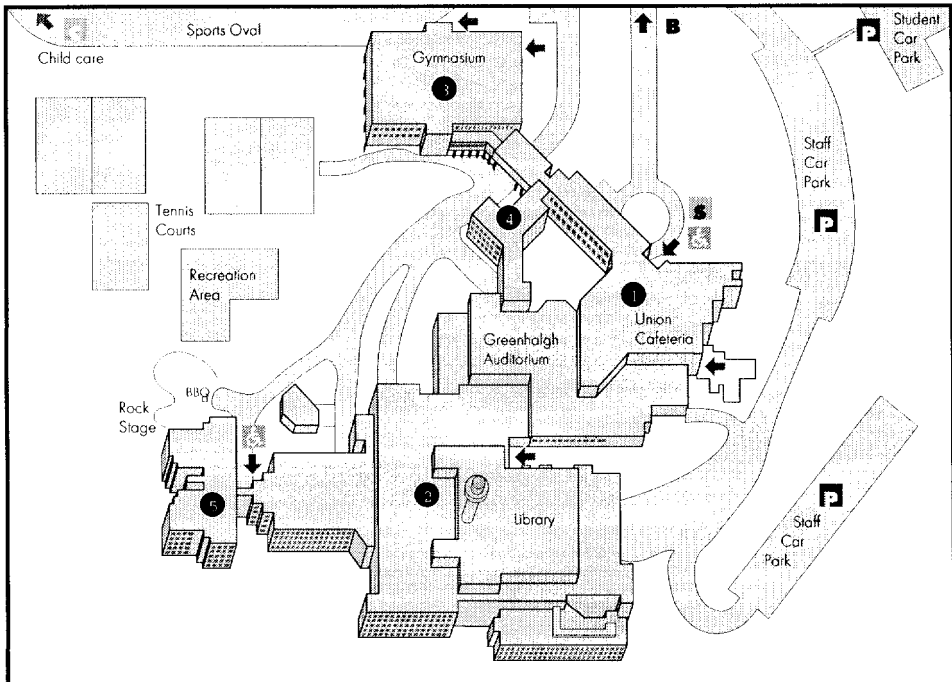
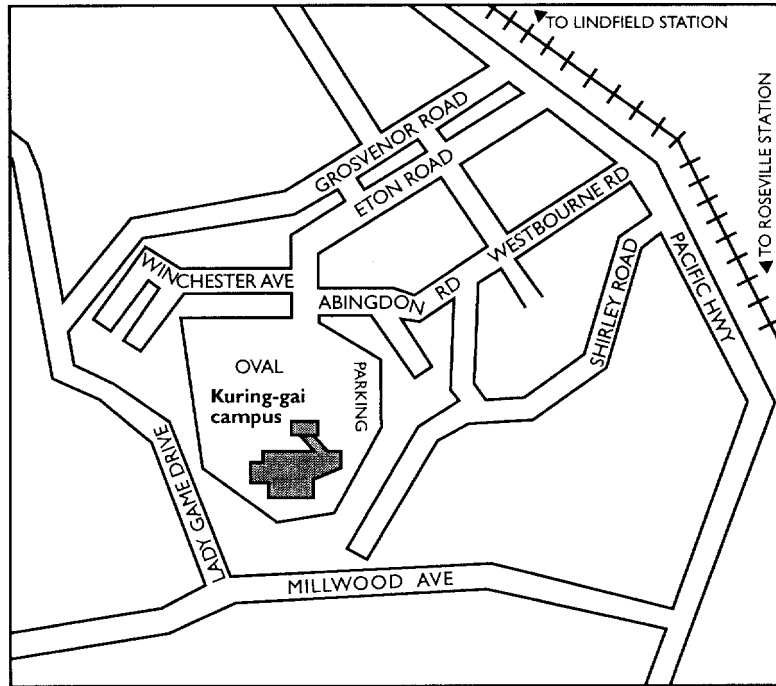
### Broadway



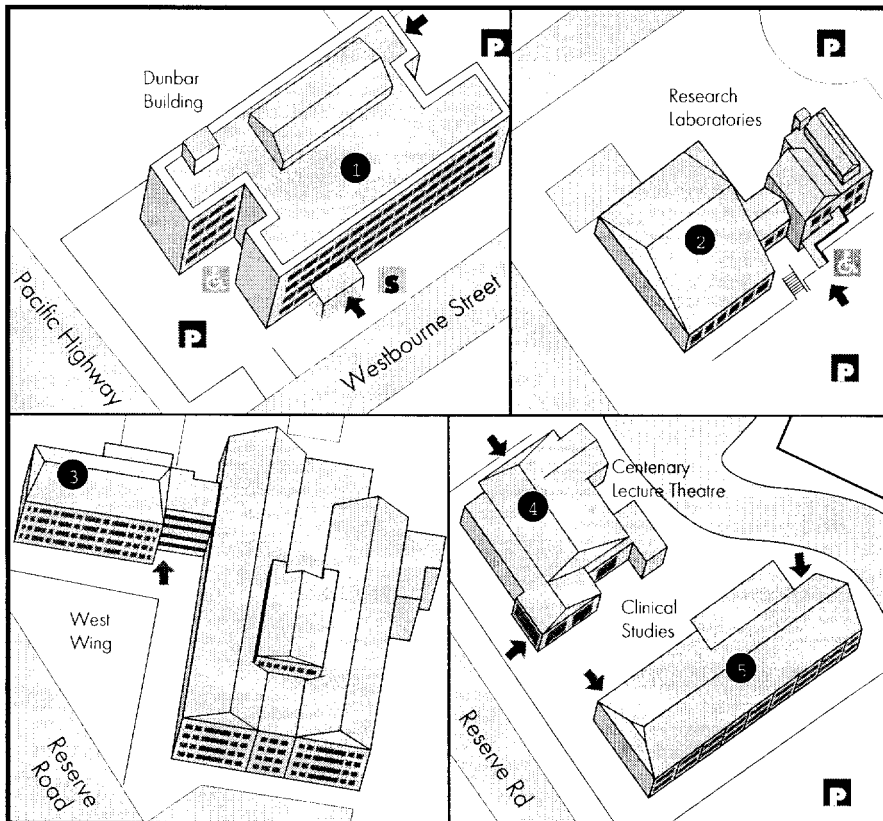
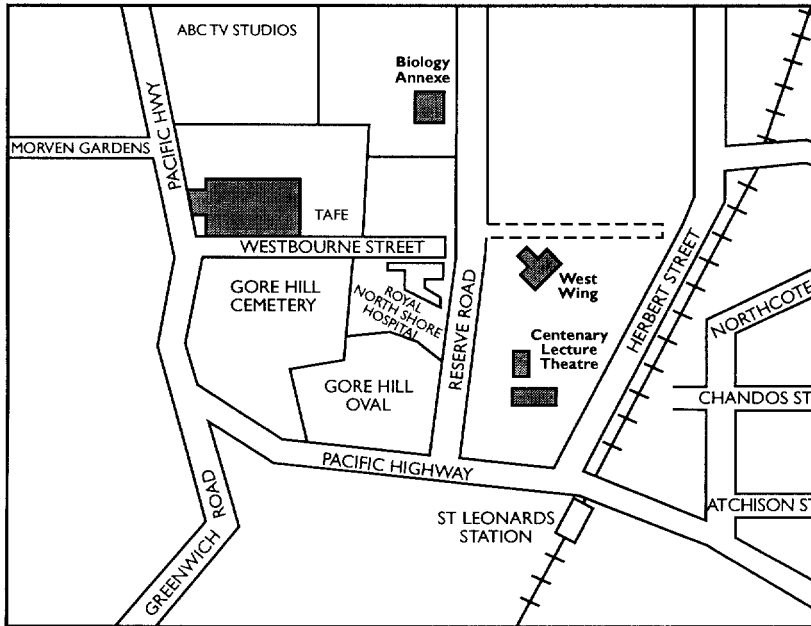
### Blackfriars



### Kuring-gai campus



### St Leonards campus



## APPLYING FOR UTS COURSES

### Undergraduate

Applications for the majority of those undergraduate courses which start at the beginning of each year must be lodged through the NSW and ACT Universities Admissions Centre (UAC) between August and October. Please check the application requirements in the *UAC Guide*, as some of these courses close for applications at the end of September. Some courses are also available by direct application to UTS. These are usually courses that are not available to school leavers.

A small number of UTS courses also start in the middle of the year. Applications for these should be made direct to UTS in May.

Contact the UTS Information Centres for more information.

### Postgraduate

Applications for postgraduate courses should be made direct to UTS. For courses starting at the beginning of the year, most applications are open from August to October, but some may have earlier closing dates. For courses

starting in the middle of the year, applications close in May.

Contact the UTS Information Centres for more information.

### Non-award and External Award study

Non-award and External Award study allows individuals and students from other universities to study single subjects at UTS. There are four application periods, and closing dates are different for each of the semesters. Some faculties may have special application procedures which will vary depending on the subjects chosen.

Contact the UTS Information Centres for more information.

### International students

International students need to satisfy the normal UTS entry requirements and be proficient in English. For details on courses, fees and application procedures, contact International Programs.

## UTS INFORMATION CENTRES

Street address	Postal address	Telephone/Fax
<i>City campus</i>		
Foyer, Tower Building 1 Broadway	UTS Information Service PO Box 123 Broadway NSW 2007	Telephone: (02) 9514 1222 Fax: (02) 9514 1200
<i>Kuring-gai campus</i>		
Level 5 or 6, Main Building Eton Road Lindfield	Kuring-gai Student Centre PO Box 222 Lindfield NSW 2070	Telephone: (02) 9514 5555 Fax: (02) 9514 5032
<i>International Programs</i>		
Level 5, Tower Building 1 Broadway	International Programs PO Box 123 Broadway NSW 2007	Telephone: (02) 9514 1531 Fax: (02) 9514 1530
<i>E-mail inquiries</i>		
Within Australia – <a href="mailto:info.office@uts.edu.au">info.office@uts.edu.au</a>		
International – <a href="mailto:intlprograms@uts.edu.au">intlprograms@uts.edu.au</a>		

## PRINCIPAL DATES FOR 1997

### Autumn semester

#### January

- 7 Release of HSC results
- 10 Formal supplementary examinations for 1996 Spring semester students
- 10 Closing date for changes of preference to the Universities Admissions Centre (UAC) from 1996 NSW and ACT HSC applicants
- 21–28 Enrolment of students at City campus
- 24 Main Round of offers to UAC applicants
- 27 Australia Day – public holiday
- 29–31 Enrolment of new undergraduate students at City campus (and 3 February till noon)
- 31 Public school holidays end

#### February

- 3 Enrolment of new undergraduate students at City campus till noon (and 29–31 January)
- 3–26 Enrolment of students at City campus

#### March

- 3 Classes begin
- 14 Last day to enrol in a course or add subjects
- 27 Last day to apply for leave of absence without incurring student fees/charges<sup>1</sup>
- 27 Last day to withdraw from a subject without financial penalty<sup>1</sup>
- 28 Public school holidays begin
- 28 Good Friday – public holiday
- 31 HECS census date
- 31 Easter Monday – public holiday
- 31 Vice-Chancellors' Week (non-teaching) begins

#### April

- 1 Graduation period begins
- 4 Public school holidays end
- 4 Vice-Chancellors' Week (non-teaching) ends
- 11 Last day to withdraw from a course or subject without academic penalty<sup>1</sup>
- 24 Provisional examination timetable available

- 25 Anzac Day – public holiday
- 30 Last day to apply to graduate in Spring semester 1997

#### May

- 1 Applications available for undergraduate courses
- 6 Applications available for postgraduate courses
- 9 Graduation period ends
- 16 Examination Masters due
- 30 Final examination timetable available
- 30 Closing date for undergraduate and postgraduate applications for Spring semester

#### June

- 9 Queen's Birthday – public holiday
- 13 Last teaching day of Autumn semester
- 14–30 Formal examination period (and 1–4 July)
- 30 Public school holidays begin

#### July

- 1–4 Formal examination period (and 14–30 June)
- 4 Autumn semester ends
- 7–11 Vice-Chancellors' Week (non-teaching)
- 11 Public school holidays end
- 14–18 Formal alternative examination period for Autumn semester students
- 25 Release of Autumn semester examination results
- 28 Formal supplementary examinations for Autumn semester students
- 30–31 Enrolment of new and readmitted students and students returning from leave/concurrent study (and 1 August)

#### August

- 1 Enrolment of new and readmitted students and students returning from leave/concurrent study (and 30–31 July)
- 1 Applications available for undergraduate and postgraduate courses for Autumn semester 1998

## Spring semester

### August

- 4 Classes begin
- 8 Last day to withdraw from full year subjects without academic penalty<sup>1</sup>
- 15 Last day to enrol in a course or add subjects
- 29 Last day to apply for leave of absence without incurring student fees/charges (Spring enrolments only)<sup>1</sup>
- 29 Last day to withdraw from a subject without financial penalty<sup>1</sup>
- 29 Last day to apply to graduate in Autumn semester 1998
- 31 HECS census date

### September

- 12 Last day to withdraw from a course or subject without academic penalty<sup>1</sup>
- 26 Provisional examination timetable available
- 29 Public school holidays begin
- 29 Graduation period begins
- 29 Vice-Chancellors' Week (non-teaching) begins
- 30 Closing date for undergraduate applications via UAC (without late fee)
- 30 Closing date for postgraduate applications (some courses may have a later closing date)
- 30 Closing date for inpUTS Special Admission Scheme applications

### October

- 3 Graduation period ends
- 3 Vice-Chancellors' Week (non-teaching) ends
- 6 Labour Day – public holiday
- 10 Public school holidays end
- 17 Examination Masters due
- 31 Final examination timetable available
- 31 Closing date for undergraduate applications via UAC (with late fee)
- 31 Closing date for undergraduate applications direct to UTS (without late fee)

- 31 Closing date for Australian Postgraduate Award (research & coursework), the R L Werner and University Doctoral Research Scholarships

### November

- 14 Last teaching day of Spring semester
- 15–28 Formal examination period (and 1–5 December)

### December

- 1–5 Formal examination period (and 15–28 November)
- 5 Spring semester ends
- 15–19 Formal alternative examination period for Spring semester students
- 19 Release of Spring semester examination results
- 22 Public school holidays begin

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<sup>1</sup> HECS/postgraduate course fees will apply after the HECS census dates (31 March and 31 August or last working day before).

**Note:** Information is correct as at 28 October 1996. The University reserves the right to vary any information described in Principal Dates for 1997 without notice.

# ***Faculty information***

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## **MESSAGE FROM THE DEAN**

The Faculty of Science comprises several departments in the biological and biomedical sciences and in the physical sciences. It is housed on two campuses, City and St Leonards.

The Faculty offers 23 undergraduate degree programs, Master's and PhD programs by research, and several graduate coursework programs including eight Master's degrees by coursework. The Faculty also provides teaching for several other faculties of the University. The Faculty ensures that its educational services are available to students from a diversity of backgrounds and offers full- and part-time study patterns that facilitate progress through its courses.

Teaching innovations in the Faculty include an inquiry/discovery approach to laboratory teaching in several areas, increasing use of multimedia technology and extensive use of computers for modelling and simulation.

The Faculty is proud of its strength in research. It wins over half of the competitive grants awarded to the University and is a major partner in two Cooperative Research Centres. Much of the Faculty's research is focused on the activities of its research centres and units. This concentration of research has enabled the Faculty to significantly improve the quality of its laboratories and its major equipment in recent years, to the obvious benefit of our students.

If you are a new student I welcome you to the Faculty, and wish you a challenging, inspiring and rewarding stay with us as you undertake your studies. The graduates you will join in a few short years have a very high reputation with Australian industry and the professions.

***Professor Tony Moon***  
***Dean***

## **FACULTY MISSION STATEMENT**

The purpose of the Faculty is to provide the highest quality graduate and postgraduate professional education and training to meet the needs of Australian industry and science; and to engage in research and allied professional scientific activities to bring economic and social benefits to the Australian and international community.

Its vision is to become a leading science faculty, recognised nationally and internationally for the quality of its teaching, research and community service programs. The Faculty has developed its reputation by producing Bachelor's and higher degree graduates who meet the needs of Australian industry and the professions, and by establishing strong links with Australian industry through cooperative education, research and development.

## FACULTY OF SCIENCE

The Faculty of Science has established a sound tradition of providing quality teaching, research and consultancy.

The Faculty consists of several departments in biological and biomedical sciences as well as in physical sciences. The Departments of Applied Geology, Applied Physics, Chemistry and Materials Science as well as the main Faculty Office are located at the City campus. The St Leonards campus houses the Departments of Cell and Molecular Biology, Environmental Biology, and Horticulture, and a Dean's office. The Department of Health Sciences works on both campuses while operating the College of Acupuncture on Harris Street and running the Acupuncture Clinic on Broadway.

The Faculty provides high quality professional education in physical, biological and biomedical sciences, and engages in high level research, scholarship and other community service activities in support of the UTS mission, with a view to bringing social and economic benefit to the Australian community.

The Faculty offers a number of graduate and Honours degree programs developed to produce graduates for professional and vocational practice with an ability to continue their studies by research and to contribute to the knowledge base of their scientific discipline. Bachelor of Applied Science and Honours programs are offered in chemistry, chemistry/forensic science, physics, geology and materials science. Bachelor of Science and Honours programs are offered in biomedical science, biotechnology, medical science, environmental biology and urban horticulture. Bachelor of Health Science and Honours programs are offered in acupuncture and Chinese herbal medicine. Many of the degrees offered by the Faculty include a mandatory period of industrial training.

The Faculty is involved in the teaching of science to other faculties, including Engineering and Nursing. The Faculty is also involved in offering three joint undergraduate degree programs:

- The Bachelor of Science in Science Education program was first introduced at UTS in 1991 and is offered jointly with the Faculty of Education. The course is unique in that it combines three-and-a-half years of full-time academic studies in science and education together with six

months of industrial training in a scientific discipline plus periods of teaching practice. The combination of academic subjects together with the industrial training means that secondary school teachers will be far better equipped to advise students on career options in industry.

- The BSc LLB combined degree is offered in conjunction with the Faculty of Law. While the standard program is aimed primarily at producing graduates with a strong general background in science who wish to work in areas such as environmental law or mining law, the opportunity also exists for students to undertake specialised studies in certain areas of science. The special strands are designed to enable graduates to obtain recognition in relevant professional fields.
- The combined degree Bachelor of Health Science in Acupuncture/Bachelor of Arts in International Studies will be offered to provide acupuncture students with greater exposure to, and understanding of, China's culture and a working knowledge of Chinese. The program will make it easier for acupuncture graduates to practise outside Australia.
- The Bachelor of Applied Science in Physics and Bachelor of Engineering in Electrical Engineering double degree program, offered for the first time in 1997, will harness the best aspects of the scientific and professional areas to produce new kinds of graduate practitioners for industry and research.

In the postgraduate area, the Faculty offers PhD and Master's degrees (by thesis), Master of Science programs (by coursework), Graduate Diplomas, and Graduate Certificates. Prospective students should discuss possible topics of research with the head of the appropriate department in the first instance. The research programs may be carried out on either a full-time or a part-time basis and it is permissible for part-time students to undertake a portion of their research at a site external to UTS, provided an appropriate external supervisor can be appointed. Details of current research in progress can be obtained from the office of the Associate Dean (graduate and research programs).



The Faculty has a strong record of research and development, essential to the strength of both undergraduate and postgraduate programs. Competitive research funding is obtained across a wide range of areas of expertise. The Faculty wins almost half of the competitive grants awarded to the University and is a major partner in two Cooperative Research Centres, namely Cardiac Technology and Aquaculture. Much of the Faculty's research focuses on the activities of its research centres and units, including the Centre for Ecotoxicology (run jointly with the Environment Protection Authority), the Institute for Coastal Resource Management, the Centre for Materials Technology, the National Centre for Groundwater Management and the Centre for Biomedical Technology. This concentration of research has enabled the Faculty to improve significantly the quality of its major equipment in recent years, to the obvious benefit of its students. In research, the areas targeted for future development include forensic science and environmental management.

In the development of all of the above programs the Faculty is assisted by appropriate advisory committees with members drawn from the wider community. The courses are regularly reviewed to ensure currency and relevance to industrial and commercial practice.

The Faculty has always maintained strong links with industry. Staff members maintain contact with industry by undertaking appropriate research and consulting activities. In some of the above undergraduate courses students spend six to 12 months working in a relevant industry. In cases where industrial training is a requirement of the course, the Faculty provides assistance to students in finding these paid industrial training positions.

Most programs referred to above are available on either a full-time or part-time basis or a combination of both these attendance patterns.

## UNITS WITHIN THE FACULTY

Much of the Faculty's research is focused in the activities of several research centres, institutes and units. The Faculty also runs the College of Acupuncture and administers a clinic. Details of the centres, institutes and the College of Acupuncture can be found on the following pages. The units in the Faculty are as follows:

### Immunobiology Unit

The Immunobiology Unit was established in 1989 as a multidisciplinary laboratory undertaking research into basic and applied aspects of the immune system. The Unit pursues active research and postgraduate training programs in the fields of toxicology, antibody engineering, lymphocyte development and malignancy, and immunophylogeny. These research projects are supported by grants from external agencies such as the ARC and NHMRC, and by commercial research contracts with industry partners.

### Molecular Parasitology Unit

The Molecular Parasitology Unit was established in 1991 as a laboratory investigating evolution, taxonomy, differentiation and diagnosis of micro-organisms based on molecular methods. Its research objective is to generate and compare gene sequences. The Unit has an international reputation in this area, and trains visiting overseas researchers and students, in addition to providing high quality postgraduate training in molecular biology research to local scientists and students. The Unit is multidisciplinary, relying on molecular techniques developed, used and taught in the Department of Cell and Molecular Biology, and mathematical analyses and computing practices undertaken in the Department of Environmental Biology and Horticulture.

### Molecular Genetics Unit

The Molecular Genetics Unit was established in the Department of Cell and Molecular Biology as a focus for basic and applied molecular biology research. Research areas include X chromosome inactivation, gene therapy (diabetes), multidrug resistance (prokaryotic and eukaryotic) and gene regulation of plant senescence and stress.

### **Neurobiology Unit**

The Neurobiology Unit was established in 1973 within the Department of Cell and Molecular Biology. It now carries out research into the effect of emotional states on cancer recurrence and laboratory-based research on multidrug resistance in cancer. The unit is funded through donations by the community and business sectors.

### **College of Acupuncture**

The UTS College of Acupuncture was established in 1994, founded upon the experience and educational expertise of Acupuncture Colleges (Australia). In 1995, the College was incorporated into the Faculty of Science as part of one of its departments. With 25 years' experience, Acupuncture Colleges (Australia) previously offered diploma and Bachelor's programs accredited by the New South Wales Ministry of Education. The decision to transfer acupuncture education to the University was in accord with the growth in acceptance and use of acupuncture in Australia, and the need to provide a standard of education at a level expected by the community.

The Faculty of Science offers a 3.5-year full-time undergraduate degree in Health Science Acupuncture. Facilities do not yet exist for offering this course on a part-time basis. In addition to the undergraduate degree, the Faculty offers a Graduate Diploma in Musculoskeletal Acupuncture as well as a Graduate Diploma in Clinical Acupuncture. The Faculty also offers a Master of Science (Acupuncture) by research and intends to establish an acupuncture Master's (by coursework) program over the next few years.

The Faculty administers a clinic which offers acupuncture services to the community and also functions in the training of acupuncture students. This clinic operates from a shop front on Broadway and members of the public can use its services for a fee.

In the development of all programs, the Faculty is assisted by advisory committees comprised of members of the education, health and acupuncture professions. The courses and specific subjects are also under ongoing review and development to ensure their relevance to acupuncture practice.

The Faculty benefits from close links with the Universities of Traditional Medicine in China and the Acupuncture Unit at the Victoria University of Technology. Through an

affiliation with the Guangzhou University of Traditional Chinese Medicine, undergraduate students are offered an optional one-month hospital internship in China which carries credits towards the clinical component of the degree program.

All course inquiries should be directed to: Mr Bob Hayes, at the UTS College of Acupuncture, 4/645 Harris Street, Ultimo 2007, telephone: 9514 2500.

## **CENTRES AND INSTITUTES**

### **Centre for Biomedical Technology**

The Centre for Biomedical Technology is a multifaculty and interdisciplinary research centre with a network of researchers from the Faculties of Science, Engineering, Mathematical and Computing Sciences, Nursing and Business. It integrates the University's diverse expertise and resources to enhance the scientific and technological base for the biomedical technology industry, government and health care providers. It aims to facilitate and coordinate biomedical technology research, promote continuing education in the field, develop medical devices and provide consultation to the biomedical technology industry. Research programs are in the areas of cardiac electrophysiology and technology, medical imaging, biomathematical modelling, medical instrumentation, diabetes and nursing-technology interface. The Centre is a key participant in the Cooperative Research Centre for Cardiac Technology.

The Centre provides expertise and facilities for postgraduate training and research programs for postdoctoral researchers, academic staff and students. Staff conduct teaching in medical physics, bioengineering, biomathematics, clinical measurement and physiology. The Centre offers Graduate Certificates, Master of Science (by coursework) degrees in Medical Physics and Clinical Measurement, Master's (by thesis) and Doctorate programs.

### **Centre for Ecotoxicology**

This Centre is a joint enterprise of UTS and the NSW EPA, and is located in the St Leonards campus of the University. The aims of the Centre are to promote education, research and information transfer in the field of ecotoxicology. This is a newly emerging discipline that has arisen as a result of the

dependence of modern society on the use of chemicals. It is a meeting point of chemistry and biology – the study of the impacts of chemicals and mixed effluence on communities in affected areas.

The Centre coordinates research programs at Honours, Master's and Doctoral levels, and also offers Master's, Graduate Diplomas and Graduate Certificates by coursework in environmental toxicology. Teaching and research supervision involve a collaboration of both the UTS and EPA staff. The research work of the Centre involves consultation with industry and government in identifying areas in which investigation is needed on the impact of chemicals on native flora and fauna under Australian climatic and other environmental conditions. A foundation of scientific knowledge is required in order to ensure the development of appropriate environmental quality guidelines for this continent.

The University arm also offers an independent investigative and testing service for industry, through the UTS consulting company, Insearch Limited.

### **Centre for Materials Technology**

The Centre for Materials Technology offers expertise, education, instrumentation and innovation in the areas of materials science and engineering. Its aim is to offer to industry and government a collaborative and multidisciplinary approach to research, development, manufacturing and problem solving for the technological and economic benefit of Australian industry.

The main functions of the Centre are to assist staff teams to obtain government and industrial research grants; make facilities and expertise available for industry and government; establish postgraduate research scholarships and research assistantships; coordinate multidisciplinary research investigations; undertake consultancy; assist relevant professional institutes to organise conferences and colloquia; present regular postgraduate and postcertificate courses; present in-house high-tech training courses for industry; present research and development seminars; develop products and devices of high quality; and provide expertise in applications and design using CAD/CAM. The Centre has been most successful in obtaining external funding for research into conducting polymers, applications of piezoelectric devices and new carbon materials.

### **Centre for Science Communication**

The aims and objectives of the Centre for Science Communication are to promote the public understanding of science and technology; organise and develop undergraduate and postgraduate courses in science communication; organise information programs on science and technology for schools; coordinate research into science communication; and promote UTS as one of Australia's leading technological institutions.

There are several programs under development, including the 'Horizons of Science' forums for the media, communication workshops for research workers, production of a booklet on biotechnology, public lectures with media briefings and a media and schools resource service. The Centre is located in Building 2, City campus.

### **Cooperative Research Centre for Aquaculture**

The Cooperative Research Centre for Aquaculture commenced operating early in 1994 and includes participants from six universities, including UTS, seven other research institutions and a number of commercial groups. The Federal Government has funded six of the research programs and UTS is involved in two of them, namely the Health Protection and Maintenance Program and the Production Efficiency and Environmental Management Program.

The Directorship of the Cooperative Research Centre is located at Broadway in the City Campus. It is linked with the University through the Office of the Pro-Vice-Chancellor (Research), the Research Office and several units throughout the University, such as the Library, the External Relations Unit and the School of Computing Sciences.

The Health Protection and Maintenance Program has been funded to support two projects and both project leaders are located in the Dunbar Building at Gore Hill. One of the projects, being carried out by the Department of Microbiology, aims to develop a method for the rapid recognition of bacteria pathogenic to fish by the use of molecular techniques; the other, being carried out by the Department of Pathology and Immunology, will develop vaccines for use against fish pathogens.

The Production Efficiency and Environmental Management Program is a collaborative effort between CSIRO, James Cook University and

UTS, together with several prawn farms. This project focuses on the analysis, management and effluent control of ponds used for the intensive farming of these crustaceans.

### **Cooperative Research Centre for Cardiac Technology**

Cooperative Research Centre for Cardiac Technology (CRC-CT) is one of 61 competitive centres funded by the Federal Government and led by four institutions including the University. Ten other organisations in the Centre are Telectronics Pacing Systems, Royal North Shore Hospital, CSIRO, University of New South Wales, Westmead Hospital, St Vincent's Hospital, Associative Measurement, AMRAD, University of Queensland and University of Sydney.

UTS participants in the CRC-CT include members of the Centre for Biomedical Technology (covering the Faculties of Science, Engineering, Mathematical and Computing Sciences) and the Faculty of Nursing.

CRC-CT's work ranges from biochemistry/molecular biology of vascular smooth muscle to studies in electrophysiology, cardiac mechanics and muscle assist, leading to conceptualisation with new implantable technological products such as cardiac defibrillators and myostimulators.

Other research is aimed at examining the basic process of hardening of the arteries in the coronary supply vessels, aiming to develop diagnostic and therapeutic agents for early detection and treatment of this widespread cause of heart attack.

A novel educational/training stream permeates the research programs; it involves training new generations of scientists and engineers at the interface of academia and industry with opportunities for international exchanges. Links have been arranged with leading cardiac research groups at Duke University, USA, the University of Liverpool, UK, and Nagoya University, Japan.

The Centre also delivers diverse education programs to support Australian industry and to encourage youthful interest. Postgraduate scholarships are provided across all the CRC-CT's activities. Student vacation scholarships for undergraduates have proved popular and successful.

The CRC-CT has already lodged a couple of provisional patents and expects to lodge several more in the next year or two.

Visiting scientists are welcomed by the CRC-CT and seminars are run in conjunction with their visits as well as independently.

The CRC-CT is pleased to have been instrumental in the imminent appointment of the new position of Professor in Cardiac Technology at UTS.

### **Institute for Coastal Resource Management**

The Institute for Coastal Resource Management is an interfaculty network of education, research and consultancy teams within the University. It integrates the University's diverse expertise and resources in several disciplines including environmental sciences (biology, chemistry, geology), environmental law, economic and sustainable development, planning, and management. This combination is unique within Australia for coastal resource management studies. Currently, staff from the Faculty of Science, Graduate School of Business, and the Schools of Civil Engineering, Leisure and Tourism Studies, Law and Building Studies are involved. The Institute is located on the St Leonards campus.

The Institute aims to offer interdisciplinary professional courses and conduct relevant research in the coastal zone for industry, government and the community, identify problem areas and solutions, and enhance the community awareness of the coastal zone and its problems. These developments, solutions and expertise will be exported to neighbouring countries in the Pacific region and other collaborative links will be developed in North America and Europe.

Through the University the Institute is linked with several overseas and national universities. These linkages are expanding. Students may complete work at those institutions and gain credit.

### **National Centre for Groundwater Management**

The National Centre for Groundwater Management is a joint enterprise between the Faculties of Science and Engineering, with the general aims of researching groundwater problems of strategic national importance, coordinating and developing postgraduate courses and continuing education programs, and liaising with industry.

The Centre is recognised by the Federal Government through the Land and Water Resources Research Development Corporation

as a National Centre for research and consultancy training in groundwater and environmental applications.

In addition to PhD and MSc (Research) degree programs in groundwater, the Centre offers two courses as a collaborative effort between the Faculty of Science and the Faculty of Engineering, namely, the Master of Science in Hydrogeology and Groundwater Management and the Graduate Diploma in Hydrogeology and Groundwater Management. Further details are given in the section on postgraduate courses.

For inquiries please contact: Professor Michael Knight, Director, National Centre for Groundwater Management, Room 1/1715, telephone: 9514 1984.

## INFORMATION FOR STUDENTS

Students in the Faculty of Science are strongly encouraged to read their copies of the 1997 Postgraduate and Undergraduate Student Handbooks. The student handbooks contain valuable information about admission requirements, enrolment, examinations, exclusion, progression and other important matters.

### Environment, Health and Safety

#### Statement of aims

The University is committed to providing a safe and healthy workplace for students, staff and visitors and adopting a socially responsible approach towards protecting and sustaining the environment. It aims to be at the forefront of environment, health and safety practice in higher education.

To this end UTS will:

- prevent or control hazards that could result in personal injury or ill-health;
- manage accidents and incidents that do occur in order to minimise harmful effects and to prevent recurrence;
- promote safe and environmentally sound practices among the UTS community;
- carry out its teaching, research and organisational activities in ways that protect the environment from harmful effects;

- integrate environment, health and safety issues into its curricula and research as appropriate.

### Faculty of Science Environment, Health and Safety Action Plan

The Faculty of Science EHS Action Plan, adopted in 1996, provides details of EHS responsibilities and procedures. Copies of the Action Plan are available in laboratories and in the Department and Faculty offices. Relevant information is also displayed in laboratories and on noticeboards.

Always remember that health and safety are everybody's responsibility. Everyone is required to demonstrate a responsible attitude towards environmental, health and safety issues, and especially their impact on laboratory and field work.

You must know how to report emergencies, accidents and incidents, and what action you should take to minimise or eliminate hazards.

Never do anything without considering the risks of your actions in relation to the health and safety of others and, if you are intending to carry out any unfamiliar work which might pose a health, safety or environmental risk, always make sure you get appropriate information, advice or instruction before you start.

By following these simple rules, we shall make the Faculty of Science a safer and healthier place in which to study and work.

### Statement of good practice and ethics in informal assessments

The 'Statement of good practice and ethics in informal assessments' is especially included here for two reasons: firstly, because it is not included in the student handbooks and secondly, and most importantly, because the statement is taken very seriously by the Faculty and we encourage you, the student, to take it seriously too.

#### 1. Aims of informal assessments

The term 'informal assessment' at UTS is defined as any assessment task other than a final examination that is administered by the Academic Registrar and held in the official UTS Examination Weeks. Such assessment is in no other sense 'informal', especially as it contributes to the final assessment of the student in the subject.

Common forms of such assessment in the Faculty of Science include:

- practical reports
- computer programs
- essays and assignments (including reports of field work)
- tests and quizzes

The setting and assessing of these tasks is aimed at promoting the following educational aims:

- furthering each student's learning of the subject
- the acquisition of practical skills of laboratory and field work, and their documentation
- providing a means for staff to assess each student's learning
- providing feedback to the student on progress in learning
- providing feedback to staff on the effectiveness of their teaching

These aims will be subverted if students deceive staff about either the authenticity of results, or the authorship of their written work. Such behaviour is unethical, unprofessional and completely unacceptable. Within the Western tradition of scholarship it is regarded as a serious academic offence.

It is recognised that students may sometimes find themselves in positions of extreme stress, for reasons of illness or misadventure, when malpractice may seem tempting. In such circumstances, however, other solutions are available, for example, seeking extra time for the submission of an assignment, accompanied by a medical certificate and/or other compelling explanation.

## 2. Unacceptable behaviour

Cheating in all its forms is unacceptable behaviour, **and cannot be condoned**. Cheating is a breach of the University Rules. Examples of cheating include:

### 2.1 Outright lying

This is never acceptable under any circumstances. Remember that lying, in science, includes inventing or falsifying results.

### 2.2 Plagiarism (copying)

The *Oxford Dictionary* defines plagiarism as the taking and using of another person's thoughts, writings or inventions as one's own. It includes unacknowledged quotations from other

authors (books, journals, fellow students), or the copying out, perhaps with changes intended to disguise, of slabs of other people's work. Don't copy!

### 2.3 Collusion

Collusion is a fraudulent, secret understanding between two or more people to deceive, for example, in 'fixing' results, or doing one essay together and rewording it slightly to pass it off as two independent efforts.

### 2.4 Use of unauthorised material or equipment

Only equipment or material specified by the coordinating examiner may be used by a student during examinations, class tests and quizzes. Don't write on rulers, calculator cases etc.!

Don't cheat! Don't even think of cheating!

## 3. Acceptable practices

### 3.1 Acknowledging sources – referencing

Whenever any other person's work is used in the formulation of a written piece of work, it must be clearly indicated where the source of the information lies. The 'other person' could be a published or unpublished author, your lecturer, or one of your fellow students. Consult the various guides to writing assignments that are held in the library (and any that your lecturers may provide). As you prepare the assignment, keep a detailed running record of your references in a notebook, and use a standard referencing system, e.g. the Harvard system. Often references cannot be found again later.

### 3.2 Collaboration

In many cases, experiments and other means of data collection require students to cooperate. Some assignments may involve an ideas-gathering stage followed by the writing-up phase.

While collaboration is normally encouraged in the developmental and experimental stages, **final data analysis and interpretation and writing-up** must be strictly your own effort (except in any exceptional circumstances that would have to be spelt out in detail by your lecturer).

## 4. Guide for good practice in written work

(Adapted from the statement prepared by the Faculty of Humanities and Social Sciences.)

### 4.1 Writing essays or assignments

Developing the ability to express yourself and argue clearly and in your own words is an important part of your university studies. Students are often confused, however, about just what is expected of them in written work: on the one hand, they are asked to present their own original ideas and arguments yet, on the other, they are told to use and take account of ideas, concepts and theories etc., in the material they read. In fact, an important element of a well-written piece of work is the way that a student meets these two, apparently conflicting, demands.

### 4.2 Originality

'Being original' in an essay, for instance, **does not** mean that you have to think up your own theories and concepts etc. Rather, it refers, in part, to the way you make use of – by critiquing, analysing, evaluating, synthesising, exemplifying, instancing – the ideas, theories, evidence etc. of other writers or of experimental or secondary data (e.g. census statistics) in constructing a coherent and plausible argument.

### 4.3 Arguing a case

Strictly speaking, an 'argument' refers to the reasoned advancement of a number of propositions leading to a particular conclusion. In an essay, it means that having read and considered the relevant literature, and on the basis of this and any other appropriate evidence, you come to a conclusion about the question. In writing the essay, you set out the argument, or a series of arguments, to support that conclusion. In doing so, you draw on relevant ideas etc. from your reading, using them to support your argument. In cases where experimental data form the basis of the written work, your task may be to argue the case of how the data support or falsify a hypothesis.

Whether you are asked to argue, discuss, evaluate, compare and contrast, analyse, critique, consider etc. **you are still being asked to mount a reasoned argument**, in one form or another, leading to a conclusion based on an evaluation of all the evidence presented in your reading or provided by the data. For example, some essay questions may ask you to discuss or evaluate two conflicting arguments; in this case you have to decide – on the basis of the arguments themselves, any other evidence, and perhaps with the help of what some other writers say – which is the

stronger or more adequate of the two and then argue that, giving evidence in support.

In a sense, you could think of writing an essay, assignment or report (some of which might require different formats) rather like designing and erecting a building. All the possible and available building materials (bricks, timber, concrete, steel, roofing etc.) would be equivalent to all the reading you have done or experimental data acquired. You certainly cannot just throw a stack of materials on to a block of land and expect them to form the building. Rather, you would need to, firstly, get a general idea of the sort of building that is appropriate by considering all the relevant factors (such as size and lie of the land, accommodation required and building restrictions); secondly, design a structure which takes all of these factors into account, selecting materials to hold up the structure and rejecting those which would not. In a similar way you need to think carefully about all the information you have and decide what is relevant and what you can generally conclude from it; then design or plan it into a coherent and cogent argument supporting that position.

The actual argument (the design) is your original contribution; the support for that argument comes from all the data, ideas and theories etc. you considered and the evidence used (the materials). Hence, **it is the way you critically analyse, evaluate, select and synthesise information and use it in your argument** which is important in the work. You do not create something totally new, nor do you merely throw together other people's ideas. Do not make the mistake of thinking that it is sufficient for you to merely compile into some coherent order other people's referenced ideas etc. – the bulk of the essay has to be your own work.

### Eligibility for Austudy

Austudy provides financial help to full-time students who meet its income and assets requirements. Application forms and information about Austudy eligibility are available from offices of the Student Services Unit at the City and Kuring-gai campuses. **Students who receive Austudy and decide to drop subjects during the semester need to be aware that to remain eligible for Austudy they must be enrolled in a minimum of 18 credit points or have a HECS liability for the semester of .375.** The only exceptions made are for students with disabilities which interfere with their studies, students who are

single supporting parents or those who have been directed by the University to reduce their study load. Student Welfare Officers in the Student Services Unit can assist students who wish to apply for exceptions on these grounds.

## PRIZES AND SCHOLARSHIPS

Prizes and scholarships are awarded each year to students in the Faculty for meritorious work. These are made available through the generosity of private individuals and public organisations. They are offered each semester, annually or biennially. In rare instances, a prize or scholarship will be offered only when funds permit. Most prizes and scholarships are offered subject to the provision that they will be awarded only when a student has attained a mark or level of achievement considered by the Faculty Board to be sufficiently high. In addition to these official University prizes and scholarships it should be noted that there are available a number of scholarships and prizes from external sources for which University students can compete. Information about these scholarships and prizes appears from time to time on official noticeboards.

### Faculty of Science Doctoral Research Scholarships

A number of Doctoral Research Scholarships may be offered to permanent residents by the Faculty for full-time study towards a PhD. The awards which may be up to the value of \$15,000 per annum over three years are available for study in the following areas:

- Materials technology
- Image processing and analysis
- Regional and resource geology
- Science education
- Cell and molecular biology
- Biomedical science and engineering
- Environmental biology and toxicology
- Groundwater management
- Biomedical technology
- Forensic and analytical chemistry
- Coastal resource management

### Dean's Merit List for Academic Excellence

The Faculty wishes to formally recognise outstanding performance by its students

through the awarding of prizes, medals and the grading of degrees. The Dean's Merit List endeavours to formally acknowledge academic achievement throughout a student's course of study. From the end of 1993 and each year thereafter, the Faculty publishes a list of students who have been placed on the Dean's Merit List. Each student also receives a certificate to this effect. To be listed a student would usually need to undertake a normal load; achieve an average mark for the year of 85 or above; and be recommended by the relevant Examination Review Committee in December each year.

### AC Hatrick Chemicals Prize

This prize was established in 1990. It is awarded to the full-time student enrolled in the Applied Chemistry course who obtains the highest aggregate mark in Chemical Process Control. The prize has a cash value of \$250.

### Australasian Association of Clinical Biochemists Prize

This prize was established in 1995 by the New South Wales Branch of the Australasian Association of Clinical Biochemists. It is offered annually to the graduating student from the Master of Science in Clinical Biochemistry course who has gained the highest weighted average mark in the subjects Clinical Biochemistry Advanced Aspects A, Clinical Biochemistry Advanced Aspects B, Case Studies in Clinical Biochemistry, and Clinical Laboratory Management. The prize consists of a suitably inscribed plaque, a cash award of \$200 and one year's membership of the Australasian Association of Clinical Biochemists.

### The Australian Acupuncture Association Prize

This prize is awarded to the graduating student from the Bachelor of Health Science in Acupuncture course who obtains the highest weighted average mark for all subjects in the course. The prize is in the form of a suitably inscribed certificate, together with a book allowance to the value of \$250 plus one year's complimentary membership of the Australian Acupuncture Association Limited.

### The Australian Ceramic Society Prize in Ceramics

This is a cash prize of \$100, intended for the purchase of books, and is awarded annually to the final-stage student in the Materials Science degree course who achieves the



highest aggregate mark in the subjects Traditional Ceramics and Technical Ceramics in the year for which the award is made. The prize, established in 1979 through the generosity of the NSW Branch of the Australian Ceramic Society, is intended as an encouragement to students studying in the field of ceramics.

#### **The Australian Ceramic Society Scholarship**

The Australian Ceramic Society Scholarship was established in 1986 and is awarded annually to the student enrolled in the Materials Science degree course who, when undertaking a research project in the area of ceramics, obtains the highest average mark in Stages 1, 2, 3 and 4. The cash value of the scholarship is \$400.

#### **Australian Institute of Medical Scientists' Prize in Clinical Bacteriology**

This prize was established in 1983 by the New South Wales Branch of the Australian Institute of Medical Laboratory Scientists. It is offered annually to students enrolled in the Biological and Biomedical Sciences courses and is awarded to the student who obtains the highest mark in the subject Clinical Bacteriology. The prize consists of a cash award of \$200, a suitably inscribed bronze medallion, and one year's membership of the Institute.

#### **Australian Institute of Medical Scientists' Prize in Haematology**

This prize was established in 1983 by the New South Wales Branch of the Australian Institute of Medical Laboratory Scientists. It is offered annually to students enrolled in the Biological and Biomedical Sciences courses and is awarded to the student who obtains the highest mark in the subject Haematology 2. The prize consists of a cash award of \$200, a suitably inscribed bronze medallion, and one year's membership of the Institute.

#### **Australian Institute of Physics Prize**

The NSW Branch of the Australian Institute of Physics has made available an annual award to a student in the fourth year of the Physics degree who obtains the best results in completing the final stage of the course. The prize is a cash award of \$200 plus one year's free membership of the Australian Institute of Physics.

#### **Boehringer Mannheim Prize for Biomedical Sciences**

This prize was established in 1990. It is awarded annually to the student enrolled in the Biomedical Science degree course who achieves the highest average mark in Stage 3, obtaining at least a distinction average mark. The prize consists of a medal and a cash award of \$250.

#### **Cathay Herbal Laboratories Prize**

This prize is awarded annually to the graduating student from the Bachelor of Health Science in Acupuncture course who obtains the highest aggregate mark in the final-year clinical subjects. The prize will be in the form of a suitably inscribed certificate, together with Cathay Herbal Laboratories products such as textbooks, acupuncture supplies, herbal medicines and educational services, to the value of \$1,000.

#### **Chemistry Department Prize**

This prize was established in 1986. It is awarded annually to the student enrolled in the Applied Chemistry degree course who, having completed Stage 2 of the course, obtains the best performance in the Stage 2 chemistry subjects Chemistry 2M or Chemistry 2 and Organic Chemistry 1. The prize is valued at \$100.

#### **CHINAHERB Prize**

This prize is awarded to the graduating student from the Bachelor of Health Science in Acupuncture course who obtains the highest weighted average mark for TCM subjects in the year. The prize is in the form of a suitably inscribed certificate, together with a \$200 cash prize and a \$300 credit account with CHINAHERB.

#### **Colin Field Prize**

This prize was established in 1989 by Emeritus Professor Colin Field, former Dean of the Faculty of Life Sciences and Head of the School of Biological and Biomedical Sciences. The prize is awarded annually to the Biomedical Science, Environmental Biology or Biotechnology student who obtains the highest overall average mark from all subjects undertaken in Stages 1 and 2, with at least a credit average for the biology subjects offered in those stages. The prize has a cash value of \$200.

### **CSL (Commonwealth Serum Laboratories) Prize**

This prize was established in 1990. It is awarded to the graduating student from the Biological and Biomedical Sciences degrees who attains the highest aggregate mark in the subject Transfusion Science, with a mark at distinction level or higher. The prize has a cash value of \$200.

### **Department of Land and Water Conservation Prize**

This prize was first established as the Department of Water Resources Prize in 1990. It is awarded annually to a student enrolled in the Biological and Biomedical Sciences courses, who obtains the highest average mark in the subjects Aquatic Ecology, Terrestrial Ecosystems, and Mapping and Remote Systems, provided that the average mark is of distinction grade. The prize has a cash value of \$250.

### **DFC Thompson Memorial Prize**

This prize is awarded annually to the student who, upon completion of Stage 5 in the Chemistry degree course, obtains the highest weighted average mark for subjects in Stages 3, 4 and 5 of the course. The prize consists of a suitably inscribed certificate, together with a cash prize of \$1,000.

### **Dr David Sugerman Prize in Pathology**

This prize was established in 1982 by Dr David Sugerman. The prize is awarded annually to the student who obtains the highest aggregate in the subjects Anatomical Pathology, Immunology and Haematology, provided that the student reaching the highest aggregate has an average mark of not less than the standard of credit. The prize consists of a cash award of \$500 and a suitably inscribed plaque.

### **The Environmental Biology Prize**

This prize was established anonymously in 1984. The prize has a cash value of \$250 and is awarded to the student enrolled in the BSc Environmental Biology degree course who obtains the highest average mark in Stages 3 to 6 of the degree course.

### **Foseco Prize in Materials Science**

This prize was established in 1982 by Foseco Pty Ltd as an incentive to students engaged in studies in the field of Materials Science. The prize is offered annually to students enrolled in the Materials Science degree course and is

awarded to the student who achieves the highest aggregate mark in the subject Physical Properties of Materials. The prize consists of a cash award of \$200.

### **Francis E Feledy Memorial Prize**

This award was established by the staff of the British Motor Corporation as a memorial to the late Francis E Feledy for his work as an architect and engineer with that company. The award was first made available in 1966 through the then Department of Technical Education. In 1974, the then Institute became the Trustee of the fund. At the discretion of the Trustee, the prize is awarded annually to an outstanding part-time student entering his or her final year in each of the Faculties of Engineering, Science, and Design, Architecture and Building. The prize is valued at \$600 for each award.

### **Hatrick-Jotun Prize in Design and Materials Selection**

This prize (formerly the Hatrick Fiberfil Prize in Design and Materials Selection) was re-established in 1986. It is awarded to the student in the Materials Science degree course who achieves the best performance in the subject Design and Selection of Materials. The prize has a cash value of \$250.

### **Hatrick Reichhold Prize in Polymer Technology**

This prize was established in 1984 by A C Hatrick Chemicals Pty Ltd as an incentive to students studying in the field of polymers and resin technology. The prize is awarded to the student who achieves the best performance in the subject Industrial Polymer Technology. The cash value of the prize is \$250.

### **The Institute of Metals and Materials Australasia Prize**

This prize, established in 1983, is offered annually to students in the Materials Science degree course, and will be awarded to the student who achieves the highest mark in the subject Physical Metallurgy 1. The prize consists of a cash award of \$200 and one year's membership of the Institute of Metals and Materials Australasia.

### **JEOL Prize for Electron Microscopy**

This prize was established in 1991. It is awarded to the student who achieves the highest mark in the subject Electron Microscopy Techniques. The prize has a cash value of \$250.

**KK & S Prize in Metallurgy**

This prize was established in 1982 by KK & S Instruments Pty Ltd as an incentive to students engaged in studies in the field of metallurgy. The prize is offered annually to students enrolled in the Materials Science degree course, and is awarded to the student who achieves the best performance in the subject Physical Metallurgy 3. The prize has a cash value of \$150.

**Leonard J Lawler Prize**

This prize is presented by the Australian Institute of Medical Scientists in dedication to the past services of Mr L J Lawler to the New South Wales Branch of the AIMS. Over a long period Mr Lawler has shown great interest in the education of clinical chemists. The prize has been awarded annually since 1976. It is awarded to the student enrolled in the Biomedical Science course who attains the best aggregate in the subjects Clinical Biochemistry 1 and Clinical Biochemistry 2. The prize consists of a cash award of \$200, a suitably inscribed bronze medallion and one year's membership of the Institute.

**Loctite Australia Prize in Adhesion Science**

This prize was established in 1983. It is awarded annually to the student enrolled in the Materials Science degree course who achieves the best performance in the subject Surface Properties of Materials. The prize has a cash value of \$150.

**Macquarie Pathology Services Prize in Biomedical Science**

This prize was established in 1984 by Macquarie Pathology Services Pty Ltd. The prize is awarded annually to the student who obtains the highest average mark in Stages 3 to 6 of the degree course leading to the award of BSc in Biomedical Science. The prize includes a cash award of \$500 and a medal.

**MY Ali Prize in Cytopathology (Previously known as MY Ali Prize in Diagnostic Cytology)**

This prize was established in 1978 by Dr M Y Ali, former Associate Head of the School of Life Sciences at NSWIT, who was responsible for the introduction and initial development of studies in diagnostic cytology. It is awarded annually to the student enrolled in the Biomedical Science degree course who achieves the highest mark in the subject

Cytopathology, provided that the mark is not less than credit level. The prize consists of a cash award of \$200 and a suitably inscribed certificate.

**National Safety Council of Australia Prize**

The National Safety Council of Australia Prize was established in 1986 and is awarded to the student enrolled in the Applied Chemistry degree course who obtains the highest aggregate mark in the subject Chemical Safety. The prize is in the form of a book token to the value of \$100.

**Pasminco Prize in Extractive Metallurgy**

This prize was established in 1990. It is awarded to the student enrolled in the Physical Sciences courses who obtains the highest aggregate mark in the subject Extractive Metallurgy. The prize has a cash value of \$250.

**Physics Staff Prize**

This prize was established in 1985. It is awarded each year to the student in the Applied Physics degree course who obtains the highest average mark in the first three stages of the course. The prize has a cash value of \$200.

**Ratcliffe Prize**

Awarded for the best aggregate result of the Graduate Diploma in Occupational Health and Safety course.

**R F G MacMillan Award**

This prize was established in 1991. It is awarded to a Materials Science degree student for participation and involvement in Materials Science activities beyond the normal academic requirements. The prize has a cash value of \$500.

**Robert K Murphy Research Fund**

To perpetuate the name of Dr R K Murphy, who was for 25 years Lecturer-in-Charge of the Chemistry Department and subsequently Principal of Sydney Technical College, the Sydney Technical College Science Association sponsored a fund to be known as the Robert K Murphy Research Fund, to which a number of chemical industries also subscribed. The income from the fund has been applied to set up the following prizes and scholarship:

**1. Robert K Murphy Research Prize**

This prize is awarded annually to the student in the Applied Chemistry degree course who

submits the best original Chemistry project. The prize has a cash value of \$250.

### **2. Robert K Murphy Prize**

This prize is awarded annually to the student in the Applied Chemistry degree course who entered the course on completion of Chemistry Certificate of the TAFE Commission and who achieves the best overall performance in the Applied Chemistry degree. The prize has a cash value of \$250.

### **3. Robert K Murphy Research Scholarship**

This scholarship is awarded annually to the student in the Applied Chemistry degree course who satisfies the Trustees that such a scholarship is warranted to assist the student in research in investigation or advanced study. The prize has a cash value of \$250.

### **Schering Plough Prize**

This prize was established in 1990. It is awarded to the student enrolled in an Advanced Chemistry project in the Applied Chemistry course who presents the best project seminar (in terms of both technical merit and presentation). The prize has a cash value of \$250.

### **SICPA Australia Award**

This is a cash prize of \$40, intended for the purchase of books, and is to be awarded annually to the student in the Materials Science degree course who achieves the highest aggregate mark in the subject Polymers 1 in the year for which the award is made. The prize, established in 1979 through the generosity of Collie Cooke Consolidated, is intended as an encouragement to students studying in the field of Organic Materials.

### **St Joe Mineral Deposits Prize**

St Joe Australia Pty Ltd established this prize in 1984. The prize is awarded to the student who obtains the highest credit point average in the subject Mineral Deposits. The prize has a cash value of \$50.

### **Stanton Coalstad Prize**

This prize may be awarded annually to a student enrolled in the Materials Science degree course who obtains the highest mark in the subject Materials Science 1 at his or her first attempt. The prize will be valued at \$500 and will comprise a cash award and a book voucher.

### **Sydney Environmental and Soil Laboratory Prize in Urban Horticulture**

This prize is awarded to the graduating student from the Bachelor of Science (Urban Horticulture) course who obtains the highest weighted average mark in Stages 3 to 6 of the course, at Distinction level or above. The prize will be in the form of a suitably inscribed certificate, together with a cash prize of \$300.

### **Western Mining Corporation Prize**

This prize was established in 1986. It is awarded annually to the student enrolled in the Applied Geology course who obtains the highest average mark of all students undertaking the Field Project in the year for which the award is made. The successful student will preferably demonstrate an interest in metalliferous exploration geology. The prize has a cash value of \$200.

### **Western Mining Corporation Junior Studies Prize**

This is a cash prize of \$150 awarded annually to the student who has shown the most significant improvement in the quality of academic work at the completion of Stage 4 in the Materials Science degree course. The prize was awarded for the first time in 1979.

### **Western Mining Corporation Senior Studies Prize**

This is a cash prize of \$150 awarded annually subject to a suitable recipient being nominated by the Head of the Department of Materials Science, for distinguished performance in the final year (Stages 5 and 6) of the Materials Science degree course. The prize was awarded for the first time in 1979.

### **Workcover Authority Prize**

Awarded for the highest aggregate mark in the first year of study in the Graduate Diploma in Occupational Health and Safety or Master of Occupational Health and Safety course.

### **Yakult Student Award in Biotechnology**

This prize was established in 1996. It is awarded to the graduating student in the Bachelor of Science in Biotechnology course who obtains the highest weighted average mark for the subjects Microbiology 3 and the specialist biotechnology subjects Bioprocessing and Applied and Environmental Microbiology, provided that average mark is at credit level or higher. The prize is valued at \$250.

## LIST OF COURSES

Course title	Code
<b>Undergraduate degrees</b>	
Bachelor of Applied Science in Chemistry	NC01
Bachelor of Applied Science (Honours) in Chemistry	NC02
Bachelor of Applied Science in Geology	NG01
Bachelor of Applied Science (Honours) in Geology	NG02
Bachelor of Applied Science in Materials Science	NM02
Bachelor of Applied Science (Honours) in Materials Science	NM03
Bachelor of Applied Science in Physics	NP01
Bachelor of Applied Science (Honours) in Physics	NP02
Bachelor of Applied Science in Physics/ Bachelor of Engineering in Electrical Engineering	NP03
Bachelor of Health Science in Acupuncture	P005
Bachelor of Health Science in Acupuncture (Honours)	P006
Bachelor of Health Science in Acupuncture/Bachelor of Arts in International Studies	NH01
Bachelor of Health Science in Chinese Herbal Medicine	NH02
Bachelor of Health Science in Chinese Herbal Medicine (Honours)	NH03
Bachelor of Medical Science	NH04
Bachelor of Science (Honours) <sup>1</sup>	KB04
Bachelor of Science (Honours) in Applied Chemistry – Forensic Science	NC04
Bachelor of Science in Biomedical Science	KB02
Bachelor of Science in Biotechnology	KB06
Bachelor of Science in Environmental Biology	KB05
Bachelor of Science in Science Education	N003
Bachelor of Science in Urban Horticulture	KB03
Bachelor of Science/Bachelor of Laws	LL04
<b>Graduate Certificates</b>	
Coastal Resource Management <sup>2</sup>	KB69
Computer Data Acquisition in the Life Sciences <sup>4</sup>	KB71
Data Processing and Management in the Life Sciences <sup>4</sup>	KB72
Ecotoxicology <sup>3,4</sup>	KB77
Electronics and Computing in the Life Sciences <sup>4</sup>	KB73
Environmental Engineering and Management <sup>2</sup>	EC58
Human Biology <sup>4</sup>	KB74
Medical Instrumentation and Measurement <sup>4</sup>	KB75
Occupational Health and Safety <sup>4</sup>	P053
Occupational Health and Safety Management <sup>4</sup>	P054
Physics in Medicine <sup>4</sup>	KB76
Principles of Coastal Zone Law and Economics <sup>2</sup>	KB80
Principles of Environmental Toxicology <sup>3</sup>	KB78

Course title	Code
<b>Graduate Diplomas</b>	
Clinical Acupuncture	NH51
Clinical Biochemistry	KB65
Coastal Resource Management <sup>2</sup>	KB70
Environmental Toxicology <sup>3</sup>	KB67
Hydrogeology and Groundwater Management	N061
Medical Microbiology	KB66
Occupational Health and Safety	P052
<b>Master's degrees (by coursework)</b>	
Master of Occupational Health and Safety	P055
Master of Science in Clinical Biochemistry	KB55
Master of Science in Clinical Measurement <sup>4</sup>	KB53
Master of Science in Coastal Resource Management <sup>2</sup>	KB59
Master of Science in Environmental Toxicology <sup>3</sup>	KB52
Master of Science in Hydrogeology and Groundwater Management	N057
Master of Science in Medical Microbiology	KB57
Master of Science in Medical Physics <sup>4</sup>	KB58
<b>Master's degrees (by thesis)</b>	
Master of Applied Science (Hydrogeology and Groundwater Management)	N056
Master of Science (Biological and Biomedical Sciences)	KB51
Master of Science (Physical Sciences)	N053
<b>Doctor of Philosophy</b>	
PhD (Biological and Biomedical Sciences)	KB56
PhD (Hydrogeology and Groundwater Management)	N055
PhD (Multidisciplinary Studies)	P095
PhD (Physical Sciences)	N054

<sup>1</sup> Offered to students who possess, or have fulfilled, all the requirements for a three-year Bachelor's degree in Biomedical Science, Biotechnology, Environmental Biology or Urban Horticulture from UTS, or equivalent, with at least an average credit grade in the final two stages of the undergraduate program.

<sup>2</sup> Interdisciplinary course run by the Faculty of Science in collaboration with the Faculties of Engineering; Business; Law; and Design, Architecture and Building.

<sup>3</sup> In collaboration with the NSW Environment Protection Authority.

<sup>4</sup> There will be no intake in these courses in 1997.

Most programs are available on a full-time and part-time basis or a combination of both these attendance patterns.

While the University of Technology, Sydney maintains traditional university standards of scholarly excellence in the granting of its awards, it is continually seeking to instruct students in new and innovative areas in keeping with the needs of our highly technological society.

## INTERNATIONAL STUDIES ELECTIVES

The Institute for International Studies in UTS offers electives in language studies and in the study of contemporary societies in parts of the non-English-speaking world. All subjects are taught over one semester and have a value of eight credit points.

### Language Studies

All students wishing to take language studies as a credited part of their degree are required to enrol through the Institute for International Studies, whether the language studies are undertaken in UTS or elsewhere. The Institute teaches some language programs at UTS, has made arrangements with other universities for some languages to be taught to UTS students, and can make special arrangements for individual students to attend specific language programs where academic needs demand. The individual student's level of language proficiency before entry to the UTS program decides their level of language study. There is a range of entry levels to the various programs available. Most are available at beginner's and post-HSC levels, and some at more advanced levels.

In 1997 the Institute is offering the following programs at UTS to students in all faculties: Cantonese, Chinese, Croatian, French, German, Greek, Indonesian, Italian, Japanese, Korean, Malaysian, Polish, Russian, Serbian, Spanish, Slovenian, Thai and Ukrainian. In addition, arrangements are in place for the delivery of French, German, Hindi, Italian, Korean and Thai. (Modern Standard Chinese is a program for students who are either complete beginners or who started to learn Chinese at school in Australia.) There are no prerequisites for entry to any language program.

### Contemporary Society

The Institute also offers a series of subjects that provide an introduction to the contemporary societies, politics, economics and culture of the countries of East Asia and South-East Asia, Latin America and Western Europe that are the areas of specialisation of the Institute.

In 1997 introductory subjects on the contemporary societies of China, Japan, South-East Asia, Hong Kong and Taiwan, Latin America and Western Europe will be available. There are no prerequisites for any of the Contemporary Society subjects. All subjects are taught in English and are available, with the permission of their faculties, to all UTS students.

For more information students should consult the Academic Administrator at the Institute for International Studies, UTS, 9 Broadway (telephone: 9514 1574, fax: 9514 1578), or the *Institute for International Studies Handbook*.

# Undergraduate courses

## Admission requirements

Applicants are considered for admission in accordance with the Rules and By-law of UTS as set out in the UTS *Calendar*, and on the basis of meeting the general requirements in one of the following categories:

- the NSW Higher School Certificate
- an appropriate TAFE award – Diploma, Associate Diploma or completion of a Tertiary Preparation Course (TPC)
- equivalent qualifications
- mature age (see UTS *Calendar* for details)
- Accumulated Matriculation (see UTS *Calendar* for special circumstances)

## Assumed knowledge/course prerequisites

There are no mandatory prerequisite subjects from the Higher School Certificate; all science subjects taught in the first semester assume no HSC knowledge of the subject. However, it is assumed that all students entering the biological and biomedical sciences courses will have studied **at least** two-unit mathematics plus one two-unit science course. It is strongly recommended that they complete studies in two science subjects. Common combinations include chemistry/physics, chemistry/biology, or multistrand with biology. For students entering the physical sciences courses, it is assumed that they have studied two-unit mathematics plus two-unit physics, or two-unit chemistry or three/four-unit science. The minimum Tertiary Entrance Rank (TER) varies from year to year depending upon the number of applications for entry and the number of places available.

## Requirements for award of Bachelor's degree

A degree will be awarded to students satisfactorily completing the following requirements:

### 1. Credit points<sup>1</sup>

A minimum of 144 credit points, accumulated by:

- full-time attendance in Bachelor's degree courses involving satisfactory completion of the prescribed core subjects and

approved elective subjects to the value of 48 credit points for each of three years;

or

- part-time attendance in Bachelor's degree courses involving satisfactory completion of the prescribed core subjects and approved elective subjects to the value of 24 credit points for each of six years;

or

- any other approved combination of full-time and part-time attendance.

<sup>1</sup> Attendance patterns: the terms 'full-time' and 'part-time' refer to the number of credit points being undertaken and do not imply attendance at any particular time of day. The Faculty of Science normally schedules classes between 9.00 a.m. and 10.00 p.m., and students may be required to attend any scheduled class regardless of their attendance pattern. It is unavoidable that full-time students will be required to attend some evening classes and that part-time students will be required to attend some daytime classes.

Students who have failed subjects cannot be guaranteed a complete program or normal progression. However, in some courses a subject failed with a mark of 40 per cent or more may allow progression into subjects for which the failed subject is a prerequisite. All failed subjects must be successfully completed for award of a degree.

Students having difficulty devising a program should consult the Student Administrative Officer or an academic adviser. Where a student experiences legitimate difficulty enrolling in sufficient credit points to make up a full-time load, a minimum of 75 per cent of a normal full-time program is deemed adequate to maintain designation as a full-time student provided the whole degree is completed within 150 per cent of the normal progression period. Thus, a three-year full-time degree should be completed in or under four-and-a-half years. Similarly, there is no minimum number of credit points for a part-time program for any one semester, but the whole degree should be completed within 150 per cent of the normal progression period i.e. a six-year part-time degree should be completed in or under nine years.

### 2. Professional/work experience

Students who are enrolled in the physical sciences courses have industrial training as an integral part of the course. In most of these



courses, students spend six to 12 months working in a relevant industry. This experience is to be gained prior to or concurrently with the final stage of the course depending on whether attendance is full time (sandwich) or part time.

Full-time students enrolled in the biological and biomedical sciences courses who desire to complete a period of work/industrial experience during their degree program, may either insert a sandwich year of full-time employment between Stages 4 and 5 or may complete Stages 5 and 6 on a part-time basis. Students are required to inform the University officially if they intend not to appear for formal courses during a sandwich year, by enrolling for the subject 91997 Professional Experience (Biol/Biom) F/T.

Part-time students enrolled in the biological and biomedical sciences courses who are employed on a full-time basis in an area relevant to their course should enrol in the subject 91999 Professional Experience (Biol/Biom) P/T in **every** semester for which they are employed so that the experience gained is reflected on their academic record.

### **Admission of Pass degree graduates into Honours courses in the physical sciences**

With regard to cognate Pass and Honours degree programs offered by the Faculty of Science:

1. Graduates from Pass degree courses will not normally be permitted to enrol in an Honours degree course offered by the Faculty in the same field of study except where

(a) the Honours degree course is distinct and separate from the Pass degree course and constitutes a fully accredited program of study; or

(b) the Honours program takes the form of a conversion program which has been approved by the Faculty Board.

2. Students who successfully complete an Honours degree course of the type described in 1 (a) above will be eligible to graduate with an Honours degree and receive a separate testamur, while those who complete a program of the type described in 1 (b) above will be eligible to graduate with an Honours degree and receive a replacement testamur on surrender of their Pass degree testamur.

## **Bachelor of Applied Science in Chemistry**

### **Course code: NC01**

The purpose of this course is to provide a program of instruction, which, together with concurrent work experience, will prepare a student for entry to professional work in the field of applied chemistry. The course includes a firm foundation of study in the basic sciences, with in-depth development in the particular discipline of chemistry, emphasising its industrial applications.

By taking an appropriate selection from a range of subjects a student can prepare for laboratory, plant or sales work in industries concerned with plastics, paints, foods, metals and alloys, solvents or industrial chemicals.

The course consists of six stages and may be completed by a number of different patterns of attendance: two years of full-time attendance followed by one year in industry and one year of full-time attendance; **or** two years of full-time attendance followed by two years of part-time attendance; **or** six years of part-time attendance. Other patterns of attendance may also be permitted.

Full-time attendance involves approximately 24 hours each week at the University; this enables a full stage of the course to be completed in one semester.

Part-time attendance involves approximately 12 hours each week at the University; with this form of attendance a full stage may be completed in one year. It is normal practice for employers to release part-time students for at least one half-day per week for attendance at classes. Students commonly attend the University for one half-day and three evenings each week, or for two half-days and two evenings per week.

The award for successful completion of the course is Bachelor of Applied Science. The course has been designed to meet the academic requirements for entry to corporate membership of the Royal Australian Chemical Institute. A new Honours program has been designed to introduce students to more advanced coursework and to research work in chemistry. It will allow selected students to continue on with postgraduate studies if desired and will generally enhance their employment prospects.

Industrial training is regarded as an integral part of the course. The minimum period of relevant employment is one year full-time, or its part-time equivalent. This experience is to be gained prior to or concurrently with the final stage of the course depending on whether attendance is full time (sandwich) or part time.

An Industrial Training Committee has been established within the Chemistry Department to provide guidance in the matter of appropriate vocational training. Students will be interviewed by this Committee after completing Stage 3 of the course. Each student will then be assigned to a member of staff who will maintain regular contact during subsequent periods of study and employment.

### Sandwich program – Pass degree

Each stage corresponds to one semester of full-time attendance.

#### Stage 1

##### Autumn semester

31870	Introduction to Microcomputers	2cp
33171	Science Mathematics 1	4cp
65101	Chemistry 1M	6cp
68101	Physics 1	6cp
91388	Concepts in Biology	6cp
	<i>or</i>	
66011	Earth Science 1	6cp
	<i>or</i>	
67101	Introduction to Materials	6cp

#### Stage 2

##### Spring semester

33172	Science Mathematics 2	3cp
31871	Computing for Science	3cp
65201	Chemistry 2M	6cp
65202	Organic Chemistry 1	6cp
68201	Physics 2	6cp

#### Stage 3

##### Autumn semester

60301	Treatment of Scientific Data	3cp
65301	Spectroscopy and Structure	7cp
65302	Inorganic Chemistry	7cp
65504	Chemical Safety	4cp
51357	Technical Communication	4cp

#### Stage 4

##### Spring semester

65401	Analytical Chemistry 1	8cp
65402	Organic Chemistry 2	8cp
65403	Electrochemistry	4cp
65404	Chemical Thermodynamics	4cp

##### Autumn semester

65996	Industrial Training 1 <sup>1</sup>	
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##### Spring semester

65997	Industrial Training 2 <sup>2</sup>	
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#### Stage 5

##### Autumn semester

33173	Science Mathematics 3	3cp
65501	Analytical Chemistry 2	8cp
65602	Reaction Kinetics	4cp
	Chemistry Elective(s) <sup>2</sup>	8cp

#### Stage 6

##### Spring semester

	Chemistry Elective(s) <sup>2</sup>	16cp
	Elective	8cp

### Part-time program – Pass degree

Each stage corresponds to two semesters of part-time attendance.

#### Stage 1

##### Autumn semester

31870	Introduction to Microcomputers	2cp
33171	Science Mathematics 1	4cp
91388	Concepts in Biology	6cp
	<i>or</i>	
66011	Earth Science 1	6cp
	<i>or</i>	
67101	Introduction to Materials	6cp

##### Spring semester

65011	Chemistry 1	6cp
68101	Physics 1	6cp

#### Stage 2

##### Autumn semester

65021	Chemistry 2 F/T	6cp
68201	Physics 2	6cp

##### Spring semester

31871	Computing for Science	3cp
33172	Science Mathematics 2	3cp
65202	Organic Chemistry 1	6cp

## Stage 3

**Academic requirements****Autumn semester**

60301	Treatment of Scientific Data	3cp
65302	Inorganic Chemistry	7cp
51357	Technical Communication	4cp

**Spring semester**

65301	Spectroscopy and Structure	7cp
65504	Chemical Safety	4cp
51357	Technical Communication	4cp

**Industrial requirements**65998 Industrial Training P/T<sup>1</sup>

## Stage 4

**Academic requirements****Autumn semester**

65402	Organic Chemistry 2	8cp
65404	Chemical Thermodynamics	4cp

**Spring semester**

65401	Analytical Chemistry 1	8cp
65403	Electrochemistry	4cp

**Industrial requirements**65998 Industrial Training P/T<sup>1</sup>

## Stage 5

**Academic requirements****Autumn semester**

65602	Reaction Kinetics	4cp
	Chemistry Elective(s) <sup>2</sup>	8cp

**Spring semester**

33173	Science Mathematics 3	3cp
65501	Analytical Chemistry 2	8cp

**Industrial requirements**65998 Industrial Training P/T<sup>1</sup>

## Stage 6

**Academic requirements****Autumn semester**

	Chemistry Elective(s) <sup>2</sup>	12cp
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**Spring semester**

	Chemistry Elective(s) <sup>2</sup>	4cp
	Elective <sup>2</sup>	8cp

**Industrial requirements**65998 Industrial Training P/T<sup>1</sup>

<sup>1</sup> Industrial experience is an integral part of this course. The minimum period of relevant employment required is the equivalent of one year's full-time employment. The Industrial Training Committee of the Chemistry Department provides guidance on this occupational requirement. The industrial training component in the sandwich program must be undertaken after the completion of the third or fourth semester of academic work. It must be undertaken before the last semester of academic work. The corresponding subject in the Honours degree program is 65995 Industrial Training (Honours).

<sup>2</sup> Chemistry electives offered in 1997 (subject to satisfactory enrolments):

Autumn semester		
65601	Environmental Chemistry	8cp
65702	Applied Organic Chemistry 2	8cp
Spring semester		
65502	Chemical Process Control	8cp
65603	Surface Chemistry	4cp
65703	Metallurgical Chemistry	8cp
65704	Coordination and Organometallic Chemistry	8cp
65705	Corrosion Science	8cp

**Program for holders of the Associate Diploma in Chemical Technology**

A special program operates for students who have successfully completed the Associate Diploma in Chemical Technology of the Sydney Technical College and who are admitted into the Applied Chemistry degree course. Students may seek exemptions from some or all of the following subjects:

31870	Introduction to Microcomputers	2cp
31871	Computing for Science	3cp
65101	Chemistry 1M	6cp
65202	Organic Chemistry 1	6cp
51357	Technical Communication	4cp
	Elective First Year subject	6cp

The study pattern for Associate Diploma holders is set out below.

**Semester 1 (for full-time) or Year 1 (for part-time)**

33172	Science Mathematics 2	3cp
60301	Treatment of Scientific Data	3cp
65302	Inorganic Chemistry	7cp
65504	Chemical Safety	4cp
68201	Physics 2	6cp

**Semester 2 or Year 2**

33171	Science Mathematics 1	4cp
68101	Physics 1	6cp
65201	Chemistry 2M	6cp
65301	Spectroscopy and Structure	7cp

**Semester 3 or Year 3**

65404	Chemical Thermodynamics	4cp
65403	Electrochemistry	4cp
65402	Organic Chemistry 2	8cp
	Chemistry Elective(s)	8cp

**Semester 4 or Year 4**

33173	Science Mathematics 3	3cp
65401	Analytical Chemistry 1	8cp
65602	Reaction Kinetics	4cp
	Chemistry Elective(s)	8cp

**Semester 5 or Year 5**

65501	Analytical Chemistry 2	8cp
	Chemistry elective	8cp
	Elective	8cp

## Bachelor of Applied Science (Honours) in Chemistry

**Course code: NC02**

The Bachelor of Applied Science Honours degree in Chemistry is a four-year full-time program (seven years part-time). The first two years are the same as the Pass degree program. To be eligible for transfer to the Honours degree program students must have a Weighted Average Mark (WAM) of at least 65 for subjects in Stages 3 and 4.

Stage 5 and subsequent stages include a total of 24 credit points of advanced level coursework in addition to the coursework undertaken in common with Pass students. These subjects involve the study of additional advanced material for Honours students and their assessment includes an additional Honours examination in each case.

Honours students undertake a substantial research project which is worth 24 credit points. This project also involves informal lectures and/or tutorials on topics relating to the student's research project plus discussion group activities concerning research methods. Honours students are required to deliver an Honours seminar to all academic staff and other senior students within the Department.

Special arrangements will be made with employers to ensure that Honours students are given more demanding work and have their industrial training assessed at a higher level.

Students wishing to undertake Honours in 1997 should contact Associate Professor Baker (telephone 9514 1764) for advice concerning projects available and the pattern of Honours most suitable for them, or consult the Chemistry noticeboards for details of available projects and supervisors.

### Sandwich program – Honours degree

**Years 1 and 2**

As for Stages 1 to 4 of the Pass course.

**Year 3****Autumn semester**

65602	Reaction Kinetics	4cp
65595	Industrial Training (Honours) Honours Elective <sup>1</sup>	8cp

**Spring semester**

33173	Science Mathematics 3	3cp
65551	Analytical Chemistry 2 (Advanced)	8cp
65595	Industrial Training (Honours)	

**Year 4****Autumn semester**

	Honours Elective <sup>1</sup>	8cp
	Honours Elective <sup>1</sup>	8cp
65851	Project 1	8cp

**Spring semester**

65852	Project 2	16cp
65853	Honours Seminar	8cp

Honours students who elect not to study while on Industrial Training will require an extra semester of attendance to complete the course. A suitable study pattern is shown below.

**Year 3****Autumn semester**

65595	Industrial Training (Honours)	
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**Spring semester**

65595	Industrial Training (Honours)	
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## Year 4

**Autumn semester**

33173	Science Mathematics 3	3cp
65551	Analytical Chemistry 2 (Advanced)	8cp
65602	Reaction Kinetics	4cp
	Honours Elective <sup>1</sup>	8cp

**Spring semester**

	Honours Elective <sup>1</sup>	4cp
	Honours Elective <sup>1</sup>	8cp
65851	Project 1	8cp

## Year 5

**Autumn semester**

65852	Project 2	16cp
65853	Honours Seminar	8cp

**Part-time program – Honours degree**

## Years 1 to 4

As for Stages 1 to 4 of the Pass course.

## Year 5

**Autumn semester**

65602	Reaction Kinetics	4cp
65995	Industrial Training (Honours)	
	Honours Elective <sup>1</sup>	8cp

**Spring semester**

33173	Science Mathematics 3	3cp
65551	Analytical Chemistry 2 (Advanced)	8cp
65995	Industrial Training (Honours)	

Year 6 and Year 7 of the part-time Honours program will comprise two Honours electives (8cp each), plus subjects 65851 Project 1, 65852 Project 2 and 65853 Honours Seminar. Each student will follow a program established in consultation with the Head of Department of Chemistry.

<sup>1</sup> Chemistry electives to be offered in 1997 (subject to satisfactory enrolments):

Autumn semester		
65702	Applied Organic Chemistry 2	8cp
Spring semester		
65502	Chemical Process Control	8cp
65603	Surface Chemistry	4cp

Honours electives to be offered in 1997 (subject to satisfactory enrolments):

Autumn semester		
65651	Environmental Chemistry (Advanced)	8cp
65752	Applied Organic Chemistry 2 (Advanced)	8cp
Spring semester		
65753	Metallurgical Chemistry (Advanced)	8cp
65754	Coordination and Organometallic Chemistry (Advanced)	8cp

**Bachelor of Applied Science in Geology****Course code: NG01**

This course is designed for students seeking careers as professional geologists. The basic award for successful completion of the course is Bachelor of Applied Science. At the end of Stage 4 of the course, more successful students may transfer to the Honours degree program.

The Pass course consists of six stages of formal study and at least one year of full-time (or its equivalent) relevant industrial experience. The formal study includes basic study of chemistry, physics, mathematics and geology, followed by general training in lithology and geological mapping, computer science, the treatment of scientific data, geodynamics and sedimentary, igneous and metamorphic geology. In the middle and later stages of the course, structural geology, exploration geophysics, remote sensing and tectonics are studied in association with exploration, resource, engineering and environmental geology, mining law, and financial aspects of the mineral industry. In these stages the student also studies a range of subjects in preparation for field and laboratory work in metalliferous and non-metalliferous exploration, and the geology of fossil fuels.

Industrial training is an essential part of the degree program, and is normally completed in two six-month periods, one after completion of Stage 4 and one on completion of Stage 6. The Department of Applied Geology maintains close liaison with potential employers and assists students to obtain appropriate positions. The student may make his or her own arrangements, but the Head of Department must be satisfied as to the suitability of the employment.

The common course patterns are four years of full-time enrolment, including two six-month periods of industrial training; or six years of part-time attendance<sup>1</sup>, while concurrently employed full-time in a relevant geological field; or alternating periods of full-time study with similar periods of full-time relevant employment.

Full-time attendance involves 24 hours each week at the University; this enables a full stage of the course to be completed in one semester.

Part-time attendance involves about 12 hours each week at the University; with this form of attendance the equivalent of a full stage may

be completed in one year. It is normal practice for employers to release part-time students for at least one half-day per week for attendance at classes. Students commonly attend the University for one half-day and three evenings each week, or for two half-days and two evenings each week.

<sup>1</sup> Industrial training can be achieved by concurrent suitable employment. The matter should be discussed with the Head, Department of Applied Geology.

**Sandwich program –  
Pass degree**

In these programs, each stage corresponds to one semester spent in full-time attendance at the University.

**Stage 1**

**Autumn semester**

66101	Earth Science 1M	6cp
65011	Chemistry 1 F/T	6cp
68101	Physics 1	6cp
	<i>or</i>	
91388	Concepts in Biology	6cp
33170	Basic Science Mathematics	3cp
	<i>or</i>	
33171	Science Mathematics 1	4cp
31870	Introduction to Microcomputers	2cp

**Stage 2**

**Spring semester**

66201	Geological Mapping	4cp
66202	Lithology	2cp
66203	Geodynamics	3cp
65021	Chemistry 2 F/T	6cp
68041	Physics 1 (LS)	6cp
	<i>or</i>	
68201	Physics 2	6cp
33171	Science Mathematics 1	4cp
	<i>or</i>	
33172	Science Mathematics 2	3cp

**Stage 3**

**Autumn semester**

31871	Computing for Science	3cp
60301	Treatment of Scientific Data	3cp
66301	Mineralogy and Petrology (2 sem)	4cp
66302	Sedimentary Geology	6cp
66303	Geochemistry	3cp
66402	Structural Geology	7cp

**Stage 4**

**Spring semester**

66301	Mineralogy and Petrology (2 sem)	4cp
66401	Technical Communication	3cp
66403	Economic Geology	4cp
66405	Basin Analysis	4cp
66406	Exploration Geophysics	4cp
66603	Remote Sensing	3cp

**Autumn semester**

66996	Industrial Training 1	
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**Stage 5<sup>1</sup>**

**Spring semester**

66404	Resource Management	3cp
66501	Engineering and Environmental Geology	5cp
66502	Advanced Petrology	4cp
66503	Fossil Fuels	4cp
66504	Exploration Geochemistry	2cp
66507	Project Seminar	3cp
66505	Advanced Structural Geology	4cp
66506	Advanced Geological Mapping	3cp

**Stage 6<sup>1</sup>**

**Autumn semester**

66601	Exploration and Mining Geology	4cp
66604	Field Project	9cp
66602	Tectonics	3cp
	<i>one of</i>	
66605	Advanced Fossil Fuels	4cp
66606	Mineral Deposits	4cp
66607	Advanced Engineering Geology	4cp

**Spring semester**

66997	Industrial Training 2	
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**Part-time program –  
Pass degree**

**Stage 1**

**Autumn semester**

66101	Earth Science 1M	6cp
31870	Introduction to Microcomputers	2cp
33170	Basic Science Mathematics	3cp
	<i>or</i>	
33171	Science Mathematics 1	4cp

**Spring semester**

65011	Chemistry 1 F/T	6cp
68101	Physics 1	6cp
	<i>or</i>	
68041	Physics 1 (LS)	6cp

**Stage 2****Autumn semester**

65021	Chemistry 2 F/T	6cp
68201	Physics 2	6cp
	<i>or</i>	
91388	Concepts in Biology	6cp

**Spring semester**

66201	Geological Mapping	4cp
66202	Lithology	2cp
66203	Geodynamics	3cp
33171	Science Mathematics 1	4cp
	<i>or</i>	
33172	Science Mathematics 2	3cp

**Stage 3****Autumn semester**

31871	Computing for Science	3cp
60301	Treatment of Scientific Data	3cp
66303	Geochemistry	3cp

**Spring semester**

66301	Mineralogy and Petrology	8cp
66302	Sedimentary Geology	6cp

**Industrial requirements**

66998 Industrial Training P/T

**Stage 4****Autumn semester**

66402	Structural Geology	7cp
66405	Basin Analysis	4cp
66406	Exploration Geophysics	4cp

**Spring semester**

66401	Technical Communication	3cp
66403	Economic Geology	4cp
66603	Remote Sensing	3cp

**Industrial requirements**

66998 Industrial Training P/T

**Stage 5<sup>1</sup>****Autumn semester**

66503	Fossil Fuels	4cp
66502	Advanced Petrology	4cp
66505	Advanced Structural Geology	4cp

**Spring semester**

66501	Engineering and Environmental Geology	5cp
66504	Exploration Geochemistry	2cp
66507	Project Seminar	3cp
66506	Advanced Geological Mapping	3cp

**Industrial requirements**

66998 Industrial Training P/T

**Stage 6<sup>1</sup>****Autumn semester**

66601	Exploration and Mining Geology	4cp
66604	Resource Management	3cp
	<i>one of</i>	
66605	Advanced Fossil Fuels	4cp
66606	Mineral Deposits	4cp
66607	Advanced Engineering Geology	4cp

**Spring semester**

66604	Field Project	9cp
66602	Tectonics	3cp

**Industrial requirements**

66998 Industrial Training P/T

<sup>1</sup> With permission of the Head of Department, other subjects may be substituted for particular subjects in Stage 5 or Stage 6, where this is appropriate.

## Bachelor of Applied Science (Honours) in Geology

**Course code: NG02**

The Honours strand diverges from the Pass degree strand at the end of Stage 4 coursework. To obtain entry to this strand, students will be expected to have an average mark of 65 or greater in their Stages 3 and 4 Geology subjects, and to be making satisfactory progress through their degree. Students accepting entry will, like students following the Pass course, go on Industrial Training in their fifth semester of enrolment. They will subsequently undertake three semesters of work at UTS but will not be required to do a second period of Industrial Training. Most of the final semesters in the Honours strand will be devoted to a research project, which will be of substantially greater scope than the Field Project in the Pass degree.

**Honours program****Years 1 to 2**

As for Stages 1 to 4 of the Pass course.

**Stage 5****Autumn semester**

66995 Industrial Training (Hons)

**Spring semester**

66404	Resource Management	3cp
66501	Engineering and Environmental Geology	5cp
66504	Exploration Geochemistry	2cp
66506	Advanced Geological Mapping	3cp
66551	Advanced Structural Geology (Honours)	5cp
66552	Advanced Petrology (Honours)	5cp
66553	Fossil Fuels (Honours)	5cp

**Stage 6**

**Autumn semester**

66601	Exploration and Mining Geology	4cp
66602	Tectonics	3cp
66858	Project (Honours) (2 sem)	8cp
	<i>Two of</i>	
66651	Convergent Margin Tectonics (Honours)	3cp
66655	Structural Geology of Ore Deposits (Honours)	3cp
66653	Applied Clastic Basin Analysis (Honours)	3cp
	External SUCOGG <sup>1</sup> Elective	

**Stage 7**

**Spring semester**

66858	Project (Honours) (2 sem)	20cp
	<i>One of</i>	
66654	Research Developments in Geoscience	3cp
	External SUCOGG <sup>1</sup> elective	

<sup>1</sup> SUCOGG: Sydney Universities Consortium of Geology and Geophysics

**Note:** Where appropriate, and with the permission of the Head of Department, other subjects may be substituted for particular subjects in Stages 5 to 7.

## Bachelor of Applied Science in Materials Science

**Course code: NM02**

With the development of technology has come an increasing demand for new, more specialised and more reliable materials. Modern engineering and scientific enterprises continue to involve larger and more complex structures or devices. Factors such as the operational behaviour, relative costs and the aesthetic appeal of different materials become more and more stringently specified. It is from this background that Materials Science has emerged as a separate field of study out of the

traditional disciplines of physics, chemistry, metallurgy and engineering.

Materials Science deals with the scientific principles governing the engineering properties of materials and the application of these properties in modern technology. Metals, ceramics and organic materials are treated in an integrated manner to establish the criteria for materials selection in relation to service conditions, materials compatibility and material durability.

There are two degree programs available, the Bachelor of Applied Science (Materials Science) and the Bachelor of Applied Science (Honours) in Materials Science. The first four stages of these degrees are the same. At the end of Stage 4 those students with an average mark of 65 or greater in Stages 3 and 4 may enrol in the Honours degree. Graduates from both these degrees will be well equipped to work in materials-science-related industry. Honours degree graduates will, however, be able to undertake postgraduate research more readily.

### Attendance patterns

The Pass course consists of six stages which may be completed on a full- or part-time basis. For full-time students, three years of study are integrated with a 12-month period of employment in suitable industries. For part-time students, the course consists of six years of part-time study whilst employed in a relevant industry.

All students enrolled in the Pass degree must undertake one calendar year of full-time, or equivalent part-time industrial training of an approved nature. This industrial training is an integral and compulsory part of the degree program. A program of this type is called a cooperative education or sandwich program.

Under a full-time pattern of attendance (involving approx 24 hours each week at the University) a full stage may be completed in one semester. Allowing for a minimum period of one year of vocational experience, the Pass course may be completed in four years.

Part-time attendance involves approximately 12 hours each week, so that a full stage may be completed in one year. Students attending entirely on a part-time basis must satisfy the Head of Department that they are employed in a relevant area. They would require a minimum of six years to complete the course. Part-time attendance normally requires attendance at the University on one afternoon and two to three evenings each week.



## Sandwich program – Pass degree

Each stage corresponds to one semester of full-time attendance at the University.

### Stage 1

#### Autumn semester

67101	Introduction to Materials	6cp
65011	Chemistry 1	6cp
68101	Physics 1	6cp
33171	Science Mathematics 1	4cp
51390	Communication in Industry	3cp

### Stage 2

#### Spring semester

67303	Mechanical Properties of Materials	6cp
65021	Chemistry 2	6cp
68201	Physics 2	6cp
33172	Science Mathematics 2	3cp
67203	Techniques in Materials Science	3cp

### Stage 3

#### Autumn semester

67304	Physical Metallurgy	6cp
67306	Traditional Ceramics	6cp
67305	Polymer Science	6cp
65031	Thermodynamics	3cp
33173	Science Mathematics 3	3cp

### Stage 4

#### Spring semester

67407	Physical Properties of Materials	6cp
67408	Industrial Metallurgy	6cp
31871	Computing for Science	3cp
67409	Polymer Technology	6cp
67410	Instrumentation for Materials Scientists	3cp

#### Autumn semester

67996	Industrial Training 1	
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#### Spring semester

67997	Industrial Training 2	
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### Stage 5

#### Autumn semester

67506	Technical Ceramics	6cp
67602	Surface Properties of Materials	4cp
68071	Applied Physics (Materials)	4cp
67507	Composites	4cp
65062	Extractive Metallurgy	6cp

### Stage 6

#### Spring semester

67606	Corrosion and Degradation of Materials	6cp
67607	Specialisation Projects in Metallurgy, Polymer Materials, Ceramics and Composite Materials (students to choose only one discipline)	8cp
67605	Design and Selection of Materials Electives	3cp 7cp

## Part-time program – Pass degree

Part-time students are expected to progress through the academic component of the course at approximately half the speed of full-time students, completing the whole course in six years. Each stage of the full-time program is taken over a full year but, because most subjects are offered only once per year, in either Autumn or Spring semester, the subject sequence in the part-time program is different from that in the full-time program. Stages one and two are spread over the first two years of study, Stages three and four over the next two years, and Stages five and six over the final two years. Part-time students should seek advice on their academic program from the Head of the Department of Materials Science.

## Bachelor of Applied Science (Honours) in Materials Science

**Course code: NM03**

### Attendance patterns

The Honours course consists of eight stages which may be completed on a full- or part-time basis. For full-time students the course includes a six-month period of employment in suitable industries. For part-time students, the course consists of seven years of part-time study whilst employed in a relevant industry.

Students may complete portions of their course on a full-time or part-time basis.

All students enrolled in the course are required to undertake six months full-time or equivalent part-time industrial training of an approved nature. This industrial training is an integral and compulsory part of the degree program. A program of this type is called a cooperative education or sandwich program.

Under a full-time pattern of attendance, involving approximately 24 hours each week at the University, a full stage may be completed in one semester.

Part-time attendance involves approximately 12 hours each week at the University, and with this form of attendance a full stage may be completed in one year. Students attending entirely on a part-time basis must satisfy the Head of Department that they are employed in an area relevant to their academic program. They would require a minimum of six years to complete the course. Part-time attendance normally requires attendance at the University on one afternoon and two or three evenings each week.

### **Sandwich program – Honours degree**

Stages 1 to 5 are identical to the Materials Science Pass degree program, except for the Industrial Training component.

#### **Stage 6**

##### **Spring semester**

67605	Design and Selection of Materials	3cp
67606	Corrosion and Degradation of Materials	6cp
67652	Advanced Materials and Characterisation	8cp
	Electives <sup>1</sup>	7cp

#### **Stage 7**

##### **Autumn semester**

67995	Industrial Training (Honours)	
67751	Honours Project Proposal	4cp

#### **Stage 8**

##### **Spring semester**

67851	Honours Project	20cp
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<sup>1</sup> Electives should be selected from subjects offered at appropriate levels by other faculties within the University.

### **Part-time program – Honours degree**

Years 1 to 4 are identical to Stages 1 to 4 of the Pass degree program.

The sequence of subjects in stages 5 to 8 will be determined for each student in consultation with the Head of Department of Materials Science.

## **Bachelor of Applied Science in Physics**

### **Course code: NP01**

The development of modern technology and its application in a wide variety of industries has created a demand for graduates who have a scientific approach to applied problem solving, a deep understanding of the physical principles underlying systems, who are able to utilise modern equipment for measurement and control and are flexible and adaptable to changing job needs. Such graduates are applied physicists. Employment is found by applied physicists in a wide range of private industries and public authorities.

Both a Pass course and an Honours course are offered. The first four stages of both courses are identical, with all students enrolling in the Pass course on commencing studies.

The first two stages of the course consist of the study of basic science subjects.

The course subjects emphasise measurement, and the use and design of instrumentation for measurement and control. There is thus an emphasis in the course on modern electronics and computers.

### **Attendance patterns**

The Pass course consists of six stages which may be completed on a full-time (sandwich) or part-time basis.

Under a sandwich pattern of attendance, involving 24 hours each week at the University, a full stage may be completed in one semester. Allowing for a minimum period of one year of vocational experience, the course may be completed in four years. The normal attendance pattern is the sandwich pattern which is as follows:

#### **Year 1**

Stage 1 – full-time at the University  
Stage 2 – full-time at the University

#### **Year 2**

Stage 3 – full-time at the University  
Stage 4 – full-time at the University

#### **Year 3**

First industrial period of six months  
Second industrial period of six months

#### **Year 4**

Stage 5 – full-time at the University  
Stage 6 – full-time at the University

Part-time attendance involves 12 hours each week at the University, and with this form of attendance a full stage may be completed in one year. A student attending entirely on a part-time basis must satisfy the Associate Dean that he or she is employed in an area which is relevant to his or her academic program. The student would require a minimum of six years to complete the course. Being in full-time employment, the student would usually attend classes at the University for three evenings and one afternoon each week, assuming the commonly allowed day-release arrangements of one afternoon per week from employment.

Industrial training is regarded as an integral part of the course. All students, both full-time and part-time, must complete one year of relevant industrial experience.

### **Sandwich program – Pass degree**

Each stage corresponds to one semester of full-time attendance at the University.

#### **Stage 1**

##### **Autumn semester**

31870	Introduction to Microcomputers	2cp
33171	Science Mathematics 1	4cp
66011	Earth Science 1	6cp
	<i>or</i>	
91388	Concepts in Biology	6cp
65011	Chemistry 1	6cp
68101	Physics 1	6cp

#### **Stage 2**

##### **Spring semester**

33172	Science Mathematics 2	3cp
33173	Science Mathematics 3	3cp
65021	Chemistry 2	6cp
67101	Introduction to Materials	6cp
68201	Physics 2	6cp

#### **Stage 3**

##### **Autumn semester**

31871	Computing for Science	3cp
33221	Engineering Mathematics 2A	3cp
68304	Electronics 1	6cp
68311	Physics 3	6cp
68312	Applied Physics 1	6cp

#### **Stage 4**

##### **Spring semester**

33330	Physical Mathematics	3cp
51368	Written and Oral Reporting	2cp

68404	Electronics 2	3cp
68406	Computational Physics	4cp
68411	Physics 4	6cp
68412	Applied Physics 2	6cp

##### **Autumn semester**

68996	Industrial Training 1	
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##### **Spring semester**

68997	Industrial Training 2	
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#### **Stage 5**

##### **Autumn semester**

68503	Materials Physics	3cp
68504	Microprocessors in Instrumentation	3cp
68508	Project A (2 sem)	3cp
68511	Physics 5	6cp
68516	Techniques of Materials Analysis	6cp
	<i>and</i>	
	Elective	3cp

#### **Stage 6**

##### **Spring semester**

68508	Project A (2 sem)	3cp
68603	Applied Thermodynamics	3cp
68604	Principles of Instrumentation	3cp
68605	Transducers and Devices	3cp
68608	Project B	3cp
68611	Physics 6	6cp
	<i>and</i>	
	Elective	3cp

**Note:** Refer to comments under heading 'Elective' at the end of Part-time program.

### **Part-time program – Pass degree**

Part-time students are expected to progress through the academic component of the course at approximately half the speed of full-time students, completing the whole course in six years. Each stage of the full-time program is taken over a full year but, because most subjects are offered only once per year, in either Autumn or Spring semester, the subject sequence in the part-time program is different from that in the full-time program. Stages one and two are spread over the first two years of study, Stages three and four over the next two years, and Stages five and six over the final two years. Part-time students should seek advice on their academic program from the Head of the Department of Applied Physics.

## Electives

The course contains two electives (six credit points). However, students may, with the agreement of the Head of Department, vary up to six credit points of the standard program in order to develop their special interests.

Students may either select subject(s) from the list made available by the Department on Enrolment Day or propose subject(s) for the approval of the Head of Department.

An external subject i.e. a subject offered by an institution other than this University, may be taken as an elective, subject to the Head of Department's approval. In such cases credit may be given either by the awarding of a mark and grade, as with University subjects, or by the granting of an exemption.

## Industrial Training

Industrial Training (I.T.) is an integral part of the Degree course. It is a period in which the student is employed full-time in industry, doing work in which a physicist's skills and responsibilities may be experienced first-hand. Academic staff make considerable effort to assist full-time students in finding suitable employment; the full cooperation of such students is expected.

A mark and grade are given for each period of I.T. While the mark does not contribute towards the usual weighted average mark, the result appears on the official transcripts which future employers will see.

For part-time students I.T. is normally undertaken during the fifth year of study, but can be taken earlier or later or in two separate one-semester periods, subject to the 'Eligibility for I.T.' rules below, and in consultation with the I.T. Coordinator.

For full-time students I.T. is undertaken for two consecutive semesters at the end of two years of study or soon after this when an appropriate number of subjects have been passed. (Refer to 'Procedures for full-time students' below.)

For both full-time and part-time students, where their relevant industrial experience is substantial, exemptions may be granted.

## Eligibility for I.T.

Normally only employment which is:

- (a) approved; and
  - (b) undertaken after 60 credit points of academic work has been passed,
- will be assessed and given a mark and grade.

## Procedures for full-time students

Close to the middle of semester, information about I.T. in general, and the preparation for obtaining a position in particular, is placed on the noticeboard on Level 12. Also placed there is the list of students who have been classified to be assisted to find employment for the next semester. Students to whom this is relevant should keep a close watch on the board.

The procedures and criteria for classifying students are as follows:

1. The question of undertaking I.T. is first considered at the beginning of the Spring semester in the second year of study.

The classification rules are as follows:

- (a) Students who
    - (i) have passed 60cp including 18cp of Stage 3 subjects; and
    - (ii) were enrolled in 21cp during their third semester of study are classified status A.
  - (b) For these status A students, the Department will make a strong effort to assist them in obtaining 12 months of employment, to be undertaken in their fourth semester.
  - (c) However, if any of these status A students do not enrol (and remain enrolled) in at least 21cp in the fourth semester, they will be removed from status A and will be downgraded to status C.
  - (d) Status C students will only be assisted in finding a job if there is an excess of jobs. If students classified status C do not obtain a job they join the group of unclassified students. They will be considered again one semester later.
2. At the beginning of the third year of study and at the beginning of each subsequent semester (as necessary) all students who have not begun I.T. will be considered again.

Then the classification rules are as follows:-

- (a) Students who have passed 84cp will be classified status B.
- (b) For these status B students, the Department will assist them in obtaining 12 months of employment to begin at the end of semester.

- (c) However, in the current semester, if any of these status B students do not enrol (and remain enrolled) in at least 18cp or the remaining number of credit points to complete the course, whichever is the greater, they will be removed from status B and will be downgraded to status C.
- (d) Refer to 1(d) above, for the consequence of being downgraded to status C.

**Notes:** Students classified status A or B will be assisted in finding employment but those classified status A will have priority for jobs.

Students who find their own job may begin I.T. at an earlier stage, subject to the Eligibility Rule above. In particular they normally need to have passed at least 60cp before beginning employment.

Any student listed as classified for I.T. but who wishes to postpone it should consult the I.T. Coordinator soon after the lists are posted. Generally such postponements are discouraged. Successful completion of the second industrial period is normally a prerequisite for the subject Project.

### Assessment

The assessment of I.T. is based on:

1. a diary provided to all students, which includes a section for workplace supervisors to make comments;
2. the academic supervisor's report (all students are allocated an I.T. Supervisor from among the Applied Physics Department staff); and
3. the student's own report due at the end of semester.

### Project

The aim of the Project is to develop the student's ability to work independently or with minimum supervision in an area of some practical relevance. The work for the Project may be carried out at the University, at the student's place of employment, or at another approved location.

The Project forms a significant part of the final year of the Applied Physics degree program. It is, therefore, to be taken seriously and will demand a major effort from the student.

Before beginning the Project students normally should have completed Stage 4 of the course and at least one of the industrial periods.

Students intending to enrol in the Project should choose their topic prior to the end of classes in the previous semester. For this purpose, a notice concerning available topics and the procedure for the approval of a topic will be placed on the 'Urgent Physics Notices Board' after the Second Tutorial Week. Information on what is expected of all students doing a project and on the assessment procedures is available from the Projects Coordinator (Dr G Anstis).

## Bachelor of Applied Science (Honours) in Physics

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**Course code: NP02**

Students studying for the Applied Physics degree or the combined Applied Physics / Electrical Engineering degree at UTS have the opportunity of undertaking an Honours degree after four semesters of study. Many Honours students go on to postgraduate studies and embark on a career in research.

### Course

On commencing studies at UTS, all Applied Physics students enrol in the Pass degree. For the first four semesters all students undertake the same program of study. Those students who perform well over this period may then transfer into the Honours program. Such students then undertake either two years of full-time study or three years of part-time study to complete the degree. Both Pass and Honours degrees are of four years' duration. The Honours degree however, involves higher assessment standards, more advanced academic work, an industrial project and a substantial final year research project.

### Admission

1. Students will normally be admitted provisionally if they satisfy the following:
  - (a) After two years of full-time study (or part-time study equivalent) they have passed at least 41cp of Stages 3 and 4

*or*

  - After three years of full-time study (or part-time study equivalent) they have passed at least 96cp of which 89 or more should be from Stages 1-4

- (b) For all subjects taken beyond Stage 2 they have a WAM (weighted average mark) of at least 65
  - (c) There is a reasonable chance that 2, below, will be satisfied.
2. Students will normally have their status in the Honours course confirmed after one year of provisional status if they satisfy the following conditions:
- (a) They have passed 114cp of the program and completed Industrial Training (Honours)
  - (b) For all subjects taken during the year for which they have provisional status they have a WAM of at least 65.

**Notes:** Students who do not have their Honours status confirmed will be required to revert to the Pass course.

Students who have not passed 96cp at the time of being admitted, provisionally, are still required to have passed 114cp by the end of one extra year.

Any subjects taken by the student extra to the course program will not be considered in applying any of the above conditions.

### Selection procedure

At the end of Stage 3 students interested in undertaking the Honours program are required to register such interest with the Undergraduate Studies Coordinator (Dr R Woolcott). This should normally be done on the re-enrolment day before the start of Stage 4.

Such students will be advised early in Stage 4 whether they appear likely to satisfy admission rules 1(a) and 1(c) at the end of that year.

If advised that they appear likely to satisfy, then they will also be advised whether their performance in Stage 3 is:

1. at;
2. a little below; or
3. distinctly below

the standard required to enter the Honours program.

If advised that they do not appear likely to satisfy, then they will be advised:

1. what is required of them to satisfy the rules subsequently
- or*
2. that it is not possible for them to satisfy the admission rules.

At the end of Stage 4 students will be informed whether they can enter the Honours program.

Those entering are required to change their course from BAppSc(Phys) to BAppSc(Phys Hons) at the re-enrolment session.

### Assessment of Honours

The overall Honours mark at the end of the course is a weighted mark according to the following scheme:

Honours Research Project	40%
Honours Industrial Project	15%
Advanced subjects	30%

Subjects (above Stage 4) which are taken in common with pass students 15%

The class of Honours awarded is normally determined as follows:

Class 1, Honours mark of 80 or greater

Class 2, Division 1 Honours mark between 70 and 79

Class 2, Division 2 Honours mark between 60 and 69

Class 3, Honours mark between 50 and 59

In awarding the grade of Honours other factors may be taken into consideration including medical reasons or special difficulties associated with the project.

A candidate who fails to meet the criteria for the award of Honours may be eligible to graduate with a Pass degree.

### Full-time program

#### Years 1 to 2

As for Stages 1 to 4 of the Pass course.

#### Year 3

##### Autumn semester

68511	Physics 5 <sup>1</sup>	6cp
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##### Industrial requirements

68995	Industrial Training (Honours)	
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##### Spring semester

68603	Applied Thermodynamics <sup>1</sup>	3cp
68604	Principles of Instrumentation <sup>1</sup>	3cp
68611	Physics 6 <sup>1</sup>	6cp
	<i>and</i>	
	Elective	3cp

#### Year 4

##### Autumn semester

68503	Materials Physics <sup>1</sup>	3cp
68504	Microprocessors in Instrumentation <sup>1</sup>	3cp

68556	Advanced X-ray Techniques	4cp
68557	Advanced Electron Microscopy Techniques	4cp
68858	Project (Honours) (2 sem)	12cp

### Spring semester

68553	Computer Modelling of Physical Systems	3cp
68652	Device Physics	6cp
68655	Advanced Solid State Physics	4cp
68858	Project (Honours) (2 sem)	12cp

<sup>1</sup> Subjects taken in common with Pass students.

### Part-time program

Years 1 to 4 are identical to Stages 1 to 4 of the pass degree program. Programs of study for part-time students in Stages 5 to 8 of the Honours program will be determined in consultation with the Head of the Department of Applied Physics.

### Staff: locations and interests

The Department of Applied Physics is located in the Tower Building (Building 1) of the City campus Broadway, and occupies Levels 10 to 13. The Department Office is on Level 12.

The names, office locations and professional interests of academic and support staff are available from the Department Office, telephone 9514 2206.

## Bachelor of Applied Science in Physics/ Bachelor of Engineering in Electrical Engineering

### Course code: NP03

Applied Physics focuses on the application of modern scientific techniques and strategic use of physics, and has the aim of advancing technology, increasing our understanding and control of the environment, improving quality in production, and providing solutions to industrial and medical problems. Electrical Engineering is a professionally oriented discipline which prepares students for careers in electrical power, electronic instrumentation and control, and optical and electrical communication. The two disciplines are thus interdependent and have many common elements.

The double degree will enable graduates to pursue careers as scientists or engineers. As engineers they will benefit from the emphasis on basic understanding and innovation, 'hands-on' experience with advanced scientific instrumentation and modelling skills that they experience and develop in the applied physics component. As scientists their experience in engineering studies will enable them to appreciate the importance of, and have skills in, good design, the evaluation and testing of designs from performance, economic, social and environmental viewpoints, and their implementation into products and systems. Graduates will be particularly suited to the modern workplace with its need for multidisciplinary team oriented projects and for clear communication of ideas through all levels from process worker to senior management.

Key industries and research areas open to graduates include biomedical technology, energy and power, applied optics, communications, space and satellite technology, instrumentation and control, computer modelling and design, imaging, electromagnetic systems and materials, physical and industrial mathematics, technology and environmental management, and management consulting.

### Sandwich program – Pass degree

Each stage corresponds to one semester of full-time attendance at the University.

#### Stage 1

##### Autumn semester

68031	Engineering Physics	6cp
65011	Chemistry 1	6cp
35101	Mathematics 1	6cp
33100	Discrete Mathematics	3cp
45116	Engineering Practice	3cp

#### Stage 2

##### Spring semester

68201	Physics 2	6cp
65021	Chemistry 2	6cp
	<i>or</i>	
67101	Introduction to Materials	6cp
35102	Mathematics 2	6cp
45123	Software Development 1	6cp

**Stage 3**

**Autumn semester**

68311	Physics 3	6cp
68312	Applied Physics 1	6cp
68304	Electronics 1	6cp
33310	Engineering Maths 3 Elective	6cp

**Stage 4**

**Spring semester**

68411	Physics 4	6cp
68312	Applied Physics 2	6cp
68404	Electronics 2	3cp
45133	Software Development 2	3cp
68033	Engineering Physics 3	3cp
45135	Engineering Communications	3cp
	2 periods of Industrial Experience will normally be taken at this point	

**Stage 5**

**Autumn semester**

68511	Physics 5	6cp
45141	Continuous and Discrete Systems	6cp
45154	Contextual Studies	3cp
45145	Engineering Statistics	3cp
45143	Computer Hardware	3cp
	Physics Elective	3cp

**Stage 6**

**Spring semester**

68611	Physics 6	6cp
68516	Techniques of Materials Analysis	6cp
	<i>or</i>	
68652	Device Physics	6cp
45163	Real-Time Software and Interfacing	3cp
45153	Signal Theory 1	3cp
45155	Project A	3cp
45266	Mathematical Modelling	3cp
	(Students are eligible to take out the Applied Physics award after completion of the above program)	

**Stage 7**

**Autumn semester**

45152	Signal Theory 2	3cp
	Electrical Engineering Strand Subjects	18cp
	1 period of Industrial Experience will normally be taken after this point	

**Stage 8**

**Spring semester**

	Electrical Engineering Strand Subjects	15cp
	Social Science Elective	6cp
45182	Thesis 1	3cp

**Stage 9**

**Autumn semester**

45183	Thesis 2	12cp
	Electrical Engineering Strand Subjects	12cp

Subject descriptions for engineering subjects are available in the *Faculty of Engineering Handbook*.

**Bachelor of Health Science in Acupuncture**

**Course code: P005**

**Introduction**

The Bachelor of Health Science in Acupuncture provides the graduate with a professional entry level for the practice of acupuncture. Traditional Chinese Medicine is made up of two major branches: acupuncture and Chinese herbal medicine. This program is a companion course to the Bachelor of Health Science in Chinese Herbal Medicine that is also offered by the Faculty of Science through the Department of Health Sciences.

During the three-and-a-half years of full-time study required to complete the Pass level program, the student will study traditional Chinese medicine (TCM) theory and philosophical foundations, acupuncture techniques, moxibustion and *tuina* (Chinese massage), diagnosis, clinical skills, western medical sciences appropriate to a primary contact health care practitioner, practice management and research methods.

Having completed the Pass program, selected students in the Bachelor of Health Science in Acupuncture may have the opportunity to enter the Honours program or the combined degree: Bachelor of Health Science in Acupuncture/Bachelor of Arts in International Studies (Chinese major).



## Course structure

### Stage 1

#### Autumn semester

99560	Introduction to Traditional Chinese Medicine	6cp
99502	Foundations of Traditional Chinese Medicine	6cp
99561	Clinical Theory and Clinic – Level 1 (A&M)	3cp
99563	Health Sciences 1	6cp
51389	Professional Writing and Communication	3cp

### Stage 2

#### Spring semester

99564	The Physiology of Qi	4cp
99565	Point Location 1 (and Treatment Techniques)	6cp
99568	Clinic – Level 2 (A&M)	4cp
99570	Health Sciences 2	6cp
92167	Foundations of Helping and Caring	4cp

### Stage 3

#### Autumn semester

99571	Chinese Diagnostic System	5cp
99509	Special Points and Systems	5cp
99573	Clinic – Level 3 (A&M)	4cp
99539	Pathophysiology 1 (TCM)	6cp
91607	Research Methods 1	4cp

### Stage 4

#### Spring semester

99511	History and Philosophy of TCM	6cp
99575	Advanced Chinese Diagnosis	6cp
99576	Clinic – Level 4 (A&M) and Point Location 2	6cp
99540	Pathophysiology 2 (TCM)	6cp

### Stage 5

#### Autumn semester

99578	Microsystems	6cp
99579	Chinese Massage ( <i>Tuina</i> )	6cp
99582	Clinic – Level 5 & Advanced Treatment Techniques	6cp
99584	Clinical Features of Disease	6cp

### Stage 6

#### Spring semester

99517	Project Workshops	3cp
91608	Research Methods 2	4cp
99585	Disease States	6cp
99521	Clinical Acupuncture	5cp

99588	Clinical Theory and Clinic – Level 6 (A&M)	6cp
99536	First Aid Certificate Course	no cp

### Stage 7

#### Autumn semester

99590	Special Topics in TCM (Intermodal and Professional)	8cp
99591	Practice Management	4cp
99538	Clinical Internship	12cp <sup>1</sup>

<sup>1</sup> In Stage 7, 99527 Hospital Training in China (6cp) which is a one-month hospital internship in China is offered as an alternative to 50 per cent of 99538 Clinical Internship.

## Electives

Electives are designed to broaden student's cognitive and analytical skills, introducing them to a wider experiential professional background. Students are required to take one elective in second year and one elective in third year.

The following elective subjects have been approved for acupuncture students but students may choose course subjects from any UTS faculty, subject to the approval of the Head of School offering the subject and the Director of the College of Acupuncture. Elective subjects for the acupuncture course are allocated three credit points but students may select subjects with six credit points or more.

The following electives may be offered, subject to availability of places:

99528	An Introduction to <i>Tai Qi Chuan</i>
99529	A Systems View of Life
99530	Philosophy, Religion and Culture
99531	The Subtle Dimensions of Healing
99532	Social Crisis
99533	Acupuncture Health Politics in Australia
99535	Nutrition in a Traditional Chinese Medical Context
99543	<i>Qi Gong</i> : Its Use in Acupuncture

## Bachelor of Health Science in Acupuncture (Honours)

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**Course code:** P006

### Admission

Admission to the Honours program will be based on the student attaining a weighted average mark equal to, or greater than, 65 over the seven stages of the Pass degree program.

Each student applying for admission to the program will be invited to nominate an area of special interest in which they wish to carry out a research project and will be required to consult with relevant members of academic staff concerning the feasibility of their proposal. If the proposal is approved, and subject to the establishment of satisfactory supervisory arrangements, the student will be formally admitted to the program and will conduct their project according to the University's Code of Practice for Supervisors and Honours Year Students.

### Course structure

#### Stages 1 – 7

as for Pass degree.

#### Stage 8

99593 Honours Project 48cp

## Bachelor of Health Science in Acupuncture/ Bachelor of Arts in International Studies

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**Course code:** NH01

The combined degree program in Acupuncture and International Studies provides Acupuncture students with a greater exposure to, and understanding of, Chinese culture and a working knowledge of Chinese. The program should also make it more possible for Acupuncture graduates to practise outside Australia.

This course is a six-year degree program in which the study of Acupuncture is integrated with the China major of the International Studies program. Students spend the fifth year of study at a Chinese university. All existing arrangements for both the Bachelor of Health

Science in Acupuncture and the Bachelor of Arts in International Studies apply equally to the combined degree program in Acupuncture and International Studies.

To graduate with a BHlthSc BA, a student will be required to have completed 272 credit points of study: 176 credit points in Acupuncture and 96 credit points in Chinese Studies. Of the 96 credit points in Chinese Studies, there will be 32 credit points (four subjects) of study of the Chinese language; 16 credit points (two subjects) of the study of contemporary China and its global context; and 48 credit points (two semesters) of In-country Study at a university or institution of higher education in China.

Students do not need to have previously studied Chinese to be able to successfully complete the program. All students are required to complete four consecutive semesters of study of Chinese Language and Culture before proceeding to China for an academic year of study. There are various classes available for students with different levels of language proficiency: from complete beginners, to HSC-level proficiency and more advanced.

### Course structure

#### Year 1

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##### Stage 1

99560	Introduction to Traditional Chinese Medicine	6cp
99502	Foundations of Traditional Chinese Medicine	6cp
99561	Clinical Theory and Clinic – Level 1 (A&M)	3cp
99563	Health Sciences 1	6cp
51389	Professional Writing and Communication	3cp

##### Stage 2

99564	The Physiology of Qi	4cp
99565	Point Location 1 (and Treatment Techniques)	6cp
99568	Clinic – Level 2 (A&M)	4cp
99570	Health Sciences 2	6cp
92167	Foundations of Helping and Caring	4cp

#### Year 2

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##### Stage 3

99571	Chinese Diagnostic System	5cp
99509	Special Points and Systems	5cp
99573	Clinic – Level 3 (A&M)	4cp
99539	Pathophysiology 1 (TCM)	6cp
91607	Research Methods 1	4cp

**Stage 4**

99511	History and Philosophy of TCM	6cp
99575	Advanced Chinese Diagnosis	6cp
99576	Clinic – Level 4 (A&M) and Point Location 2	6cp
99540	Pathophysiology 2 (TCM)	6cp

**Year 3****Stage 5**

971101	Language and Culture: (Modern Standard) Chinese 1	8cp
99516	Advanced Needle Techniques, Ex-Channel Point Location and Clinic – Level 5	5cp
99517	Independent Research Project Workshops	3cp
91604	Introductory Microbiology/ Pharmacology	4cp
99518	Clinical Features of Disease	4cp

**Stage 6**

972101	Language and Culture: (Modern Standard) Chinese 2	8cp
99519	Advanced Acupuncture Principles	4cp
99521	Clinical Acupuncture	5cp
99522	Clinical Theory (Outpatient Clinic) and Clinic – Level 6	4cp
	First Aid Certificate course	0cp
	Elective	3cp

**Year 4****Stage 7**

973101	Language and Culture: (Modern Standard) Chinese 3	8cp
99515	Advanced Chinese Massage	3cp
99525	Supervised Practice (Outpatient Clinic)	6cp
99526	Independent Research Project	7cp

**Stage 8**

974101	Language and Culture: (Modern Standard) Chinese 4	8cp
976111	Contemporary Society: Contemporary China	8cp
99520	Disease States 1 & 2	8cp

**Year 5****Stage 9**

977110	In-country Study 1: China	24cp
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**Stage 10**

978110	In-country Study 2: China	24cp
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**Year 6****Stage 11**

975011	Contemporary Society 1: Modernisation and Globalisation	8cp
99514	Microsystems and Special Methods of Treatment	5cp
99523	Disease States 3	4cp
99524	Specialist Lecture Topics	4cp
21816	Practice Management	3cp

**Stage 12**

99525	Supervised Practice	6cp
99526	Independent Research Project	6cp
	<b>Total</b>	<b>272cp</b>

Further details of International Studies subjects may be found in the *Institute for International Studies Handbook*.

**Acupuncture Electives**

99528	An Introduction to <i>Tai Qi Chuan</i>	3cp
99529	A Systems View of Life	3cp
99530	Philosophy, Religion and Culture	3cp
99531	The Subtle Dimensions of Healing	3cp
99532	Social Crises	3cp
99533	Acupuncture Health Politics in Australia	3cp
99543	<i>Qi Gong</i> : Its Use in Acupuncture	3cp
99535	Nutrition in a Traditional Chinese Medical Context	3cp

## Bachelor of Health Science in Chinese Herbal Medicine

**Course code: NH02**

The Bachelor of Health Science in Chinese Herbal Medicine provides the graduate with a professional entry level for the practice of the herbal aspects of traditional Chinese medicine (TCM). TCM is made up of two major branches: acupuncture and Chinese herbal medicine. This program is a companion course to the Bachelor of Health Science in Acupuncture that is also offered by the Faculty of Science through the Department of Health Sciences.

During the three-and-a-half years of full-time study required to complete the Pass level program, the student will study TCM theory and philosophical foundations, Chinese herbs and herbal formulae, diagnosis, clinical skills, Western medical sciences appropriate to a primary contact health care practitioner, practice management and research methods.

Having completed the Pass program, selected students in the Bachelor of Health Science in Chinese Herbal Medicine may have the opportunity to enter the Honours program.

**Course structure**

**Stage 1**

**Autumn semester**

99560	Introduction to Traditional Chinese Medicine	6cp
99502	Foundations of Traditional Chinese Medicine	6cp
99562	Clinical Theory and Clinic – Level 1 (CHM)	3cp
99563	Health Sciences 1	6cp
51389	Professional Writing and Communication	3cp

**Stage 2**

**Spring semester**

99566	Introduction to Botany	4cp
99567	Introduction to Chinese Herbal Medicine	6cp
99569	Clinic – Level 2 (CHM)	4cp
99570	Health Sciences 2	6cp
92167	Foundations of Helping and Caring	4cp

**Stage 3**

**Autumn semester**

99571	Chinese Diagnostic System	5cp
99572	Chinese Herbal Formulae	5cp
99574	Clinic – Level 3 (CHM)	4cp
99539	Pathophysiology 1 (TCM)	6cp
91607	Research Methods 1	4cp

**Stage 4**

**Spring semester**

99511	History and Philosophy of TCM	6cp
99575	Advanced Chinese Diagnosis	6cp
99577	Clinic – Level 4 (CHM) and Chinese Herbal Medicine Practice	6cp
99540	Pathophysiology 2 (TCM)	6cp

**Stage 5**

**Autumn semester**

99580	Pharmacognosy	6cp
99581	Chinese Herbal Medicine 1	6cp
99583	Clinic – Level 5 (CHM) and Chinese Herbal Medicine Practice	6cp
99584	Clinical Features of Disease	6cp

**Stage 6**

**Spring semester**

99517	Project Workshops	3cp
91608	Research Methods 2	4cp
99536	First Aid Certificate Course	0cp
99586	Chinese Herbal Medicine 2	6cp
99587	Clinical Chinese Herbalism	5cp
99589	Clinical Theory (Internship Clinic) and Clinic – Level 6 (CHM)	6cp

**Stage 7**

**Autumn semester**

99590	Special Topics in TCM (Intermodal and Professional)	6cp
99591	Practice Management	4cp
99592	Clinical Internship (CHM)	12cp <sup>1</sup>

<sup>1</sup> In Stage 7, 99527 Hospital Training in China (6cp) which is a one-month hospital internship in China is offered as an alternative to 50 per cent of 99538 Clinical Internship.

**Bachelor of Health Science in Chinese Herbal Medicine (Honours)**

**Course code: NH03**

**Admission**

Admission to this course will be based on the student attaining a weighted average mark equal to, or greater than, 65 over the seven stages of the Pass degree program.

Students applying for admission will be invited to nominate an area of special interest in which they wish to carry out a research project and will be required to consult with relevant members of academic staff concerning the feasibility of their proposal. If the proposal is approved, and subject to the establishment of satisfactory supervisory arrangements, the student will be formally admitted to the program and will conduct their project according to the University's Code of Practice for Supervisors and Honours Year Students.

**Course structure**

**Stages 1 – 7**

as for Pass degree.

**Stage 8**

99593	Honours Project	48cp
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## Bachelor of Medical Science

### Course code: NH04

The Bachelor of Medical Science degree is designed to educate and train graduates for careers in both medical and health-related sciences. Following an initial program of studies in basic science, students specialise in a wide variety of medical and preclinical science areas structured to provide knowledge and understanding of the human body targeting its structure, function and disease processes both at a cellular, whole organ and behavioural level. In the intermediate and final years students will also select elective subjects to provide a major specialised strand. Elective strands will focus on either additional medical science areas such as molecular biology, immunology, haematology and clinical biochemistry or other subjects appropriate to the vocationally oriented course described below.

### Employment opportunities

The purpose of the course is to provide students with a degree that equips them to work in pharmaceutical, pathology and biomedical industries; biotechnology companies; medical research in research institutes, hospitals, industry and universities; and other health-related professions at both State and federal levels. In addition to employment in these areas graduates will also have the background knowledge and skills that are necessary for entry into graduate medical degrees as well as for preparing them for other vocationally oriented courses in the areas of occupational health and safety, biomedical engineering, nutrition and dietetics, osteopathy, public health and health administration. In addition, Honours, Master's and Doctoral programs by research are available for graduates who show an aptitude for independent research work.

### Course structure

The course consists of six stages offered on a full-time attendance basis only. Subjects are divided into core subjects and elective subjects. All students enrolled in the course must satisfactorily complete a total of 30 credit points of elective subjects for award of the degree. Students generally choose elective subjects with a particular theme or area of

expertise in mind. Elective combinations include a particular area of study through subjects available within the biological and biomedical sciences, or by way of subjects from other faculties of UTS including Humanities and Social Sciences, Engineering, Nursing, Business, Law, or the Institute of International Studies. It should be noted that timetable constraints may prevent the undertaking of some elective combinations.

#### Stage 1

##### Autumn semester

91701	Introductory Medical Science 1	6cp
65012	Chemistry 1 (LS)	6cp
33103	Statistics for Life Sciences	3cp
68101	Physics 1	6cp
33101	Mathematics 1	3cp

#### Stage 2

##### Spring semester

91702	Introductory Medical Science 2	6cp
65022	Chemistry 2 (LS)	6cp
33105	Introductory Biometrics	3cp
68201	Physics 2	6cp
91395	Biocomputing	3cp

#### Stage 3

##### Autumn semester

91703	Physiological Systems	6cp
91313	Biochemistry 1	6cp
91314	Microbiology 1	6cp
91354	Anatomical Pathology	6cp

#### Stage 4

##### Spring semester

91704	Behavioural Sciences	6cp
91705	Medical Devices and Diagnostics	6cp
91320	Biochemistry 2	6cp
	Electives	6cp

#### Stage 5

##### Autumn semester

91706	Neuroscience	8cp
91707	Pharmacology 1	8cp
	Electives	8cp

#### Stage 6

##### Spring semester

91708	Psychophysiology	8cp
91709	Pharmacology 2	8cp
	Electives 8cp	

## Bachelor of Science (Honours)

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**Course code:** KB04

### Admission

The Honours course is open to students who possess, or have fulfilled, all the requirements for a three-year Bachelor's degree in Biomedical Science, Biotechnology, Environmental Biology or Urban Horticulture from UTS, or equivalent qualification, with at least an average credit grade in the final two stages of the undergraduate program.

### Aims

An Honours program gives basic training in biological or biomedical research. Students may then enter occupations for which an Honours degree is the minimum requirement or continue with postgraduate research.

### Attendance patterns

The course is offered as a full-time program over two semesters. The research project, which is the major component of the course and extends over both semesters, normally takes the form of an experimental or analytical investigation, undertaken either in the laboratory or in the field. The course also requires students to undertake two critical reviews of the scientific literature in designated areas. The project work is in an area of biomedical science (biochemistry, molecular biology, immunology, pathology or microbiology), biotechnology, physiology (neuro or cardiac), environmental biology (including environmental toxicology and coastal resource management) or urban horticulture, and the results are presented in an oral seminar and in a written report, both of which are formally assessed.

### Application

Prospective candidates should make an application to the Registrar by 31 October, for entry to the Honours degree program in the first semester of the following year. There is provision for consideration of late applications.

### Selection

Applications for entry to the Honours degree will be considered by the Honours Degree Committee. Applicants will be notified of acceptance by the Registrar.

### Fees and Higher Education Contribution Scheme

Higher Education Contribution Scheme (HECS) fees will normally apply to all students enrolled in Honours courses. All enrolled students are also required to pay the compulsory University Union and Students' Association charges on enrolment.

### Commencement date

Students are required to commence work on their Honours program on the Monday of the first week in February. This applies even when formal enrolment is held after this date. Students should contact their supervisor for details.

### Award

The Honours degree will be awarded with the following grades: Class 1, Class 2 Division 1, Class 2 Division 2 and Class 3.

They will be referred to as Bachelor of Science (Honours)

Abbreviation: BSc (Hons)

Course code: KB04

### Further information

Interested students should discuss the program and the possible research projects available, with Course Coordinators or with individual members of academic staff.

### Course structure

#### Full-time program

Year 1 Stages 1 and 2

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#### Autumn and Spring semesters

91304 Honours (Biological and Biomedical Sciences)	48cp
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#### Part-time program

Year 1 Stages 1 and 2

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#### Autumn and Spring semesters

91305 Honours (Biological and Biomedical Sciences) (2yrs)	24cp
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Year 2 Stages 3 and 4

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#### Autumn and Spring semesters

91305 Honours (Biological and Biomedical Sciences) (2yrs)	24cp
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## Bachelor of Science (Honours) in Applied Chemistry – Forensic Science

### Course code: NC04

This course was introduced in 1994 and Forensic Science subjects started in 1996.

This course provides a program of instruction which, together with a research project, will prepare students for entry to professional work in the field of applied chemistry or as a specialist in the forensic science area. The course includes a firm foundation of studies in the basic sciences, with in-depth development of the discipline of chemistry, emphasising its forensic applications.

### Length

The Bachelor of Science (Honours) in Applied Chemistry – Forensic Science will comprise four years of full-time coursework including one semester of research work.

### Attendance pattern

The course will be offered on a four-year full-time basis.

### Course structure

The first two years of the program are common for all chemistry students, after which those students studying for the degree in Forensic Science will undertake two years of forensic studies.

If the required standard for Honours is not achieved at the end of Stage 4, students' enrolment in the course will be discontinued and they will be offered the option of full-credit transfer to the BAppSc (Chemistry).

### Full-time program

Each stage corresponds to one semester of full-time attendance.

#### Stage 1

##### Autumn semester

31870	Introduction to Microcomputers	2cp
33171	Science Mathematics 1	4cp
65101	Chemistry 1M	6cp
68101	Physics 1	6cp
66011	Earth Science 1	6cp
	<i>or</i>	
91388	Concepts in Biology	6cp

#### Stage 2

##### Spring semester

31871	Computing for Science	3cp
33172	Science Mathematics 2	3cp
65201	Chemistry 2M	6cp
65202	Organic Chemistry 1	6cp
68201	Physics 2	6cp

#### Stage 3

##### Autumn semester

60301	Treatment of Scientific Data	3cp
65301	Spectroscopy and Structure	7cp
65302	Inorganic Chemistry	7cp
65504	Chemical Safety	4cp
66031	Technical Communication	4cp

#### Stage 4

##### Spring semester

65401	Analytical Chemistry 1	8cp
65402	Organic Chemistry 2	8cp
65403	Electrochemistry	4cp
65404	Chemical Thermodynamics	4cp

#### Stage 5

##### Autumn semester

33173	Science Mathematics 3	3cp
	Elective	4cp
65551	Analytical Chemistry 2 (Advanced)	8cp
65556	Forensic Examination of Physical Evidence 1	4cp
65557	Forensic Toxicology 1	5cp

#### Stage 6

##### Spring semester

65603	Surface Chemistry	4cp
65656	Forensic Examination of Physical Evidence 2	6cp
65657	Forensic Toxicology 2	8cp
79990	Legal System	4cp
91382	Introduction to Biological Fluids	3cp

#### Stage 7

##### Autumn semester

65756	Forensic Examination of Physical Evidence 3	6cp
65757	Narcotics and Drugs of Abuse	5cp
65758	Fire Investigation	5cp
79991	Forensic Science Case Study	6cp

#### Stage 8

##### Spring semester

65856	Research Project	24cp
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## Bachelor of Science in Biomedical Science

### Course code: KB02

The Biomedical Science degree consists of an initial program of biology, chemistry, physics, mathematics, statistics and computing followed by microbiology, biochemistry, pathology, immunology and molecular biology. Students then complete the third year of the course by undertaking a number of elective subjects, totalling a minimum of 48 credit points. Some of these electives cover more advanced biomedical aspects of the second-year core subjects while others introduce a range of important areas of applied biomedical science.

The undergraduate training provides a solid background in the physical sciences and emphasises practical experimentation. In the final stages of the course, research activities are encouraged through project assignments. Students acquire familiarity with advanced instruments and technology. They are encouraged to participate in seminar activities. The purpose of the course is to educate people in a number of interface areas between modern technology, biology and medicine.

### Employment opportunities

A wide range of employment opportunities is available to graduates. Biomedical scientists work closely with clinical pathologists, surgeons and other medical specialists in the control and elimination of disease. There is a demand for biomedical scientists in the Commonwealth and State health departments, the Repatriation Department, CSIRO, universities, pharmaceutical firms, veterinary laboratories and private pathology laboratories.

### Course structure

Students can complete the degree in three years full time or six years part time or by a combination of both these attendance patterns. Subjects are divided into core subjects and elective subjects. All students enrolled in the degree must satisfactorily complete all core subjects for award of the degree and, in addition, must satisfactorily complete the required number of credit points of elective subjects. Students generally choose elective subjects with a particular theme or area of expertise in mind. Recommended electives are given in the Elective Options Table, and

recommended combinations of subjects are listed for the guidance of students. It should be noted that timetable constraints may prevent the undertaking of some elective combinations.

### Full-time program

#### Stage 1

##### Autumn semester

33101	Mathematics 1 (LS)	3cp
33103	Statistics for Life Sciences	3cp
65012	Chemistry 1 (LS)	6cp
68041	Physics 1 (LS)	6cp
91311	Biology 1	6cp

#### Stage 2

##### Spring semester

33105	Introductory Biometrics	3cp
65022	Chemistry 2 (LS)	6cp
91312	Biology 2	6cp
91317	Human Biology	6cp
91395	Biocomputing	3cp

#### Stage 3

##### Autumn semester

91313	Biochemistry 1	6cp
91314	Microbiology 1	6cp
91316	Bioinstrumentation and Physiological Systems	6cp
91354	Anatomical Pathology	6cp

#### Stage 4

##### Spring semester

91320	Biochemistry 2	6cp
91326	Analytical Biochemistry	6cp
91330	Microbiology 2	6cp
91351	Immunology 1	3cp
91355	Haematology 1	3cp

#### Stage 5

##### Autumn semester

Electives <sup>1</sup>	24cp
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#### Stage 6

##### Spring semester

Electives <sup>1</sup>	24cp
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<sup>1</sup> For details of electives available for the Biomedical Science degree, see Elective Options Table.



**Part-time program****Stage 1****Autumn semester**

65012	Chemistry 1 (LS)	6cp
91311	Biology 1	6cp

**Spring semester**

91312	Biology 2	6cp
65022	Chemistry 2 (LS)	6cp

**Stage 2****Autumn semester**

68041	Physics 1 (LS)	6cp
33101	Mathematics 1 (LS)	3cp
33103	Statistics for Life Sciences	3cp

**Spring semester**

33105	Introductory Biometrics	3cp
91395	Biocomputing	3cp
91317	Human Biology	6cp

**Stages 3 and 4 – in 1997 and odd years****Autumn semester**

91314	Microbiology 1	6cp
91354	Anatomical Pathology	6cp

**Spring semester**

91330	Microbiology 2	6cp
91351	Immunology 1	3cp
91355	Haematology 1	3cp

**Stages 3 and 4 – in 1998 and even years****Autumn semester**

91313	Biochemistry 1	6cp
91316	Bioinstrumentation and Physiological Systems	6cp

**Spring semester**

91320	Biochemistry 2	6cp
91326	Analytical Biochemistry	6cp

**Stage 5****Autumn semester**

Electives <sup>1</sup>	8 or 16cp
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**Spring semester**

Electives <sup>1</sup>	16 or 8cp
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**Stage 6****Autumn semester**

Electives <sup>1</sup>	8 or 16cp
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**Spring semester**

Electives <sup>1</sup>	16 or 8cp
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<sup>1</sup> For details of electives available for the Biomedical Science degree, see Elective Options Table.

**Notes:** The order in which part-time students undertake Stage 3, 4, 5 and 6 subjects, is determined by the fact that subjects are offered in appropriate time slots in alternate years only. Students entering the program in even and odd years will take their preferred combination of subjects in a different sequence.

**Elective Options Table for Biomedical Science course**

Code	Name	Credit points	Sem A/S	Recommended subject for stage
91331	Microbiology 3	8	A	5
91332	Molecular Biology 1	8	A	5
91344	Clinical Biochemistry 1	8	A	5
91358	Haematology 2	8	A	5
91335	Molecular Biology 2	8	S	6
91338	Clinical Bacteriology	8	S	6
91340	Transfusion Science	8	S	6
91345	Clinical Biochemistry 2	8	S	6
91350	Principles in Pharmacology and Toxicology	4	A	5
91352	Eukaryotic Microbiology	8	S	6
91359	Immunology 2	8	S	6
91377	Cytopathology	16	Full Year	5&6
91398	Special Reading Assignment LS <sup>1</sup>	4	A&S	5&6
91399	Individual Project LS <sup>1</sup>	8	A&S	5&6
xxxxx	Miscellaneous elective <sup>2</sup>	4	A&S	5 or 6

**Key:**

A = Timetabled in Autumn semester      S = Timetabled in Spring semester      LS = Life Sciences

1 Supervision form must be completed and approved by the Course Coordinator.

2 This may include subjects from other courses within the biological and biomedical sciences, subjects from another UTS school or faculty or subjects from another university undertaken on a cross-institution enrolment basis: e.g. Viruses and Disease at UNSW. Programs that include more than 4cp of miscellaneous subjects require approval of the Associate Dean (Undergraduate Programs).

**Notes:** Subjects marked 5 and 6 can be undertaken by part-time students when programmable provided the prerequisites are met.

Owing to timetabling constraints, not all electives may be available to all students in any given semester.

Subjects not marked may be able to be taken as electives following discussion with an appropriate member of academic staff.

## Recommended subject strands

Completion of any combination of subjects totalling a minimum of 48 credit points from the table of approved electives will fulfil the requirements of Stages 5 and 6 of the Biomedical Science degree course. However, it is strongly recommended that students include at least one of the following combinations of subjects in their programs. Each combination constitutes a cohesive strand of study in a particular discipline or related disciplines.

### Biochemistry strand

#### Stage 5

91332	Molecular Biology 1	8cp
91344	Clinical Biochemistry 1	8cp
	<i>plus</i>	
	Additional electives	8cp

#### Stage 6

91335	Molecular Biology 2	8cp
91345	Clinical Biochemistry 2	8cp
	<i>plus</i>	
	Additional electives	8cp

### Microbiology strand

#### Stage 5

91331	Microbiology 3	8cp
91332	Molecular Biology 1	8cp
	<i>plus</i>	
	Additional electives	8cp

#### Stage 6

91338	Clinical Bacteriology	8cp
91352	Eukaryotic Microbiology	8cp
	<i>plus</i>	
	Additional electives	8cp

### Pathology strand

#### Stage 5

91358	Haematology 2	8cp
91377	Cytopathology (2 sem)	8cp
	<i>plus</i>	
	Additional electives	8cp

#### Stage 6

91340	Transfusion Science	8cp
91377	Cytopathology (2 sem)	8cp
	<i>plus</i>	
	Additional electives	8cp

### Immunology strand

#### Stage 5

91332	Molecular Biology 1	8cp
	<i>plus</i>	
	Additional electives	16cp

#### Stage 6

91335	Molecular Biology 2	8cp
91359	Immunology 2	8cp
	<i>plus</i>	
	Additional electives	8cp

## Bachelor of Science in Biotechnology

### Course code: KB06

The Bachelor of Science in Biotechnology is fully recognised for membership of both the Australian Institute of Biology Inc. and the Australian Society for Microbiology, as well as being a professional qualification with emphasis on DNA technology and its applications. The course encompasses basic sciences plus microbiology, biochemistry, immunology, industrial biotechnology and molecular biology. At the completion of the course students will have acquired a sound background in industrial microbiology, and competence in a wide range of standard biological, microbiological and biochemical laboratory techniques.

### Employment opportunities

Today's biotechnologist has an expanding variety of career opportunities, and graduates from this degree can expect to find employment opportunities in the food, beverage, chemical, pharmaceutical and fermentation industries, particularly in production, quality control, or research and development areas. These industries depend on a high level of professional competence in standard techniques of microbiology and biochemistry. An increasing number of products involve the application of some of the molecular or other aspects of biotechnology in their manufacture. A variety of research and development opportunities exist e.g. AIDS research, or the production of transformed plants or animals with designer genes. Good employment opportunities also exist with State and Federal Government scientific instrumentalities, and in research and other laboratories in tertiary institutions, hospitals

and industry. In recent years a number of smaller, specialised development and consulting companies have developed from biotechnology research programs. These organisations require graduates with a strong basis in biotechnology and applied microbiology. Many employers in the biotechnology field, being themselves active in research and development, have close links with tertiary education institutions, and can offer graduates the possibility of higher degree studies in conjunction with employment.

### Course structure

Students can complete the degree in three years full time or six years part time or by a combination of both these attendance patterns. Subjects are divided into core subjects and elective subjects. All students enrolled in the degree must satisfactorily complete all core subjects for award of the degree and, in addition, must satisfactorily complete a total of 12 credit points of elective subjects. Students generally choose elective subjects with a particular theme or area of expertise in mind. Examples of recommended electives are given in the Elective Options Table; however, it should be noted that timetable constraints may prevent the undertaking of some elective combinations.

**Elective combinations** include a particular area of study via subjects available from within the biological and biomedical sciences, or via subjects from other faculties of UTS and other individual elective sequences as may be approved by the Associate Dean, including subjects offered by other universities.

### Full-time program

#### Stage 1

##### Autumn semester

33101	Mathematics 1 (LS)	3cp
33103	Statistics for Life Sciences	3cp
65012	Chemistry 1 (LS)	6cp
68041	Physics 1 (LS)	6cp
91311	Biology 1	6cp

#### Stage 2

##### Spring semester

33105	Introductory Biometrics	3cp
65022	Chemistry 2 (LS)	6cp
91312	Biology 2	6cp
91317	Human Biology	6cp
91395	Biocomputing	3cp

#### Stage 3

##### Autumn semester

91313	Biochemistry 1	6cp
91314	Microbiology 1	6cp
91315	Biomonitoring	3cp
91316	Bioinstrumentation and Physiological Systems	6cp
91376	Environmental Measurement	3cp

#### Stage 4

##### Spring semester

91320	Biochemistry 2	6cp
91326	Analytical Biochemistry	6cp
91330	Microbiology 2	6cp
91351	Immunology 1	3cp
91373	Applied Mycology	3cp

#### Stage 5

##### Autumn semester

91331	Microbiology 3	8cp
91332	Molecular Biology 1	8cp
91369	Applied and Environmental Microbiology	8cp

#### Stage 6

##### Spring semester

91335	Molecular Biology 2	8cp
91368	Bioprocessing <i>plus</i> Electives <sup>1</sup>	8cp

<sup>1</sup> For details of the electives available for the Biotechnology degree, see Elective Options Table.

Note: Total elective credit points to be completed: 8.

### Part-time program

#### Stage 1

##### Autumn semester

65012	Chemistry 1 (LS)	6cp
91311	Biology 1	6cp

##### Spring semester

65022	Chemistry 2 (LS)	6cp
91312	Biology 2	6cp

#### Stage 2

##### Autumn semester

33101	Mathematics 1 (LS)	3cp
33103	Statistics for Life Sciences	3cp
68041	Physics 1 (LS)	6cp

**Spring semester**

33105	Introductory Biometrics	3cp
91317	Human Biology	6cp
91395	Biocomputing	3cp

**Stages 3 and 4 – in 1997 and odd years****Autumn semester**

91314	Microbiology 1	6cp
91315	Biomonitoring	3cp
91376	Environmental Measurement	3cp

**Spring semester**

91330	Microbiology 2	6cp
91351	Immunology 1	3cp
91373	Applied Mycology	3cp

**Stages 3 and 4 – in 1998 and even years****Autumn semester**

91313	Biochemistry 1	6cp
91316	Bioinstrumentation and Physiological Systems	6cp

**Spring semester**

91320	Biochemistry 2	6cp
91326	Analytical Biochemistry	6cp

**Stage 5****Autumn semester**

91332	Molecular Biology 1	8cp
91331	Microbiology 3	8cp

**Spring semester**

91335	Molecular Biology 2	8cp
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**Stage 6****Autumn semester**

91369	Applied and Environmental Microbiology <i>plus</i> Electives <sup>1</sup>	8cp 8, 4 or 0cp
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**Spring semester**

91368	Bioprocessing <i>plus</i> Electives <sup>1</sup>	8cp 0, 4 or 8cp
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<sup>1</sup> For details of the electives available for the Biotechnology degree, see Elective Options Table.

**Notes:** Total elective credit points to be completed: 8. Some electives for part-time students are offered in alternate years only. Students entering the program in even and odd years will take their preferred combination of electives in a different sequence.

The order in which part-time students undertake Stage 3, 4, 5 and 6 subjects is determined by the fact that subjects are offered in appropriate time slots in alternate years only.

**Elective Options Table for Biotechnology course**

Code	Name	Credit points
91324	Environmental Toxicology	8
91338	Clinical Bacteriology	8
91327	Environmental Management Procedures	8
91350	Principles in Pharmacology and Toxicology	4
91352	Eukaryotic Microbiology	8
91347	Toxic Materials in the Environment	4
91359	Immunology 2	8
91375	Field Studies: Marine Science	4
91399	Individual Project LS <sup>1</sup>	8
	Miscellaneous elective <sup>2</sup>	4&8

Key:

LS = Life Sciences

<sup>1</sup> Supervision form must be completed and approved by the Course Coordinator.

<sup>2</sup> This may include subjects from other courses within the biological and biomedical sciences, subjects from another UTS school or faculty or subjects from another university undertaken on a cross-institution enrolment basis: e.g. Viruses and Disease at UNSW.

Programs that include more than 4cp of miscellaneous subjects require approval of the Associate Dean (Undergraduate Programs).

**Bachelor of Science in Environmental Biology****Course code: KB05**

The Bachelor of Science in Environmental Biology is fully recognised for membership of the Australian Institute of Biology Inc. and fully qualifies graduates as biological scientists with specialisation in environmental science.

The course provides a degree in biological science and the advanced technological skills to tackle complex environmental problems such as an ability to apply sampling and measurement methods for such purposes as pollution monitoring or the preparation of environmental assessments. After foundation studies in the basic sciences, students will specialise in the ecology and physiology of plants, animals and micro-organisms, and in freshwater, marine and terrestrial ecosystems. Students will also have the opportunity to take part in field trips to many parts of the State, for example north and south coastal areas, Snowy Mountains, the Murrumbidgee Irrigation Area, the far west and Jervis Bay.

Students should note that excursions for field study elective subjects may be held in the weeks prior to semester and in other non-teaching weeks during the year. In 1997, the excursion for Stage 5 subject Aquatic Ecology will be held in February. An excursion to Jervis Bay (as part of Field Studies: Marine Sciences) is also offered during February and/ or July of each year. Students should consult with lecturers before annual recess.

### Employment opportunities

Graduates of the course may be employed as scientific officers with government agencies such as the Water Board, Environment Protection Authority, Departments of Environment, Fisheries, CaLM Planning, National Parks and Wildlife Service, museums and herbaria; with local government authorities; or as technical and research officers with universities and colleges; or as environmental consultants, or environmental, toxicological or biological scientists in private enterprise. Many organisations provide opportunities for graduates to undertake research projects for a higher degree in the Faculty.

### Course structure

Students can complete the degree in three years full time or six years part time or by a combination of both attendance patterns. Subjects are divided into core subjects and elective subjects. All students enrolled in the degree must satisfactorily complete all core subjects for award of the degree, and, in addition, must satisfactorily complete a total of 12 credit points of elective subjects. Students generally choose elective subjects with a particular theme or area of expertise in mind. Examples of recommended electives are given in the Elective Options Table; however, it should be noted that timetable constraints may prevent the undertaking of some elective combinations.

**Elective combinations** include a particular area of study via subjects available from within the biological and biomedical sciences, and other individual electives, for example, from another faculty or university, as approved by the Associate Dean.

## Full-time program

### Stage 1

#### Autumn semester

33101	Mathematics 1 (LS)	3cp
33103	Statistics for Life Sciences	3cp
65012	Chemistry 1 (LS)	6cp
68041	Physics 1 (LS)	6cp
91311	Biology 1	6cp

### Stage 2

#### Spring semester

33105	Introductory Biometrics	3cp
65022	Chemistry 2 (LS)	6cp
91312	Biology 2	6cp
91317	Human Biology	6cp
91395	Biocomputing	3cp

### Stage 3

#### Autumn semester

91270	Plant Physiology	6cp
91303	Experimental Design in Ecology	3cp
91329	Ecological Sampling	3cp
91313	Biochemistry 1	6cp
91314	Microbiology 1	6cp

### Stage 4

#### Spring semester

91307	Community and Population Ecology	3cp
91308	Australian Soils	3cp
91309	Australian Biota	6cp
91363	Animal Ecophysiology <i>plus one of the following</i>	6cp
91320	Biochemistry 2	6cp
91326	Analytical Biochemistry	6cp
91330	Microbiology 2	6cp

### Stage 5

#### Autumn semester

91306	Terrestrial Ecosystems	4cp
91318	Ecological Modelling	4cp
91323	Mapping and Remote Sensing	4cp
91364	Aquatic Ecology <i>plus</i> Electives <sup>1</sup>	8cp 4cp

### Stage 6

#### Spring semester

91324	Environmental Toxicology	8cp
91325	Open Space Management	4cp

91327	Environmental Management Procedures	4cp
	<i>plus</i> Electives <sup>1</sup>	8cp

<sup>1</sup> For details of the electives available for the Environmental Biology degree, see Elective Options Table.

Note: Total elective credit points to be completed: 12.

## Part-time program

### Stage 1

#### Autumn semester

65012	Chemistry 1 (LS)	6cp
91311	Biology 1	6cp

#### Spring semester

65022	Chemistry 2 (LS)	6cp
91312	Biology 2	6cp

### Stage 2

#### Autumn semester

33101	Mathematics 1 (LS)	3cp
33103	Statistics for Life Sciences	3cp
68041	Physics 1 (LS)	6cp

#### Spring semester

33105	Introductory Biometrics	3cp
91317	Human Biology	6cp
91395	Biocomputing	3cp

### Stages 3 and 4 – in 1997 and odd years

#### Autumn semester

91270	Plant Physiology	6cp
91314	Microbiology 1	6cp

#### Spring semester

91309	Australian Biota	6cp
91363	Animal Ecophysiology	6cp

### Stages 3 and 4 – in 1998 and even years

#### Autumn semester

91303	Experimental Design in Ecology	3cp
91329	Ecological Sampling	3cp
91313	Biochemistry 1	6cp

#### Spring semester

91307	Community and Population Ecology	3cp
91308	Australian Soils	3cp
	<i>plus one of the following</i>	
91320	Biochemistry 2	6cp
91326	Analytical Biochemistry	6cp
91330	Microbiology 2	6cp

### Stages 5 and 6 – in 1997 and odd years

#### Autumn semester

91306	Terrestrial Ecosystems	4cp
91364	Aquatic Ecology	8cp

#### Spring semester

	<i>either</i>	
91324	Environmental Toxicology	8cp
91327	Environmental Management Procedures	4cp
	<i>or</i>	
91325	Open Space Management	4cp
	<i>plus</i> Electives <sup>1,2</sup>	8cp

### Stages 5 and 6 – in 1998 and even years

#### Autumn semester

91318	Ecological Modelling	4cp
91323	Mapping and Remote Sensing	4cp
	<i>plus</i> Electives <sup>1</sup>	4cp

#### Spring semester

	<i>either</i>	
91324	Environmental Toxicology	8cp
91327	Environmental Management Procedures	4cp
	<i>or</i>	
91325	Open Space Management	4cp
	<i>plus</i> Electives <sup>1,2</sup>	8cp

<sup>1</sup> For details of the electives available for the Environmental Biology degree, see Elective Options Table.

<sup>2</sup> Students are urged to ensure that 8cp of electives are taken in their final semester.

Notes: Total elective credit points to be completed: 12. Subjects for part-time students may be offered in a different order or combination in any one year. Students should note that excursions may be held in the week prior to semester.

## Bachelor of Science in Urban Horticulture

### Course code: KB03

The Bachelor of Science in Urban Horticulture is fully recognised for membership of the Australian Institute of Biology Inc. and the Australian Institute of Horticulture Inc. as a professional qualification in plant science and as a specialist qualification in ornamental and amenity, landscape and environmental horticulture.

The course provides students with a sound background in plant science and horticultural management. After introductory studies in horticulture and foundation studies in the basic sciences, students will specialise in plant science. Areas studied include plant structure, physiology, ecology, genetics and soil science. As there is a particular emphasis on ornamental and amenity horticulture, students also undertake studies in plant cultivation, protection, breeding and Australian plants. Horticultural management is studied in relation to financial management, plant production systems and open space areas.

Excursions will be undertaken in the Sydney metropolitan area and to other parts of the State. **Students should note that excursions may be held in the weeks prior to semester and in other non-teaching weeks during the semester. In 1997, for example, the Marine Ecology excursion will be held in February prior to formal classes.**

### Employment opportunities

Graduates of the course are in increasing demand as professional horticulturists. As an urban horticulturist you might be a researcher in a plant sciences laboratory; work on the selection and breeding of new ornamental varieties, including Australian native species; be responsible for the planning and management of nursery production, park and recreation areas; or be responsible for the revegetation and management of natural areas disturbed by human impact. Many graduates also enter universities and research organisations.

### Course structure

Students can complete the degree in three years full time or six years part time or a combination of both attendance patterns. The undergraduate program emphasises practical experimentation, and research activities are

encouraged through project assignments. The students acquire familiarity with advanced instruments and technology, and are encouraged to participate in seminar activities. The course has been developed in close liaison with all branches of the industry and with the Horticulture School of the Ryde College of TAFE.

Subjects are divided into core subjects and elective subjects. All students enrolled in the degree must satisfactorily complete all core subjects for award of the degree and, in addition, must satisfactorily complete a total of eight credit points of elective subjects. Students generally choose elective subjects with a particular theme or area of expertise in mind. Examples of recommended electives are given in Elective Options Table; however, it should be noted that timetable constraints may prevent the undertaking of some elective combinations.

**Elective combinations** include a particular area of study via subjects available and approved by the Head of Department, for example from another faculty or university.

### Full-time program

#### Stage 1

##### Autumn semester

33103	Statistics for Life Sciences	3cp
65012	Chemistry 1 (LS)	6cp
91230	Landscape Design	3cp
91231	Horticulture 1	6cp
91311	Biology 1	6cp

#### Stage 2

##### Spring semester

33105	Introductory Biometrics	3cp
65022	Chemistry 2 (LS)	6cp
91232	Horticulture 2	6cp
91312	Biology 2	6cp
91395	Biocomputing	3cp

#### Stage 3

##### Autumn semester

91233	Plant Production and Growth Media	6cp
91270	Plant Physiology	6cp
91303	Experimental Design in Ecology	3cp
91329	Ecological Sampling	3cp
91314	Microbiology 1	6cp



**Stage 4****Spring semester**

91234	Uses of Australian Plants	6cp
91237	Plant Pathology	6cp
91307	Community and Population Ecology	3cp
91308	Australian Soils	3cp
91309	Australian Biota	6cp

**Stage 5****Autumn semester**

91207	Plants in the Landscape	8cp
91229	Horticultural Financial Management	4cp
91236	Plant Tissue Culture	4cp
91306	Terrestrial Ecosystems	4cp
	<i>plus</i>	
	Electives <sup>1</sup>	4cp

**Stage 6****Spring semester**

91224	Horticultural Production Management	4cp
91325	Open Space Management	4cp
91271	Plant Genetics and Breeding	8cp
	<i>plus</i>	
	Electives <sup>1</sup>	8cp

<sup>1</sup> For details of the electives available for the Urban Horticulture degree, see Elective Options Table.

**Notes:** Total elective credit points to be completed: 12. Students should note that excursions for field study elective subjects may be held in the weeks prior to semester and in other non-teaching weeks during the year.

**Part-time program****Stage 1****Autumn semester**

65012	Chemistry 1 (LS)	6cp
91311	Biology 1	6cp

**Spring semester**

65022	Chemistry 2 (LS)	6cp
91312	Biology 2	6cp

**Stage 2****Autumn semester**

33103	Statistics for Life Sciences	3cp
91230	Landscape Design	3cp
91231	Horticulture 1	6cp

**Spring semester**

33105	Introductory Biometrics	3cp
91232	Horticulture 2	6cp
91395	Biocomputing	3cp

**Stages 3 and 4 – in 1997 and odd years****Autumn semester**

91314	Microbiology 1	6cp
91270	Plant Physiology	6cp

**Spring semester**

91309	Australian Biota	6cp
91234	Uses of Australian Plants	6cp

**Stages 3 and 4 – in 1998 and even years****Autumn semester**

91233	Plant Production and Growth Media	6cp
91303	Experimental Design in Ecology	3cp
91329	Ecological Sampling	3cp

**Spring semester**

91308	Australian Soils	3cp
91307	Community and Population Ecology	3cp
91237	Plant Pathology	6cp

Stages 5 and 6 – in 1997 and odd years

**Autumn semester**

91306	Terrestrial Ecosystems	4cp
91207	Plants in the Landscape	8cp

**Spring semester**

*either*

91271	Plant Genetics and Breeding	8cp
91324	Horticultural Production Management	4cp

*or*

91325	Open Space Management	4cp
	<i>plus</i> Electives <sup>1,2</sup>	8cp

Stages 5 and 6 – in 1998 and even years

**Autumn semester**

91229	Horticultural Financial Management	4cp
91236	Plant Tissue Culture	4cp
	<i>plus</i> Electives <sup>1</sup>	4cp

**Spring semester**

*either*

91271	Plant Genetics and Breeding	8cp
91324	Horticultural Production Management	4cp

*or*

91325	Open Space Management	4cp
	<i>plus</i> Electives <sup>1,2</sup>	8cp

<sup>1</sup> For details of the electives available for the Urban Horticulture degree, see Elective Options Table.

<sup>2</sup> Students are urged to ensure that 8cp of electives are taken in their final semester.

**Notes:** Total elective credit points to be completed: 12. The order in which part-time students undertake Stage 3, 4, 5 and 6 subjects is determined by the fact that subjects are offered in appropriate time slots in alternate years only.

Students should note that excursions for field study elective subjects may be held in the weeks prior to semester and in other non-teaching weeks during the year.

**Part-time program  
(for entrants with Associate  
Diploma in Horticulture or  
equivalent)**

Stage 1

**Autumn semester**

33103	Statistics for Life Sciences	3cp
65012	Chemistry 1 (LS)	6cp
91230	Landscape Design	3cp

**Spring semester**

33105	Introductory Biometrics	3cp
91312	Biology 2	6cp
91395	Biocomputing	3cp

Stage 2 – in 1998 and even years

**Autumn semester**

91233	Plant Production and Growth Media	6cp
91303	Experimental Design in Ecology	3cp
91329	Ecological Sampling	3cp

**Spring semester**

65022	Chemistry 2 (LS)	6cp
91307	Community and Population Ecology	3cp
91308	Australian Soils	3cp

Stage 3 – in 1997 and odd years

**Autumn semester**

91314	Microbiology 1	6cp
91270	Plant Physiology	6cp

**Spring semester**

91309	Australian Biota	6cp
91234	Uses of Australian Plants	6cp

Stage 4

**Autumn semester**

91207	Plants in the Landscape	8cp
91229	Horticultural Financial Management	4cp
91236	Plant Tissue Culture	4cp

**Spring semester**

91271	Plant Genetics and Breeding	8cp
91224	Horticultural Production Management	4cp
91225	Open Space Management	4cp

**Note:** Subjects for part-time students may be offered in a different order or combination in any one year.

## Elective Options Table for Environmental Biology and Urban Horticulture Courses

Code	Name	Credit points	Semester A/S	Envir Biology	Urb Hort
91207	Plants in the Landscape	8	A	5	C
91233	Plant Production and Growth Media	6	A	5	C
91234	Uses of Australian Plants	6	S	6	C
91236	Plant Tissue Culture	4	A	5	C
91237	Plant Pathology	6	S	5	C
91270	Plant Physiology	6	A	C	C
91271	Plant Genetics and Breeding	8	S	8	C
91319	Concepts in Biochemistry	8	A	N/A	5
91324	Environmental Toxicology	8	S	C	6
91328	Environmental Microbiology	4	A	4	4
91330	Microbiology 2	6	S	C	6
91331	Microbiology 3	8	A	5	N/A
91332	Molecular Biology 1	8	A	5	N/A
91335	Molecular Biology 2	8	S	6	N/A
91338	Clinical Bacteriology	8	S	N/A	N/A
91347	Toxic Materials in the Environment	4	S	6	N/A
91350	Principles of Pharmacology and Toxicology	4	A	5	N/A
91352	Eukaryotic Microbiology	8	S	6	N/A
91363	Animal Ecophysiology	6	S	C	6
91364	Aquatic Ecology	8	A	C	5
91370	Field Studies: Semi-Arid Ecology (July '97)	8		5 or 6	5 or 6
91371	Field Studies: Mountain Ecology (Nov '98)	8	S	5 or 6	5 or 6
91373	Applied Mycology	3	S	6	6
91375	Field Studies: Marine Sciences	4	A&S	5 or 6	5 or 6
91280	Current Urban and Environmental Issues A	4	A&S	5 or 6	5 or 6
91281	Current Urban and Environmental Issues B	6	A&S	5 or 6	5 or 6
91282	Current Urban and Environmental Issues C	8	A&S	5 or 6	5 or 6
91283	Undergraduate Research Project <sup>1</sup>	8	S	6	6
	Miscellaneous elective/LS elective (i.e. a subject from another faculty or university)	4/8	A&S	5 or 6	5 or 6

### Key:

A = Timetabled in Autumn semester

S = Timetabled in Spring semester

LS = Life Sciences

5 or 6 = Recommended elective Stage 5 or 6

C = Core subject for that course

N/A = Not available to students in this degree

<sup>1</sup> = Supervision form must be completed

**Notes:** Subjects marked 5 and/or 6 can be undertaken by part-time students when programmable provided the prerequisites are met.

Owing to timetabling constraints, not all electives may be available to all students in any given semester.

Subjects not marked may be able to be taken as electives following discussion with an appropriate member of academic staff.

Students should note that excursions for field study elective subjects may be held in the weeks prior to semester and in other non-teaching weeks during the year.

## Bachelor of Science in Science Education

### Course code: N003

This course provides students with a degree in Science and a professional qualification in Education. The degree can be completed in four years, and comprises three-and-a-half years' full-time academic studies in science and education, and one-half year's industrial training in a scientific discipline.

The course is a preparation for secondary school science teachers of chemistry, physics and geology. Graduates find employment in private and public secondary schools. The opportunity to seek employment in the relevant scientific discipline also exists.

The degree is fully recognised by the NSW Department of School Education and by professional scientific bodies.

### Course program – Chemistry major

#### Year 1

##### Autumn semester

65101	Chemistry 1M	6cp
68101	Physics 1	6cp
31870	Introduction to Microcomputers	2cp
33171	Science Mathematics 1	4cp
66011	Earth Science 1	6cp
	<i>or</i>	
91388	Concepts in Biology	6cp

##### Spring semester

65201	Chemistry 2M	6cp
65202	Organic Chemistry 1	6cp
68201	Physics 2	6cp
31871	Computing for Science	3cp
33172	Science Mathematics 2	3cp

#### Year 2

##### Autumn semester

60301	Treatment of Scientific Data	3cp
65301	Spectroscopy and Structure	7cp
65302	Inorganic Chemistry	7cp
66031	Technical Communication	4cp
33173	Science Mathematics 3	3cp

##### Spring semester

65401	Analytical Chemistry 1	8cp
65402	Organic Chemistry 2	8cp
65403	Electrochemistry	4cp
65404	Chemical Thermodynamics	4cp

#### Year 3

##### Autumn semester

023001	Psychology of Secondary Students	3cp
023002	Meeting Special Needs in Secondary School	3cp
023191	Secondary Practicum 1	12cp
028001	Learning in Science 1	7cp

##### Spring semester

65996	Industrial Training 1	
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#### Year 4

##### Autumn semester

Electives	24cp
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##### Spring semester

023502	Social Bases of Education	4cp
023192	Secondary Practicum 2	12cp
028002	Learning in Science 2	7cp

### Course program – Physics major

#### Year 1

##### Autumn semester

65011	Chemistry 1 F/T	6cp
68101	Physics 1	6cp
31870	Introduction to Microcomputers	2cp
33171	Science Mathematics 1	4cp
66011	Earth Science 1	6cp
	<i>or</i>	
91388	Concepts in Biology	6cp

##### Spring semester

65021	Chemistry 2 F/T	6cp
68201	Physics 2	6cp
67101	Introduction to Materials	6cp
33172	Science Mathematics 2	3cp
33173	Science Mathematics 3	3cp

#### Year 2

##### Autumn semester

31871	Computing for Science	3cp
33221	Engineering Mathematics 2A	3cp
68304	Electronics 1	6cp
68311	Physics 3	6cp
68312	Applied Physics 1	6cp

##### Spring semester

33330	Physical Mathematics	3cp
51368	Written and Oral Reporting	2cp
68411	Physics 4	6cp
68404	Electronics 2	3cp
68406	Computational Physics	4cp
68412	Applied Physics 2	6cp

## Year 3

**Autumn semester**

023001	Psychology of Secondary Students	3cp
023002	Meeting Special Needs in Secondary School	3cp
023191	Secondary Practicum 1	12cp
028001	Learning in Science 1	7cp

**Spring semester**

68996	Industrial Training 1	
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## Year 4

**Autumn semester**

Electives	24cp
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**Spring semester**

023502	Social Bases and Education	4cp
023192	Secondary Practicum 2	12cp
028002	Learning in Science 2	7cp

**Course program –  
Geology major**

## Year 1

**Autumn semester**

66101	Earth Science 1M	6cp
65011	Chemistry 1 F/T	6cp
31870	Introduction to Microcomputers	2cp
68101	Physics 1	6cp
	<i>or</i>	
91388	Concepts in Biology	6cp
33170	Basic Science Mathematics	3cp
	<i>or</i>	
33171	Science Mathematics 1	4cp

**Spring semester**

66201	Geological Mapping	4cp
66202	Lithology	2cp
66203	Geodynamics	3cp
65021	Chemistry 2 F/T	6cp
68041	Physics 1 (LS)	6cp
	<i>or</i>	
68201	Physics 2	6cp
33171	Science Mathematics 1	4cp
	<i>or</i>	
33172	Science Mathematics 2	3cp

## Year 2

**Autumn semester**

66301	Mineralogy and Petrology	8cp
66302	Sedimentary Geology	6cp
66303	Geochemistry	3cp
31871	Computing for Science	3cp
60301	Treatment of Scientific Data	3cp

**Spring semester**

66401	Technical Communication	3cp
66402	Structural Geology	7cp
66403	Economic Geology	4cp
66404	Resource Management	3cp
66405	Basin Analysis	4cp
66406	Exploration Geophysics	4cp

## Year 3

**Autumn semester**

023001	Psychology of Secondary Students	3cp
023002	Meeting Special Needs in Secondary School	3cp
023191	Secondary Practicum 1	12cp
028001	Learning in Science 1	7cp

**Spring semester**

66996	Industrial Training 1	
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## Year 4

**Autumn semester**

Electives	24cp
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**Spring semester**

023502	Social Bases and Education	4cp
023192	Secondary Practicum 2	12cp
028002	Learning in Science 2	7cp

## Bachelor of Science/ Bachelor of Laws

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### Course code: LL04

The BSc LLB combined degree was first introduced at UTS in 1991. The course is aimed primarily at producing Law graduates with a strong background in science who wish to work in areas such as environmental law, patents and mining law.

Students completing the course are able to apply for admission as either solicitors or barristers of the Supreme Court of New South Wales.

The combined degree is a five-year full-time course. Three law subjects studied in the first year of the course are taught over one year (two semesters), the remaining subjects are one semester. Students attend 11 to 15 hours of lectures, practicals and seminars per week. Students may be required to attend evening classes.

Students have the option to undertake the standard science component, as detailed below, or to specialise in a particular disciplinary strand in order to obtain relevant professional recognition and the opportunity to proceed to a separate science degree. Students who choose to enter one of the disciplinary strands are required to have their academic program approved by the relevant Head of Department prior to the commencement of semester. Details of the strands and their requirements are available from the Faculty Office but students should be aware that specialisation can lead to timetabling difficulties and that they will need to be flexible in arranging their study programs.

### Course program

Each stage corresponds to one semester of full-time attendance. Students should note that, owing to the introduction of changes into the materials science and applied physics degree courses in 1997, minor variations to the standard program may be necessary and some of the listed science electives may not be available. Students who are affected by these changes are asked to consult the Associate Dean (Undergraduate Programs).

#### Stage 1

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##### Autumn semester

65013	Chemistry 1 (SL)	5cp
66013	Earth Science 1 (SL)	5cp
70113	Legal Process and History	10cp
70100	Skills: Legal Research and Writing	2cp
70400	Skills: Computerised Legal Research	2cp

#### Stage 2

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##### Spring semester

33171	Science Mathematics 1	4cp
65025	Chemistry 2 (SL)	5cp
70211	Law of Contract	8cp
70212	Criminal Law	7cp
70200	Skills: Case Analysis and Statutory Interpretation	2cp

#### Stage 3

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##### Autumn semester

33172	Science Mathematics 2	3cp
60301	Treatment of Scientific Data	3cp
68081	Physics 1 (SL)	5cp
70311	Law of Tort	8cp
70611	Federal Constitutional Law	7cp

#### Stage 4

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##### Spring semester

66404	Resource Management	3cp
67201	Materials Science 1	4cp
70300	Skills: Conveyancing	3cp
70312	Real Property	7cp
70411	Commercial Transactions	7cp

#### Stage 5

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##### Autumn semester

67302	Polymers 1	3cp
70513	Succession	4cp
70514	Family Law	5cp
70612	Administrative Law	7cp
91389	Biology 1 (SL)	5cp

#### Stage 6

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##### Spring semester

68082	Physics 2 (SL)	5cp
70412	Corporate Law	7cp
70500	Skills: Drafting	2cp
70511	Equity and Trusts	7cp
91390	Biology 2 (SL)	5cp

#### Stage 7

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##### Autumn semester

70600	Skills: Pleadings	2cp
70705	Skills: Litigation	4cp

## 70 UNDERGRADUATE COURSES

71114	Remedies and Restitution	7cp
71113	Insolvency	3cp
	<i>plus</i>	
	Science electives <sup>1</sup>	12cp

### Stage 8

#### Spring semester

70900	Skills: Moot	3cp
71112	Conflict of Laws	7cp
71212	Revenue Law	7cp
	<i>plus</i>	
	Science electives <sup>1</sup>	10cp

### Stage 9

#### Autumn semester

71201	Skills: Alternative Dispute Resolution	2cp
71211	Law of Evidence	7cp
	<i>plus</i>	
	Science electives <sup>1</sup>	11cp
	<i>plus</i>	
	Law elective <sup>2</sup>	7cp

### Stage 10

#### Spring semester

	Science electives <sup>1</sup>	6cp
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#### <sup>1</sup> Science electives

The Science electives may be chosen from the following:

65301	Spectroscopy and Structure	7cp
65401	Analytical Chemistry 1	8cp
65501	Analytical Chemistry 2	8cp
65601	Environmental Chemistry	8cp
66061	Environmental Geology	3cp
66202	Lithology	2cp
66601	Exploration and Mining Geology	4cp
67301	Materials Science 2	4cp
67402	Polymers 2	4cp
68302	Applied Optics	3cp
91313	Biochemistry 1	6cp
91314	Microbiology 1	6cp
91315	Biomonitoring	3cp
91317	Human Biology	6cp
91320	Biochemistry 2	6cp
91330	Microbiology 2	6cp
91376	Environmental Measurement	3cp
91351	Immunology 1	3cp
91354	Anatomical Pathology	6cp
91355	Haematology 1	3cp
91380	Concepts in Environmental Science	3cp

#### <sup>2</sup> Law elective

Choice of any subject with 77...prefix (from 77001 to 77054 inclusive). Please refer to the *Faculty of Law Handbook* for details.

# Postgraduate courses

## General Information

The Faculty offers both PhD and Master's programs by research and thesis. There are also a number of Master's by coursework, Graduate Diplomas and Graduate Certificate programs. Brief outlines of the programs are provided below. Prospective students should discuss possible topics of research with the Head of the appropriate department in the first instance. For further formal information, they should consult the University Graduate School information booklet and individual brochures.

## External supervision

The research programs may be carried out on either a full-time or a part-time basis, and it is permissible for part-time students to undertake a portion of their research at a site external to UTS, provided an appropriate external supervisor can be appointed. Students applying for the part-time study mode with external supervision are required to show, prior to enrolment, that appropriate supervision, research support and facilities are available. These requirements are in addition to the normal requirement of internal supervision of an agreed research topic.

## Fees and Higher Education Contribution Scheme

Higher Education Contribution Scheme (HECS) will normally apply to all Research and Master's by coursework students. Course fees apply for some Graduate Diplomas and for all Graduate Certificates. At the discretion of the Vice-Chancellor, HECS scholarships have, in recent years, been granted to students enrolled in Doctoral degrees. All enrolled students are required to pay the compulsory University Union and Students' Association charges on enrolment.

## Postgraduate scholarships

A number of scholarships are available to postgraduate students undertaking Master's and Doctoral programs both by coursework and research. The Department of Employment, Education, Training and Youth Affairs (DEETYA) currently funds research, coursework and overseas research postgraduate awards. Information regarding eligibility criteria and how to apply for these

scholarships is available from the University Graduate School, City campus of UTS. Closing dates for these scholarships have, in recent years, been in late September/October of the year prior to award.

## GRADUATE CERTIFICATE COURSES

### Graduate Certificates in Biomedical Technology<sup>1</sup>

- Computer Data Acquisition in the Life Sciences (KB71)
- Data Processing and Management in the Life Sciences (KB72)
- Electronics and Computing in the Life Sciences (KB73)
- Human Biology (KB74)
- Medical Instrumentation and Measurement (KB75)
- Physics in Medicine (KB76)

### Graduate Certificates in Coastal Resource Management<sup>2</sup>

- Coastal Resource Management (KB69)
- Principles of Coastal Zone Law and Economics (KB80)

### Graduate Certificate in Environmental Engineering and Management<sup>2</sup> (EC58)

### Graduate Certificates in Environmental Toxicology and Ecotoxicology<sup>3</sup>

- Ecotoxicology (KB77)
- Principles of Environmental Toxicology (KB78)

### Graduate Certificates in Occupational Health and Safety

- Occupational Health and Safety (P053)
- Occupational Health and Safety Management (P054)

<sup>1</sup> There will be no intake in these courses in 1997.

<sup>2</sup> Interdisciplinary course run by the Faculty of Science in collaboration with the Faculties of Engineering; Business; Law; and Design, Architecture and Building.

<sup>3</sup> In collaboration with the NSW Environment Protection Authority.



The Graduate Certificate courses in Coastal Resource Management, Environmental Toxicology and Ecotoxicology normally consist of two or three subjects offered over one semester for up to nine hours per week. The Graduate Certificate courses in Environmental Engineering and Management and Occupational Health and Safety are normally offered over two semesters. Offered at the postgraduate level, they allow professionals to undertake a specific group of work-related subjects in order to enhance their knowledge in the rapidly expanding fields of science and technology.

### Attendance

Each certificate course normally involves nine hours of attendance at UTS per week – one afternoon and two evenings – over one semester.

### Course fees

Course fees will apply for all Graduate Certificate courses. Postgraduate students are also required to pay the student services charge on enrolment. The Graduate Certificate fee-paying courses are designed for students who do not wish to undertake a Master's degree and/or have been unable to gain entry into the Master's degree program. Students who have completed a Graduate Certificate and have achieved a high level of academic performance in the course may apply for entry to an appropriate Master's degree program. Such applications will be considered subject to vacancies.

## Graduate Certificate in Computer Data Acquisition in the Life Sciences

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**Course code:** KB71

*Course Coordinator:* Associate Professor L K Holley

**Note:** There will be no intake in this course in 1997.

Graduate Certificates in Biomedical Technology are specifically designed as intensive training programs for professionals working in the areas of medical instrumentation and clinical measurement.

This certificate is designed to give comprehensive theoretical and practical education in computer hardware and software used in the area of clinical and physiological data acquisition. The program will provide the participant with knowledge and tools to set up and operate the digital acquisition and processing section of a data acquisition laboratory in a physiological setting.

### Admission requirements

This course is offered to graduates from the physical or biological sciences, engineering or medicine, with appropriate prerequisites. Graduate Certificate courses in Biomedical Technology will be offered in either Autumn or Spring semester and some will be offered in alternate years only.

### Available in Spring semester - odd years

91463	Hardware for Clinical Data Acquisition and Control	6cp
91464	Laboratory Biocomputing	5cp
91465	Advanced Programming – Life Sciences	5cp

## Graduate Certificate in Data Processing and Management in the Life Sciences

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**Course code: KB72**

*Course Coordinator: Associate Professor L K Holley*

**Note:** There will be no intake in this course in 1997.

Graduate Certificates in Biomedical Technology are specifically designed as intensive training programs for professionals working in the areas of medical instrumentation and clinical measurement.

This certificate is designed to provide students with an extensive range of mathematical, statistical, signal-processing and image-processing skills. These are directly applicable to the analysis of biological systems, diagnostic images, physiological signals and related areas of data processing and analysis in the life sciences.

### Admission requirements

This course is offered to graduates from the physical or biological sciences, engineering or medicine, with appropriate prerequisites. Graduate Certificate courses in Biomedical Technology will be offered in either Autumn or Spring semester and some will be offered in alternate years only.

#### **Available in Autumn semester every year when the course is offered**

91462	Digital Processing of Signals and Images in Medicine	5cp
91461	Physiological Modelling	5cp
91433	Biostatistics	6cp

## Graduate Certificate in Electronics and Computing in the Life Sciences

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**Course code: KB73**

*Course Coordinator: Associate Professor L K Holley*

**Note:** There will be no intake in this course in 1997.

Graduate Certificates in Biomedical Technology are specifically designed as intensive training programs for professionals working in the areas of medical instrumentation and clinical measurement.

This certificate is designed to give a foundation education in analogue and digital electronics, accompanied by a suitable treatment of mathematical concepts, and in computer programming as applied to the life sciences. It is suitable for health professionals wishing to enter biomedical instrumentation, clinical measurement and other related fields.

### Admission requirements

This course is offered to graduates from the physical or biological sciences, engineering or medicine, with appropriate prerequisites. Graduate Certificate courses in Biomedical Technology will be offered in either Autumn or Spring semester and some will be offered in alternate years only.

#### **Available in Autumn semester every year when the course is offered**

91405	Bioelectronics	6cp
91408	Principles of Biocomputing	5cp
91436	Advanced Mathematics in the Life Sciences	5cp

## Graduate Certificate in Human Biology

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**Course code:** KB74

*Course Coordinator:* Associate Professor L K Holley

**Note:** There will be no intake in this course in 1997.

Graduate Certificates in Biomedical Technology are specifically designed as intensive training programs for professionals working in the areas of medical instrumentation and clinical measurement.

This certificate is designed to give a foundation education in biological processes, and, in particular, the various physiological processes of the human body. It is suitable for scientists and engineers in the areas of biomedical engineering, medical physics or related fields, who wish to branch into biological applications.

### Admission requirements

This course is offered to graduates from the physical or biological sciences, engineering or medicine, with appropriate prerequisites. Graduate Certificate courses in Biomedical Technology will be offered in either Autumn or Spring semester and some will be offered in alternate years only.

**Available in Autumn semester every year when the course is offered**

91421 Principles of Human Biology 10cp

## Graduate Certificate in Medical Instrumentation and Measurement

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**Course code:** KB75

*Course Coordinator:* Associate Professor L K Holley

**Note:** There will be no intake in this course in 1997.

Graduate Certificates in Biomedical Technology are specifically designed as intensive training programs for professionals working in the areas of medical instrumentation and clinical measurement.

This certificate is designed to give comprehensive theoretical and practical education in the techniques of monitoring and measuring physiological parameters. Advanced instrumentation techniques and

sensors and transducers used in physiological monitoring are taught in this course. The physical principles used to explain the operation and interaction of the physiological behaviour and the measurement techniques are also covered.

### Admission requirements

This course is offered to graduates from the physical or biological sciences, engineering or medicine, with appropriate prerequisites. Graduate Certificate courses in Biomedical Technology will be offered in either Autumn or Spring semester and some will be offered in alternate years only.

**Available in Spring semester – even years**

91437	Advanced Bioinstrumentation	5cp
91438	Biosensors and Transducers	5cp
91439	Physiological Measurement	6cp

## Graduate Certificate in Physics in Medicine

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**Course code:** KB76

*Course Coordinator:* Associate Professor L K Holley

**Note:** There will be no intake in this course in 1997.

Graduate Certificates in Biomedical Technology are specifically designed as intensive training programs for professionals working in the areas of medical instrumentation and clinical measurement.

This course is designed for professionals in the area of medical physics, radiation protection, organ imaging and other related fields. Extensive theoretical and practical work is carried out in the hospital setting and at the Australian Nuclear Science and Technology Organisation.

### Admission requirements

This course is offered to graduates from the physical or biological sciences, engineering or medicine, with appropriate prerequisites. Graduate Certificate courses in Biomedical Technology will be offered in either Autumn or Spring semester and some will be offered in alternate years only.

**Available in Spring semester – even years**

91434	Radiation Protection	5cp
91403	Medical Imaging	6cp
91404	Physics in Medicine	5cp

## Graduate Certificate in Coastal Resource Management

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**Course code:** KB69

This course is designed to introduce graduates to general concepts and technical and scientific aspects of coastal resource management. The course would be particularly suitable for graduates without a scientific background in their undergraduate degree course e.g. graduates from business or law courses. Science graduates may also be interested to extend their range of expertise, in the context of coastal resource management.

This Graduate Certificate course comprises 12 credit points of part-time study and will be offered in Autumn semester. The subjects undertaken by individual candidates will be drawn from those offered in the first stage of the part-time Master's program, the combination of subjects being determined by a candidate's needs and academic background.

## Graduate Certificate in Principles of Coastal Zone Law and Economics

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**Course code:** KB80

This course introduces graduates to the concepts and basic tenets of economics and environmental law as they relate to coastal resource management, and at the same time introduces students to research design and methods. While the last of these helps to bring together the various disciplinary approaches found in an integrated resource management team, it has particular relevance to cost-benefit analysis. In linking these three subjects, an attempt is made to provide future coastal resource managers with the ability to develop achievable and affordable solutions to real problems within an appropriate legal framework.

The course would be particularly suitable for graduates in science and engineering who wish to broaden their knowledge of these fields. It would also be suitable for graduates in business and law who wish to extend their expertise in the context of coastal resource management.

This Graduate Certificate course comprises 12 credit points of part-time study and will be offered in Spring semester. The subjects will be those offered in the second stage of the part-time Master's program.

## Graduate Certificate in Environmental Engineering and Management

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**Course code:** EC58

Environmental engineering and management are high on the political agenda. They also have a high professional priority. The Code of Ethics of the Institution of Engineers, Australia reminds its members that their responsibility '... for the welfare, health and safety of the community shall at all times come before their responsibility to the profession, to sectional or private interest or to other Engineers'. This responsibility applies equally to scientists, town planners and other professionals working in this field. They have a compelling duty to ensure that the adverse effects of development on the total environment are minimised.

This course of four subjects deals with the broad aspects of environmental management relevant to practising professionals in engineering, science, planning, architecture, law, surveying, health and building. Completing the course will develop a background and competency in environmental management.

More specifically, it will develop an awareness of ecological process; a sensitivity to the possible impacts of planned actions on environment, an understanding of the issues related to monitoring and to reducing the impacts of those actions; and professional skills to work as part of an integrated team responsible for environmental planning and management.

### Duration of course and attendance patterns

This course is offered on a block-release pattern of study. The normal attendance pattern is based on two subjects per semester requiring a minimum of two semesters to complete the course.

The block-release pattern of study currently consists of three sessions per semester. Each session involves three days of full-time attendance covering two subjects per semester.

### Admission requirements

The normal educational qualification for admission is a Bachelor's degree in engineering, science, design, architecture, building, surveying or planning. Equivalent qualifications will be considered on their merits.

Provisional admission for graduates from disciplines other than those above will be available provided their education contained an adequate introduction to mathematics and physical sciences. Each application in these categories will be used as a selection criterion if acceptable applications outnumber available places.

### Articulation with Master's program

A multidisciplinary Master's degree program for environmental professionals is under active consideration. It is likely that completion of the Graduate Certificate will provide 'advanced standing' in such Master's programs at UTS.

### Course structure

#### Autumn semester

49121	Environmental Assessment and Planning	6cp
49122	Introduction to Environmental Engineering and Management	6cp

#### Spring semester

49123	Waste Minimisation and Advances in Pollution Control	6cp
49124	Urban Water Quality Management	6cp

### Academic inquiries should be directed to the following persons:

Associate Professor R Buckney  
Department of Environmental Biology and Horticulture,  
Room GH2.3a, telephone: 9514 4092

Dr M Dawson  
Department of Chemistry,  
Room 4/208, telephone: 9514 1717

Associate Professor S Vigneswaran  
School of Civil Engineering,  
Room 2/523, telephone: 9514 2641

Dr J Broadbent  
School of Design,  
Room 6/610, telephone: 9514 8986

## Graduate Certificate in Principles of Environmental Toxicology

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### Course code: KB78

Course Coordinator: Dr R Lim

Graduate Certificates in Environmental Toxicology and Ecotoxicology are designed to provide training in specific areas of environmental toxicology.

This Graduate Certificate course is designed to provide a foundation education in environmental toxicology and to familiarise the student with biochemical and environmental effects of the various groups of environmentally hazardous chemicals.

### Admission requirements

Admission to these courses is open to graduates with degrees in biological sciences, chemistry, agriculture, pharmacy, engineering or equivalent disciplines. The student load per semester is 12 credit points. Two Graduate Certificates are offered, each to be completed as one semester of formal coursework.

#### Available in Autumn semester

91441	Principles of Toxicology <i>and either</i>	8cp
91493	Biosystems <i>or</i>	4cp
91474	Statistics in Bioscience	4cp

## Graduate Certificate in Ecotoxicology

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### Course code: KB77

Course Coordinator: Dr R Lim

Graduate Certificates in Environmental Toxicology and Ecotoxicology are designed to provide training in specific areas of environmental toxicology.

This Graduate Certificate is designed to provide students with skills in experimental design and analysis in natural environmental systems and a sound understanding of toxicity testing in a wide range of organisms.

## Admission requirements

Admission to these courses is open to graduates with degrees in biological sciences, chemistry, agriculture, pharmacy, engineering or equivalent disciplines. The student load per semester is 12 credit points. Two Graduate Certificates are offered, each to be completed as one semester of formal coursework.

### Available in Spring semester

91440	Experimental Design and Methods	4cp
91473	Bioassays/Toxicological Testing	8cp

## Graduate Certificate in Occupational Health and Safety

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### Course code: P053

This program involves an appropriate selection of subjects from those offered in the Graduate Diploma program, to be completed in two semesters part-time. This Graduate Certificate program is not government funded and is accordingly offered only on a full-fee basis.

## Graduate Certificate in Occupational Health and Safety Management

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### Course code: P054

This program involves an appropriate selection of subjects from those offered in the Graduate Diploma program, to be completed in two semesters part time. This Graduate Certificate program is not government funded and is accordingly offered only on a full-fee basis.

## GRADUATE DIPLOMA COURSES

The Faculty offers the following Graduate Diploma programs:

- Graduate Diploma in Clinical Acupuncture (NH51)
- Graduate Diploma in Clinical Biochemistry (KB65)
- Graduate Diploma in Coastal Resource Management<sup>1</sup> (KB70)
- Graduate Diploma in Environmental Toxicology<sup>2</sup> (KB67)
- Graduate Diploma in Hydrogeology and Groundwater Management (N061)
- Graduate Diploma in Medical Microbiology (KB66)
- Graduate Diploma in Occupational Health and Safety (P052)

For Graduate Diploma courses, exemptions from subjects may be granted if a student can provide documented evidence of completed formal tertiary studies or recognised prior learning in the area. Exemptions will be granted at the discretion of the relevant Course Coordinator who will make a recommendation to the Faculty of Science Graduate Courses Committee. Total exemptions will not exceed a maximum of 50 per cent of the total credit points of the program. Exemptions may be granted for subjects previously completed at the undergraduate and postgraduate level, but the maximum exemptions granted for undergraduate subjects will not exceed 25 per cent of the total credit points of the program.

### Requirements for student progression

Students enrolled in a Graduate Diploma who fail in any two subjects, or any one subject twice, will be seen as making unsatisfactory progress and will have their registration discontinued. Students may appeal against such discontinuation of registration under Rule 3.4.12 (see the UTS *Postgraduate Student Handbook*).

<sup>1</sup> Interdisciplinary course run by the Faculty of Science in collaboration with the Faculties of Engineering; Business; Law; and Design, Architecture and Building.

<sup>2</sup> In collaboration with the NSW Environment Protection Authority.

## Graduate Diploma in Clinical Acupuncture

### Course code: NH51

The Graduate Diploma in Clinical Acupuncture has been designed in response to the needs of acupuncturists who have undertaken a considerable degree of training through unaccredited acupuncture programs and who now wish to gain access to University programs. The Graduate Diploma is a 'gateway program' which acknowledges prior learning, consolidates knowledge and builds upon the practitioner's theoretical and experiential base.

### Course content

The program focuses upon three major areas – biomedical science, acupuncture theory/practice, and acupuncture research. A specially tailored biomedical science upgrade relevant to the specific characteristics of acupuncture practice will be offered.

Subjects relating to the theory and practice of acupuncture will involve the students by drawing upon their clinical experience. In relation to specific topics, students will be asked to refine, extend and share their knowledge by way of seminars and workshops.

Students will also study research methodology as it applies to the health sciences and undertake a specific research project under the supervision of the academic staff of the College of Acupuncture.

### Admission requirements

As the Graduate Diploma is a gateway program for practising acupuncturists, applicants will be either overseas- or Australian-trained practitioners. All applicants are required to have at least two years of professional experience and be able to furnish documentation to verify this fact.

**Australian-trained practitioners** who apply for the course are expected to have completed the equivalent of three years' full-time training that has included an adequate education in the theory/practice of acupuncture and appropriate biomedical science subjects such as anatomy, physiology, microbiology, pharmacology, pathophysiology and differential diagnosis.

**Overseas applicants** are required to have completed an acupuncture training program equivalent to that which is required of Australian-trained applicants.

**Australian applicants born and trained overseas** are expected to:

- (a) have completed a program equivalent to that which is required of Australian-trained applicants;
- or*
- (b) hold a medical degree, recognised in their country of origin but not in Australia, and to have practised acupuncture as their primary modality for at least three years. An interview will be conducted to assure the College that a reasonable level of acupuncture knowledge has been acquired.

All applicants are required to hold a current First Aid Certificate (St John's Ambulance Level II or equivalent).

All applicants are required to meet the University's requirement for English competency.

### Course structure

There are no majors, sub-majors/minors or electives in this program. The course is one year full time or two years part time. Initially the course is being offered only on a part-time basis as indicated in the following course outline.

### Part-time program

#### Semester 1

91609	Biomedical Science Upgrade	8cp
99544	Clinical Aspects of Acupuncture 1	6cp

#### Semester 2

99545	Clinical Aspects of Acupuncture 2	6cp
91607	Research Methods 1	4cp

#### Semester 3

91608	Research Methods 2	4cp
99518	Clinical Features of Disease	4cp
99546	Clinical Review	3cp

#### Semester 4

99547	Clinical Aspects of Acupuncture 3	6cp
99537	Independent Research Project (Postgraduate)	7cp

## Graduate Diploma in Clinical Biochemistry

**Course code: KB65**

*Course Coordinator: Dr R Orwell*

This course offers postgraduate education for entry into or advancement in the profession of clinical biochemistry. The entry requirement is a degree in science or medicine with an identifiable component of biochemistry. Students will acquire the theoretical knowledge and practical skills in all areas appropriate to the operations of a modern biochemical diagnostics laboratory.

Although there are no employment requirements for admission to the Graduate Diploma course, entry is subject to quota limits, and preference may be given to applicants currently employed in a clinical biochemistry laboratory or related area.

Students are required to successfully complete a minimum of 64 credit points for award. The course is offered on a part-time basis over four semesters, normally involving attendance at UTS for nine hours each week, and normally timetabled over one afternoon and two evenings. The program of study consists of formal lectures, discussion groups, laboratory sessions, seminars and assignment work. In the early stages of the course, students are introduced to analytical aspects of biochemistry and to fundamental areas of clinical biochemistry. Other subjects include the use of computing in the biological and medical sciences, the statistical analysis of data and experimental design, and either case study analysis or aspects of clinical laboratory management. A number of specialised and contemporary areas of clinical biochemistry are surveyed in the advanced clinical biochemistry subjects, and in the final stage students formulate a proposal for a project that could be researched within a clinical biochemistry environment.

Students who have achieved a high level of performance in the first three stages of this course, and whose employment situation will allow the conducting of a suitable research project, may apply for transfer to the Master's degree program in Clinical Biochemistry.

## Part-time program

**Entry to program in 1997 and odd years<sup>1</sup>**

### Stage 1

#### Autumn semester

91410	Principles of Clinical Biochemistry	5cp
91433	Biostatistics	6cp

#### Spring semester

91408	Principles of Biocomputing	5cp
91411	Biochemical Pathophysiology	6cp
91424	Clinical Biochemistry – Advanced Aspects B	10cp

### Stage 2

#### Autumn semester

91426	Analytical Techniques in Biochemistry <i>and either</i>	10cp
91419	Case Studies in Clinical Biochemistry <i>or</i>	6cp
91417	Clinical Laboratory Management	6cp

#### Spring semester

91423	Clinical Biochemistry – Advanced Aspects A	10cp
91453	Project Proposal (Clinical Biochemistry)	6cp

**Entry to program in 1998 and even years**

### Stage 1

#### Autumn semester

91410	Principles of Clinical Biochemistry	5cp
91426	Analytical Techniques in Biochemistry	10cp

#### Spring semester

91411	Biochemical Pathophysiology	6cp
91423	Clinical Biochemistry – Advanced Aspects A	10cp

### Stage 2

#### Autumn semester

91453	Project Proposal (Clinical Biochemistry)	6cp
91433	Biostatistics <i>and either</i>	6cp
91419	Case Studies in Clinical Biochemistry <i>or</i>	6cp
91417	Clinical Laboratory Management	6cp



**Spring semester**

91408	Principles of Biocomputing	5cp
91424	Clinical Biochemistry – Advanced Aspects B	10cp

<sup>1</sup> Entrants in odd and even years will undertake slightly different programs.

**Notes:** Subjects will be prescribed in the first semester according to the educational background of the entrant. Each semester normally consists of approximately nine hours per week, over one afternoon and two evenings. A minimum of 64 credit points must be successfully completed for award of the Graduate Diploma.

## Graduate Diploma in Coastal Resource Management

**Course code: KB70**

*Course Coordinator: Associate Professor K R Brown*

The aims of this course are similar in principle but more limited than those of the Master's degree course. Graduates complete all the foundation and intermediate subjects which enable them to become competent practitioners at an appropriate level, but they do not have the opportunity to carry out an individual research project, or to study the advanced aspects of integrated resource management and recreation and tourism management.

The diploma course comprises 48 credit points and will be offered over four semesters of part-time study or equivalent full-time study.

There will be no automatic entry from the Graduate Diploma to the Master's program. Selection will be based on the individual performance of the student in the course completed, and the availability of places in the in-load Master's program. Such places may be available from year to year, either because of under-enrolment in the Master's course, or by attrition from it. Graduates of the Graduate Diploma who gain entry into the Master's course, will be granted advanced standing for the subjects already completed.

**Full-time program****Stage 1****Autumn semester**

Principles of Coastal Resource Management

98711	Coastal Resource Policy	4cp
	<i>plus two to three of the following:</i>	
91479	Coastal Zone Law <sup>1</sup>	4cp

91493	Biosystems <sup>1,3</sup>	4cp
98712	Estuarine and Coastal Chemistry <sup>1</sup>	4cp
98714	Introductory Coastal Geology <sup>1</sup>	4cp
98715	Biological Resources and Assessment <sup>2</sup>	8cp
98716	Physical Geology of the Coastal Zone	4cp

**Spring semester**

Principles of Coastal Zone Law and Economics

91477	Research Design and Methods	4cp
91478	Economics of Coastal Resources <sup>1</sup>	4cp
98713	Hydraulics	4cp
98717	Coastal Resource Planning <sup>2</sup>	8cp
98718	Pollution Assessment	4cp

**Part-time program****Stage 1****Autumn semester**

Principles of Coastal Resource Management

98711	Coastal Resource Policy	4cp
	<i>plus</i>	
	Coastal Systems	
	<i>two to three of the following</i>	
91479	Coastal Zone Law <sup>1</sup>	4cp
91493	Biosystems <sup>1</sup>	4cp
98712	Estuarine and Coastal Chemistry <sup>1</sup>	4cp
98714	Introductory Coastal Geology <sup>1</sup>	4cp

**Spring semester**

Principles of Coastal Zone Law and Economics

91477	Research Design and Methods	4cp
91478	Economics of Coastal Resources <sup>1</sup>	4cp
98713	Hydraulics	4cp

**Stage 2****Autumn semester**

98715	Biological Resources and Assessment <sup>2</sup>	8cp
98716	Physical Geology of the Coastal Zone	4cp

**Spring semester**

98717	Coastal Resource Planning <sup>2</sup>	8cp
98718	Pollution Assessment	4cp

<sup>1</sup> Advanced standing may be given for up to two of these subjects, depending upon background.

<sup>2</sup> Strands A and B (details can be found in the subject description).

<sup>3</sup> Not offered in 1997.

## Graduate Diploma in Environmental Toxicology

**Course code: KB67**

*Course Coordinator: Dr R Lim*

Course fees will apply. Postgraduate students are also required to pay the student services charge on enrolment.

This course provides postgraduate education and training in the developing science of environmental toxicology. It is a discipline which deals with the toxic effects of chemicals in the environment to organisms, communities and ecosystems. Students will acquire the theoretical knowledge and practical skills required of a practising environmental toxicologist. The Graduate Diploma and Graduate Certificate fee-paying courses are designed for students who do not wish to undertake a Master's degree and/or have been unable to gain entry into the Master's degree program.

Admission to the course is open to graduates with degrees in biological sciences, chemistry, agriculture, pharmacy, engineering or equivalent disciplines. Admission to the course will be limited and the selection process may involve personal interviews. The course can be completed in two years (four semesters) of part-time or one year (two semesters) of full-time attendance. Students are required to successfully complete 48 credit points of formal coursework for award. This program consists of formal lectures, discussion groups, laboratory and field studies, seminars, assignments and formal examinations. The course comprises six subjects.

In the first year of the course students are introduced to concepts in mammalian and environmental toxicology, biostatistics, research design, and principles of laboratory toxicity testing. Subjects covered in the second year are biochemical and analytical toxicology, and approaches and methods in field surveillance, and the fate and management of toxic substances.

Students who have achieved a high level of performance in the course may apply for transfer to the Master's degree program in Environmental Toxicology. Such applications will be considered subject to vacancies. This

will require the conduct of a suitable research project and submission of a report based on the project undertaken. Projects may be undertaken with industry or government institutions.

### Full-time program

#### Stage 1

##### Autumn semester

91441	Principles of Toxicology	8cp
91471	Biochemical and Analytical Toxicology <i>either</i>	12cp
91493	Biosystems <i>or</i>	4cp
91474	Statistics in Bioscience	4cp

##### Spring semester

91472	Field Surveillance, Fate and Management of Toxic Substances	12cp
91440	Experimental Design and Methods	4cp
91473	Bioassays/Toxicological Testing	8cp

### Part-time program

#### Stage 1

##### Autumn semester

91441	Principles of Toxicology <i>either</i>	8cp
91493	Biosystems <i>or</i>	4cp
91474	Statistics in Bioscience	4cp

##### Spring semester

91440	Experimental Design and Methods	4cp
91473	Bioassays/Toxicological Testing	8cp

#### Stage 2

##### Autumn semester

91471	Biochemical and Analytical Toxicology	12cp
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##### Spring semester

91472	Field Surveillance, Fate and Management of Toxic Substances	12cp
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**Notes:** Subjects will be prescribed in the first semester according to the educational background of the entrant. Each semester normally consists of approximately nine hours per week over one afternoon and two evenings in part-time mode.

A minimum of 48 credit points must be successfully completed for award of the Graduate Diploma.

## Graduate Diploma in Hydrogeology and Groundwater Management

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**Course code: N061**

This course is designed for students working in the area of groundwater resource management.

### Admission requirements

Applicants should hold a four-year science degree from UTS or an equivalent qualification. Non-science graduates may be admitted to this course if their qualifications are relevant to hydrogeology and groundwater management. Applicants with other qualifications relevant to groundwater resource development may be accepted for admission, subject to approval by the Faculty Board.

### Attendance

The course is offered on a block-release attendance pattern and students may extend their enrolment over more than one year.

### Duration

The course requires block-release attendance of three periods of one day each during the Autumn semester. It has a pattern similar to the Master of Science in Hydrogeology and Groundwater Management. However, the project work of the Spring semester is shorter and requires completion by the end of the teaching semester.

### Course structure

With the exception of Project (12 credit points) and Computing for Groundwater Specialists, all subjects have a credit point value of six.

#### Autumn semester

- 66014 Hydrogeology
- 49550 Computing for Groundwater Specialists<sup>1</sup>
- 49555 Groundwater Modelling
- 66015 Hydrogeochemistry
- 49551 Surface Hydrology and Groundwater
- Elective 1
- Elective 2

#### Spring semester

- 66022 Groundwater Science Project (GD) F/T
- or
- 66024 Groundwater Science Project (GD) P/T

### Electives

- 49554 Groundwater Computing
- 66016 Geophysics and Remote Sensing of Groundwater Resources
- 66017 Geopollution Management
- 66018 Groundwater Geophysics
- 66025 Contaminated Site Management
- An approved subject offered elsewhere

<sup>1</sup> This is a non-credit subject available to students whose computing background requires strengthening.

## Graduate Diploma in Medical Microbiology

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**Course code: KB66**

*Course Coordinator: Dr I Stevenson*

Postgraduate students are required to pay the student services charge on enrolment.

This course offers postgraduate education to graduates in the medical or biological sciences wishing to further a career in medical microbiology or related areas of hospital and medical science, such as diagnostic bacteriology, virology, parasitology and mycology. It is being offered by the Faculty, with support from the Westmead Hospital Centre for Infectious Diseases and Microbiology, and other major Sydney hospitals.

The program can be completed in two years of part-time attendance. The formal coursework consists of lectures, tutorials and supervised laboratory work, some of which may be conducted at hospitals or other laboratories in Sydney. Students will undertake assignments and complete formal examinations. Admission to the course is open to science graduates of approved tertiary institutions where microbiology has been a significant component of the degree, or persons with equivalent qualifications.

### Part-time program

#### Entry into program in 1997

##### Stage 1

#### Autumn semester

- |       |   |     |
|-------|---|-----|
| 91485 | Human Viral Disease                         | 5cp |
| 91486 | Management of the Microbiology Laboratory   | 4cp |
| 91487 | Research Methodology – Medical Microbiology | 3cp |

**Spring semester**

91408	Principles of Biocomputing	5cp
91488	Molecular Microbiology – Techniques and Diagnosis	8cp
91490	Research Proposal Design – Medical Microbiology	4cp

**Stage 2****Autumn semester**

91480	Epidemiology and Disease Control	4cp
91481	Current Topics in Medical Microbiology	3cp
91483	Human Fungal Disease	4cp

**Spring semester**

91482	Human Parasitology	5cp
91481	Current Topics in Medical Microbiology	3cp

**Note:** Depending on year of entry, subjects may be completed in a different order. A minimum of 48 credit points must be successfully completed for award of the Graduate Diploma. Upgrade to a Master of Science in Medical Microbiology would be considered on application, following successful completion of the Graduate Diploma.

## Graduate Diploma in Occupational Health and Safety

**Course code: P052**

The aim of the course is to provide a graduate program in occupational health and safety which will produce broadly based, practical occupational health and safety professionals, with the ability to promote and facilitate a preventive approach to occupational health and safety which minimises occupational injuries and diseases.

The behavioural objectives of the course are to enable graduates of the Graduate Diploma in Occupational Health and Safety to:

- influence managers so that occupational health and safety becomes an integral part of day-to-day management;
- manage occupational health and safety services within the context of legislative, regulatory and industrial relations environments;
- recommend practical and appropriate solutions to occupational health and safety problems;

- contribute to improvements in design of plant, processes and equipment, work practices, work organisation and environment, including access for people with disabilities;
- apply their knowledge of the concepts of occupational health and safety to satisfy the needs of people;
- be able to establish systems to recognise, evaluate and control hazards;
- disseminate information and increase awareness of occupational health and safety issues in the workplace;
- understand minimum requirements in order to interpret the intent of legislation and standards;
- collect, analyse and maintain relevant data;
- operate as a sole operator and as a member of a multidisciplinary team;
- coordinate/liaise with relevant bodies in occupational health and safety;
- be involved with the rehabilitation of injured workers and the deployment of people with disabilities;
- recognise their own limitations and be aware of and call on other experts when needed;
- recognise the need and be able to maintain the currency of their knowledge.

**Duration**

The two-year course is offered on a part-time basis, and will require attendance at the University's City campus, Broadway, for eight hours per week. In general, students will be expected to satisfactorily complete 12 credit points per semester. The subjects will generally be scheduled so that students will attend for four hours on two evenings per week.

**Admission requirements**

Students in this course could come from a wide variety of educational backgrounds, including the physical sciences, life sciences, health sciences, social science, medicine, engineering, industrial design, architecture, building, commerce, business, law and the humanities. Applicants will in general be required to have a degree in their discipline from a recognised university or college of advanced education in order to satisfy the basic admission requirement.

In this field, however, there are many very experienced people such as occupational health nurses, safety officers and inspectors who for historical reasons do not have a first degree. Applicants in this category are also encouraged to apply. Such applicants would be required to have at least a diploma or certificate in a relevant area together with sound experience in occupational health and safety in a responsible position.

### Course structure

The course has been structured to provide the required basic knowledge and skills for students with different backgrounds. The sequence of subjects for 1997 is as follows:

### Sequence of subjects for 1997 to 1998

#### 1997 intake

##### Year 1

##### **Autumn semester**

69312	Occupational Hazard Analysis	6cp
69324	Biological Hazards and Toxicology	3cp
69325	Data Analysis in Occupational Health and Safety	3cp

##### **Spring semester**

69311	Occupational Health and Safety in Society	3cp
69313	Organisational Behaviour and Communication	3cp
69335	People and the Physical Environment	3cp
69342	Legal Aspects of Occupational Health and Safety	3cp

##### Year 2

##### **Autumn semester**

69332	Chemical Safety (OHS)	3cp
69336	Evaluating OHS (Construction Industry)	6cp
69343	Occupational Health and Safety Management	3cp

##### **Spring semester**

69323	Human Factors/Ergonomic Design	3cp
69334	Occupational Health Services	3cp
69341	Risk Management	6cp

#### 1998 intake

##### Year 1

##### **Autumn semester**

69312	Occupational Hazard Analysis	6cp
69325	Data Analysis in Occupational Health and Safety	3cp
69332	Chemical Safety (OHS)	3cp

##### **Spring semester**

69313	Organisational Behaviour and Communication	3cp
69323	Human Factors/Ergonomic Design	3cp
69334	Occupational Health Services	3cp
69335	People and the Physical Environment	3cp

##### Year 2

##### **Autumn semester**

69324	Biological Hazards and Toxicology	3cp
69336	Evaluating OHS (Construction Industry)	6cp
69343	Occupational Health and Safety Management	3cp

##### **Spring semester**

69311	Occupational Health and Safety in Society	3cp
69341	Risk Management	6cp
69342	Legal Aspects of Occupational Health and Safety	3cp

## MASTER'S DEGREES (BY COURSEWORK)

Master of Occupational Health and Safety (P055)  
 Master of Science in Clinical Biochemistry (KB55)  
 Master of Science in Clinical Measurement<sup>1</sup> (KB53)  
 Master of Science in Coastal Resource  
 Management<sup>2</sup> (KB59)  
 Master of Science in Environmental Toxicology<sup>3</sup>  
 (KB52)  
 Master of Science in Hydrogeology and  
 Groundwater Management (N057)  
 Master of Science in Medical Microbiology (KB57)  
 Master of Science in Medical Physics<sup>1</sup> (KB58)

<sup>1</sup> There will be no intake in these courses in 1997.

<sup>2</sup> Interdisciplinary course run by the Faculty of Science in collaboration with the Faculties of Engineering, Business, Law, and Design, Architecture and Building.

<sup>3</sup> In collaboration with the NSW Environment Protection Authority.

### Admission requirements and selection

Candidates may be admitted to the course with either a Bachelor's degree from UTS (or equivalent) or such other general or professional qualifications as will satisfy the Academic Board that the applicant possesses the educational preparation and capacity.

### Requirements for subject assessment and student progression

Students enrolled for a Master's degree (by coursework) shall have each subject assessed according to the normal Rules of this University. However, there is no allowance for conceded pass.

Students who fail in any two subjects, or any one subject twice, or who fail to submit a Project Report at the specified time, will be seen as making unsatisfactory progress and will have their registration discontinued. Students may appeal against such discontinuation of registration under Rule 3.4.12 (see the UTS *Postgraduate Student Handbook*).

### Continuing UTS students

Master's degree (by coursework) students who have previously been enrolled in undergraduate UTS courses in the Faculty may not enrol in postgraduate subjects which are equivalent to subjects previously undertaken towards an undergraduate degree.

## Master of Occupational Health and Safety

**Course code: P055**

*Course Coordinator: Dr D Cobbin*

This course involves all the coursework requirements of the Graduate Diploma, plus an additional year part time to undertake a substantial research project in an area of particular interest and/or relevance to the student. Students would normally enrol in the first instance for the Graduate Diploma, and would be permitted to transfer to the Master's program only if they achieved a credit average or better in the coursework. The 24 credit points to be completed in the Master's program involve the following two semester subjects, each allocated 12 credit points:

69351 Occupational Health and Safety Project  
 69353 Research Proposal (Occupational Health and Safety)

Persons who already have a Graduate Diploma in Occupational Health and Safety or equivalent from this or another university are able to enter the Master's program with advanced standing. They would normally be required to complete one semester of appropriate coursework at credit level or better before undertaking the two-semester research project.

## Master of Science in Clinical Biochemistry

**Course code: KB55**

*Course Coordinator: Dr R Orwell*

The course is available to science and medical graduates with a good background in general biochemistry and is designed mainly for those working in clinical laboratories. It extends their knowledge and professional expertise in the discipline of clinical biochemistry and in the efficient operation of a clinical laboratory. The course also provides an opportunity for research training in clinical biochemistry.

Admission to the course will be limited and the selection process may involve personal interviews. Concurrent employment in a clinical biochemistry laboratory or related area is a normal requirement for admission.

The course is offered on a part-time basis over six semesters, normally involving attendance

at UTS for nine hours per week. The program of study consists of formal lectures, discussion groups, laboratory sessions, seminars and a supervised research project. In the early stages of the course, students are introduced to analytical aspects of biochemistry and to fundamental areas of clinical biochemistry. Other subjects include the use of computing in the biological and medical sciences, aspects of laboratory management, the statistical analysis of data and experimental design. Later stages of the course focus on more advanced areas of clinical biochemistry and include case study analysis and the development of problem solving and consulting skills.

The final third of the course is devoted to a research project involving investigatory or developmental work in an appropriate area of clinical biochemistry. Projects are undertaken in cooperation with the employing laboratories and the results of the work are presented in an oral seminar and in a written report prepared in accordance with the formal requirements laid down by the Faculty.

Students who have already demonstrated their competence in any of the foundation subjects may be offered alternative subjects of equivalent weight.

### Part-time program

#### Entry to program in 1997 and odd years<sup>1</sup>

##### Stage 1

##### Autumn semester

91410	Principles of Clinical Biochemistry	5cp
91433	Biostatistics	6cp

##### Spring semester

91408	Principles of Biocomputing	5cp
91411	Biochemical Pathophysiology	6cp
91424	Clinical Biochemistry – Advanced Aspects B	10cp

##### Stage 2

##### Autumn semester

91419	Case Studies in Clinical Biochemistry	6cp
91426	Analytical Techniques in Biochemistry	10cp

##### Spring semester

91423	Clinical Biochemistry – Advanced Aspects A	10cp
91453	Project Proposal (Clinical Biochemistry)	6cp

##### Stage 3

##### Autumn semester

91417	Clinical Laboratory Management	6cp
91456	Project 1 (Clinical Biochemistry)	10cp

##### Spring semester

91459	Project 2 (Clinical Biochemistry)	16cp
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#### Entry to program in 1998 and even years<sup>1</sup>

##### Stage 1

##### Autumn semester

91410	Principles of Clinical Biochemistry	5cp
91426	Analytical Techniques in Biochemistry	10cp

##### Spring semester

91411	Biochemical Pathophysiology	6cp
91423	Clinical Biochemistry – Advanced Aspects A	10cp

##### Stage 2

##### Autumn semester

91417	Clinical Laboratory Management	6cp
91433	Biostatistics	6cp
91453	Project Proposal (Clinical Biochemistry)	6cp

##### Spring semester

91408	Principles of Biocomputing	5cp
91424	Clinical Biochemistry – Advanced Aspects B	10cp

##### Stage 3

##### Autumn semester

91419	Case Studies in Clinical Biochemistry	6cp
91456	Project 1 (Clinical Biochemistry)	10cp

##### Spring semester

91459	Project 2 (Clinical Biochemistry)	16cp
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<sup>1</sup> Entrants in odd and even years will undertake some subjects in a different order.

**Notes:** Subjects will be prescribed in the first semester according to the educational background of the entrant. Each semester normally consists of approximately nine hours per week, over one afternoon and two evenings. A minimum of 96 credit points must be successfully completed for award of the degree.

For further information contact: The Course Coordinator, Clinical Biochemistry, Dr R Orwell, telephone: 9514 4098, fax: 9514 4003.

# Master of Science in Clinical Measurement

## Course code: KB53

Course Coordinator: Associate Professor L K Holley

Note: There will be no intake in this course in 1997.

The course offers postgraduate education to graduates in physical or biological science wishing to enter careers in clinical measurement, biomedical engineering and related areas of hospital and medical science such as cardiology, respiratory physiology, neurophysiology, biochemistry and orthopaedics.

The program can be completed with two years of full-time or three years of part-time attendance. The part-time pattern normally involves nine hours per week for six semesters. In the first semester most students undertake two appropriate foundation subjects. In the next three semesters six advanced subjects are offered, covering essential knowledge and skills in the area of clinical measurement. The formal coursework consists of lectures, tutorials and supervised laboratory work, some of which may be conducted at teaching hospitals in Sydney. Students will undertake assignments and complete formal examinations. In the final year students undertake a project in an applied field relevant to their interests.

In the full-time attendance pattern students must complete the requirements of the degree in two years. Admission to the course is open to science, engineering and medical graduates of universities and colleges of advanced education, or persons with equivalent qualifications. Basic human anatomy and physiology, or basic electronics and computer programming and mathematics, are normally prerequisites. Foundation subjects are available to those who need extra background in either of these areas.

## Part-time program

### Stage 1

#### Autumn semester

91405	Bioelectronics	6cp
91408	Principles of Biocomputing	5cp
91436	Advanced Mathematics in the Life Sciences	5cp
	<i>or</i>	
91493	Biosystems	4cp
91421	Principles of Human Biology	10cp

#### Spring semester<sup>1</sup>

91437	Advanced Bioinstrumentation	5cp
91438	Biosensors and Transducers	5cp
91439	Physiological Measurement	6cp

### Stage 2

#### Autumn semester

91462	Digital Processing of Signals and Images in Medicine	5cp
91461	Physiological Modelling	5cp
91433	Biostatistics	6cp

#### Spring semester<sup>1</sup>

91463	Hardware for Clinical Data Acquisition and Control	6cp
91464	Laboratory Biocomputing	5cp
91465	Advanced Programming – Life Sciences	5cp

### Stage 3

#### Autumn semester

91407	Project (Clinical Measurement) P/T	16cp
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#### Spring semester

91407	Project (Clinical Measurement) P/T	16cp
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<sup>1</sup> Sets of Spring semester subjects alternate each year, which means entrants in odd and even years will undertake slightly different programs.

Notes: Subjects will be prescribed in the first semester according to the educational background of the entrant. Each semester normally consists of approximately nine hours per week, over one afternoon and two evenings. A minimum of 96 credit points must be successfully completed for award of the degree.

## Full-time program

Full-time students must complete the requirements of the degree in two years by enrolling in 91406 Project (Clinical Measurement) F/T, in each year. All other subjects are as outlined above for the part-time program.

For further information contact: The Course Coordinator, Clinical Measurement, Associate Professor L K Holley, telephone: 9514 4152/4044, fax: 9514 4003.



## Master of Science in Coastal Resource Management

### Course code: KB59

Course Coordinator: Associate Professor K R Brown

The degree in Coastal Resource Management is a joint enterprise of the Faculties of Science, Engineering and Business, in collaboration with the Faculties of Law, and Design, Architecture and Building. The course can be completed over three years of part-time study, normally involving attendance on one afternoon and two evenings each week. Associated short courses, based on the various subject modules, and a two-year full-time option for the Master's course are available.

The course is part of the UTS Coastal Resource Management Program, the aims of which are to:

- offer interdisciplinary professional courses for work in industry and government;
- conduct the research needed to improve the management of coastal resources;
- collaborate with industry and government in identifying areas of concern;
- provide consultancy and information resources to industry and government;
- help provide effective solutions to the complex problems of this area of study;
- enhance community awareness and education in this area; and
- develop a centre of expertise in the Pacific region.

The course will enable graduates to enter or develop a career in coastal resource management in commerce, industry, consultancy, or with government agencies, as one of the new generation of environmental managers with:

- an understanding of ecological processes;
- an ability to assess the possible impacts of planned actions on coastal and marine environments;
- a willingness and ability to monitor and reduce the impacts of those actions;
- the professional skills to work in integrated teams for environmental problem solving, planning and management; and

- an ability to manage coastal resources in developing and developed environments.

The course includes field work, site inspections, laboratory procedures and a variety of desk studies. In the final semester students will select and undertake an individual research project, in consultation with an appropriate academic supervisor, in their own area of interest and expertise. The project may be completed on campus or in association with an employer agency. The course equips environmental managers who, as part of a team, can take responsibility for decision making and conflict resolution with respect to coastal resources.

Admission to the course is open to graduates in science, engineering, architecture, building, business, law, or equivalent background. Applicants with general or professional qualifications which satisfy the Academic Board of capacity to pursue graduate studies may also qualify for admission. Entrants may be eligible for exemptions from one or more of the foundation subjects, on the basis of prior qualifications.

Linkages with other programs nationally and internationally further provide the opportunity for graduates to expand their professional exposure.

### Part-time program

#### Stage 1

##### Autumn semester

98711	Coastal Resource Policy <i>plus</i> Coastal Systems <i>two to three of the following</i>	4cp
91479	Coastal Zone Law <sup>1</sup>	4cp
91493	Biosystems <sup>1</sup>	4cp
98712	Estuarine and Coastal Chemistry <sup>1,2</sup>	4cp
98714	Introductory Coastal Geology <sup>1</sup>	4cp

##### Spring semester

91477	Research Design and Methods	4cp (equiv)
91478	Economics of Coastal Resources <sup>1</sup>	4cp
98713	Hydraulics <sup>1</sup>	4cp

#### Stage 2

##### Autumn semester

98715	Biological Resources and Assessment <sup>2</sup>	8cp
98716	Physical Geology of the Coastal Zone	4cp

##### Spring semester

98717	Coastal Resource Planning <sup>2</sup>	8cp
98718	Pollution Assessment	4cp

## Stage 3

**Autumn semester**

98719	Recreation, Tourism and Natural Resource Management	4cp
98720	Integrated Coastal Resource Management <sup>2</sup>	8cp

**Spring semester**

98721	Coastal Resource Project	12cp
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**Full-time program**

## Stage 1

**Autumn semester**

98711	Coastal Resource Policy	4cp
98715	Biological Resources and Assessment <sup>2</sup>	8cp
98716	Physical Geology of the Coastal Zone	4cp
	<i>plus</i>	
	Coastal Systems	
	<i>two to three of the following</i>	
91479	Coastal Zone Law	4cp
91493	Biosystems	4cp
98712	Estuarine and Coastal Chemistry <sup>1,3</sup>	4cp
98714	Introductory Coastal Geology <sup>1</sup>	4cp

**Spring semester**

91477	Research Design and Methods	4cp
91478	Economics of Coastal Resources <sup>1,3</sup>	4cp
98713	Hydraulics <sup>1</sup>	4cp
98717	Coastal Resource Planning <sup>2</sup>	8cp
98718	Pollution Assessment	4cp

## Stage 2

**Autumn semester**

98719	Recreation, Tourism and Natural Resource Management	4cp
98720	Integrated Coastal Resource Management <sup>2</sup>	8cp
98721	Coastal Resource Project	12cp

<sup>1</sup> Advanced standing may be given for up to two of these subjects, depending on background.

<sup>2</sup> Strands A and B (details can be found in the subject descriptions).

<sup>3</sup> Not offered in 1997.

**Notes:** Subjects will be prescribed according to the educational background of the entrant.

Each semester normally consists of approximately nine hours per week, over one afternoon and two evenings. A minimum of 72 credit points must be successfully completed for award of the degree.

For further information contact: The Course Coordinator, Coastal Resource Management, Associate Professor K R Brown, telephone: 9514 4042/4393, fax: 9514 4079.

## Master of Science in Environmental Toxicology

**Course code: KB52**

Course Coordinator: Dr R Lim

Environmental toxicology is the science which deals with the toxicity of chemicals in the environment to organisms, communities and ecosystems. A wide range of chemicals is in current use and their toxic effects need to be monitored. New chemicals are constantly being introduced in every aspect of industrialised society and toxicological data are needed to assess potential hazards. The science of environmental toxicology and ecotoxicology has, therefore, an intrinsic management goal.

The course provides relevant postgraduate education and training in the developing science of environmental toxicology and is offered in conjunction with the Centre for Ecotoxicology. This Centre is a joint initiative between the New South Wales Environment Protection Authority and the University, and is housed in the Dunbar Building, St Leonards campus.

Admission to the course is open to graduates with degrees in the biological sciences, chemistry, agriculture, pharmacy, engineering or equivalent disciplines. Admission to the course will be limited and the selection process may involve personal interviews.

The course is offered on a full-time or part-time basis. The part-time program normally involves attendance for nine hours per week for a total of six semesters. In the first two years there are six formal subjects which cover the essential knowledge and skills for the practising environmental toxicologist. The formal coursework comprises lectures, tutorials, and supervised laboratory and field work. Students will undertake written assignments and formal examinations. The final year involves a project which enables students to apply their knowledge to problems in environmental toxicology through experimental investigation, extensive critical reviews or other suitable activities. Projects may be undertaken in conjunction with industry or government institutions. All students must complete a report based on the project undertaken. The report must be prepared in accordance with the formal requirements laid down in the UTS Rules.

In the full-time attendance pattern students must complete the requirements of the degree in one-and-a-half years with the project being completed in the final semester.

## Objectives

The objectives of the course are to train scientific personnel to:

- be familiar with the groups of environmentally hazardous chemicals and their biochemical and environmental effects;
- design and implement toxicological tests on a variety of organisms including invertebrates, fish, mammals and terrestrial and aquatic plants;
- analyse and interpret the results of toxicological tests;
- use techniques of analytical chemistry to determine the nature and level of toxic materials in the environment;
- conduct field surveillance for the effects of toxic substances; and
- assess the risk from toxic chemicals and advise on environmentally sound management procedures.

## Full-time program

### Stage 1

#### Autumn semester

91441	Principles of Toxicology	8cp
91471	Biochemical and Analytical Toxicology	12cp
	<i>either</i>	
91493	Biosystems <sup>1</sup>	4cp
	<i>or</i>	
91474	Statistics in Bioscience <sup>1</sup>	4cp

#### Spring semester<sup>1</sup>

91472	Field Surveillance, Fate and Management of Toxic Substances	12cp
91440	Experimental Design and Methods	4cp
91473	Bioassays/Toxicological Testing	8cp

### Stage 2

#### Autumn semester

91476	Environmental Toxicology Project F/T <sup>2</sup>	24cp
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## Part-time program

### Stage 1

#### Autumn semester

91441	Principles of Toxicology	8cp
	<i>either</i>	
91493	Biosystems <sup>1</sup>	4cp
	<i>or</i>	
91474	Statistics in Bioscience <sup>1</sup>	4cp

#### Spring semester<sup>1</sup>

91440	Experimental Design and Methods	4cp
91473	Bioassays/Toxicological Testing	8cp

### Stage 2

#### Autumn semester

91471	Biochemical and Analytical Toxicology	12cp
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#### Spring semester<sup>1</sup>

91472	Field Surveillance, Fate and Management of Toxic Substances	12cp
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### Stage 3

#### Autumn semester

91475	Environmental Toxicology Project P/T	12cp <sup>2</sup>
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#### Spring semester

91475	Environmental Toxicology Project P/T	12cp <sup>2</sup>
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<sup>1</sup> Subjects will be prescribed in the first semester according to the educational background of the entrant.

<sup>2</sup> Enrolment in this subject would normally require a credit average or better in the coursework.

**Notes:** Each semester normally consists of approximately nine hours per week, over one afternoon and two evenings.

A minimum of 72 credit points must be successfully completed for award of the degree.

For further information contact: The Course Coordinator, Environmental Toxicology, Dr R Lim, telephone: 9514 4037/4044, fax: 9514 4003.

## Master of Science in Hydrogeology and Groundwater Management

**Course code: N057**

This course is designed to enable students to develop specialist skills in the area of groundwater management including aspects of geology, hydrology, hydraulics and resource management. This provides a multidisciplinary perspective to issues of groundwater management. For further information see the National Centre for Groundwater Management entry under 'Centres and Institutes' within the Faculty.

### Admission requirements

Applicants must hold a four-year science degree from UTS or an equivalent qualification and should have a minimum of two years' experience in employment related to the course. Applicants are required to submit a covering letter indicating why they wish to undertake the course, together with the names, telephone numbers and addresses of two professional referees.

### Attendance

The course is offered on the basis of block-release attendance extending over one calendar year.

### Duration

The course requires block-release attendance of three periods of one day each for a series of lectures and laboratory work during Autumn semester and project work during Spring semester. The time required to complete the project will be approximately 30 weeks. Students must continue project work until a satisfactory level of achievement has been attained.

### Course structure

With the exception of Project (24 credit points) and Computing for Groundwater Specialists, all subjects have a credit point value of six.

#### Autumn semester

- 66014 Hydrogeology
- 49550 Computing for Groundwater Specialists<sup>1</sup>
- 49555 Groundwater Modelling
- 66015 Hydrogeochemistry

- 49551 Surface Hydrology and Groundwater  
Elective 1  
Elective 2

#### Spring semester

- 66021 Groundwater Science Project (M) F/T  
*or*
- 66023 Groundwater Science Project (M) P/T

#### Electives

- 49554 Groundwater Computing
- 66016 Geophysics and Remote Sensing of Groundwater Resources
- 66017 Geopollution Management
- 66018 Groundwater Geophysics
- 66025 Contaminated Site Management  
An approved subject offered elsewhere

<sup>1</sup> This is a non-credit subject available to students whose computing background requires strengthening.

## Master of Science in Medical Microbiology

**Course code: KB57**

*Course Coordinator: Dr Iain Stevenson*

The course offers postgraduate education to graduates in the medical or biological sciences wishing to further a career in medical microbiology or related areas of hospital and medical science, such as diagnostic bacteriology, virology, mycology and parasitology. It is being offered by the Faculty, with support from the Westmead Hospital Centre for Infectious Diseases and Microbiology, and other major Sydney hospitals.

The program can be completed in three years of part-time attendance. The formal coursework consists of lectures, tutorials and supervised laboratory work, some of which may be conducted at hospitals or other laboratories in Sydney. Students will undertake assignments and complete formal examinations. The final year involves a project in a field relevant to the student's interests.

Admission to the course is open to science graduates of approved tertiary institutions where microbiology has been a significant component of the degree, or persons with equivalent qualifications.

## Objectives

To provide excellent postgraduate education for microbiology professionals.

Graduates of this course will:

- have a wide perspective and current awareness of individual groups of significant micro-organisms in the diagnostic clinical microbiology laboratory;
- be able to attain competence in the application of state-of-the-art diagnostic methods and procedures in their own laboratories;
- appreciate the constraints inherent in many laboratory diagnostic procedures in microbiology;
- be able to assess and apply new and developing methodologies and technologies in the medical microbiology laboratory;
- be able to access current literature and other informational material rapidly and effectively; and
- have the potential to progress to research or research degree studies in microbiology.

## Part-time program

### Stage 1

#### Autumn semester

91485	Human Viral Disease	5cp
91486	Management of the Microbiology Laboratory	4cp
91487	Research Methodology – Medical Microbiology	3cp

#### Spring semester

91408	Principles of Biocomputing	5cp
91488	Molecular Microbiology – Techniques and Diagnosis	8cp
91490	Research Proposal Design – Medical Microbiology	4cp

### Stage 2

#### Autumn semester

91480	Epidemiology and Disease Control	4cp
91481	Current Topics in Medical Microbiology	3cp
91483	Human Fungal Disease	4cp

#### Spring semester

91482	Human Parasitology	5cp
91481	Current Topics in Medical Microbiology	3cp

### Stage 3

#### Autumn semester

91491	Research Project – Medical Microbiology P/T (2 sem)	12cp
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#### Spring semester

91491	Research Project – Medical Microbiology P/T (2 sem)	12cp
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**Notes:** Depending on year of entry, subjects may be completed in a different order. By prior arrangement, students may be able to complete the research project component of the course at their place of employment, which may be outside Sydney or Australia. It may also be possible to undertake the project prior to completion of coursework subjects.

A minimum of 72 credit points must be successfully completed for award of the degree.

For further information contact: The Course Coordinator, Medical Microbiology, Dr I Stevenson, telephone: 9514 4154, fax: 9514 4003.

## Master of Science in Medical Physics

### Course code: KB58

*Course Coordinator: Associate Professor L K Holley*

**Note:** There will be no intake into this course in 1997.

The course offers postgraduate education to graduates in the physical sciences wishing to enter a career in medical physics or related areas of hospital and medical science, such as nuclear medicine, radiotherapy, radiology or radiation protection. It is offered by the Faculty with support from members of the Australian College of Physical Scientists and Engineers in Medicine (ACPSEM) and major teaching hospitals.

The program can be completed with two years of full-time or three years of part-time attendance. The part-time pattern normally involves nine hours per week for six semesters. In the first semester most students undertake two appropriate foundation subjects. In the next three semesters six advanced subjects are offered, covering essential knowledge and skills in the area of medical physics. The formal coursework consists of lectures, tutorials and supervised laboratory work, some of which may be conducted at teaching hospitals in Sydney. Students will undertake assignments and complete formal examinations. In the final year students undertake a project in an applied field relevant to their interests.

Admission to the course is open to physical science graduates of universities and colleges of advanced education, or persons with equivalent qualifications. Basic human anatomy and physiology, or basic electronics, computer programming and mathematics, are normally prerequisites. Foundation subjects are available to those who need extra background in either of these areas.

## Objectives

The objectives of the course are to provide students with:

- specialist knowledge in the field of medical physics;
- comprehensive theoretical and practical education in computing;
- knowledge of hardware and software used in clinical and physiological data acquisition;
- extensive range of biomathematical, biostatistical, signal-processing and image-processing skills;
- skills to conduct and report on an extensive research project; and
- ability to work as an independent, analytical professional in the medical physics environment.

## Part-time program

### Stage 1

#### Autumn semester

91493	Biosystems	4cp
91421	Principles of Human Biology	10cp

#### Spring semester<sup>1</sup>

91434	Radiation Protection	5cp
91403	Medical Imaging	6cp
91404	Physics in Medicine	5cp

### Stage 2

#### Autumn semester

91462	Digital Processing of Signals and Images in Medicine	5cp
91461	Physiological Modelling	5cp
91433	Biostatistics	6cp

## Spring semester<sup>1</sup>

91463	Hardware for Clinical Data Acquisition and Control	6cp
91464	Laboratory Biocomputing	5cp
91465	Advanced Programming – Life Sciences	5cp

### Stage 3

#### Autumn semester

91489	Project (Medical Physics) P/T (2 sem)	16cp
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#### Spring semester

91489	Project (Medical Physics) P/T (2 sem)	16cp
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<sup>1</sup> Sets of Spring semester subjects alternate each year, which means entrants in odd and even years will undertake slightly different programs.

**Notes:** Subjects will be prescribed in the first semester according to the educational background of the entrant. Each semester normally consists of approximately nine hours per week, over one afternoon and two evenings. A minimum of 96 credit points must be successfully completed for award of the degree.

## Full-time program

Full-time students must complete the requirements of the degree in two years by enrolling in 91484 Project (Medical Physics) F/T in each year. All other subjects are as outlined above for the part-time program.

For further information contact: The Course Coordinator, Medical Physics, Associate Professor L K Holley, telephone: 9514 4152/4044, fax: 9514 4003.

## POSTGRADUATE DEGREES BY RESEARCH/THESIS

The Master's and PhD programs are designed for graduates who wish to develop a career in the fields of biological and biomedical sciences as well as physical sciences by undertaking an appropriate research investigation under professional supervision.

The broad areas of research expertise within the Faculty are:

- materials technology
- image processing and analysis
- regional and resource geology
- science education
- cell and molecular biology
- biomedical science and engineering
- environmental biology and toxicology
- groundwater management
- biomedical technology
- forensic and analytical chemistry
- coastal resource management

Applications are invited for these research programs. Please consult with a potential academic supervisor or appropriate Head of Department before submitting an application.

For further information about the potential supervisors, please telephone the Office of the Associate Dean, Graduate and Research Programs, on 9514 4066.

### Admission to Master's degree (by thesis) program

An application for admission to a Master's degree program is accepted subject to the availability of facilities and supervision. The course can be completed in two years of full-time study or over a minimum of three years part-time. Study can be carried out by means of a cooperative arrangement with the candidate's employer. Applicants should hold at least a Bachelor's degree from UTS, or equivalent, or other general or professional qualifications as will satisfy the Academic Board that the applicant possesses the educational preparation and capacity to successfully complete the course.

#### Master's degrees (by thesis)

Master of Applied Science  
(Hydro-geology and Groundwater Management) N056

Master of Science  
(Biological and Biomedical Science) KB51

Master of Science (Physical Sciences) N053

### Admission to PhD program

Applications for the PhD program will be accepted at any time and a decision will be advised following consideration by the relevant research degrees committees. Candidates may be admitted to the program with a Bachelor's degree with First or Second Class Honours Division 1 from UTS, or an appropriate Master's degree from UTS, or an equivalent qualification.

#### PhD Programs

Biological and Biomedical Sciences KB56

Hydrogeology and Groundwater Management N055

Multidisciplinary Studies P095

Physical Sciences N054

# Subject descriptions

## Guide to subject descriptions

The subject descriptions shown below indicate the subject code and name, the number of credit points for the subject (e.g. 3cp), the duration of the subject, indicated as semester weeks, if applicable, and the number of formal contact hours each week (e.g. 4hpw); for some subjects, there may also be practical components off-campus, and this is indicated in the text. Also shown are the prerequisites or corequisites if any, the method of assessment and a brief outline of the content.

Prerequisites are subjects which must be completed before taking the subject to which they refer. Corequisites may be completed before or be taken concurrently with the subject to which they refer.

### 44152, 44156

#### Groundwater Engineering Projects (M) F/T, P/T

30cp

These projects will provide students with the opportunity to research specific engineering groundwater resource or contamination problems. The depth and extent of research will vary with credit points required. Projects include one or more of the following: modelling, laboratory experiments, field work related to hydrogeology and groundwater management, contaminant transport and processes, waste disposal and groundwater impact.

### 44153, 44157

#### Groundwater Engineering Projects (GD) F/T, P/T

15cp

As above but at a reduced scale.

### 49121

#### Environmental Assessment and Planning

6cp; 3hpw

Conserving resources and meeting essential needs; industry, urban, energy futures – the need to reorientate technology; ecology and economics. Environmental law: principles; Federal, State and local government responsibilities; environmental impact

assessment. The concept of licensing requirements, approval procedures. Environmental economics: social benefit/cost analysis for environmental services, resource pricing, risk assessment; land-use planning. Project planning – environmental aspects.

### 49122

#### Introduction to Environmental Engineering and Management

6cp; 3hpw

Ecological systems and processes; basic ecological principles; bio-geochemical cycles; development of ecosystems; interaction between physical ecosystems; global environment issues such as greenhouse effect, ozone depletion and acid rain. Human impact on ecosystems: population growth; terrestrial ecosystems (forest and agricultural land); aquatic ecosystems (lake, river and ocean). Biodiversity; importance of sustainable development. An overview of major environmental problems; their effect and remedies. Air pollution, noise pollution, water pollution, soil pollution, solid and hazardous wastes. Case studies.

### 49123

#### Waste Minimisation and Advances in Pollution Control

6cp; 3hpw

Environmental auditing of the product life cycle; leading-edge technologies of waste minimisation and pollution control, raw materials extraction and refinement; product development, design and manufacture; product use; product reuse/recycling; solid/hazardous wastes; liquid wastes. Effective management of the product life cycle; institutional barriers to improving the technologies of waste minimisation and pollution control; reviews of advanced technology and management practices adopted in domestic waste pollution control; economic considerations. Case studies: pulp and paper industry, metal plating industry, food and dairy industry, household waste, waste recycling in buildings.



**49124****Urban Water Quality Management***6cp; 3hpw*

Characteristics of Australian urban water systems: natural features and human infrastructure; benefits and uses of water systems. The sources and nature of major categories of pollutants generated from agricultural, urban and industrial sources; groundwater pollution; beach and coastal pollution; the ecological and public health impacts of pollutants causing siltation. Criteria and designs of monitoring programs; sampling procedures; methods of data analysis; description and modelling of pollution processes. Remedies: regulation of point sources; stormwater and sewer flow controls; groundwater controls etc. Standards, pollution laws, regulatory bodies and responsible organisations (with particular emphasis on New South Wales). Water and waste water treatment processes.

**49550****Computing for Groundwater Specialists***3hpw*

*Note: This subject does not carry academic credit.*

Provides the computing background needed for students with varying degrees of computer literacy. Topics covered include introduction to FORTRAN programming, mainframe and microcomputer operation systems, databases, spreadsheets, word processing, statistical and graphical packages with applications relating to groundwater processes.

**49551****Surface Hydrology and Groundwater***5cp; 3hpw*

Provides the interface process link between surface hydrology and groundwater. Topics include hydrological cycle, water and energy balances and circulation, precipitation, interception, infiltration, storm runoff, hydrograph analysis, evaporation and transpiration, surface and groundwater interactions, land-use effects, artificial recharge.

**49554****Groundwater Computing***5cp; 3hpw*

Provides a strong computing basis for groundwater management, especially in the area of statistics and graphics as applied to

groundwater problems involving computing. Introduction to FORTRAN programming, mainframe, microcomputer operation systems, databases, spreadsheets, word processing, elements of geostatistics and graphical packages with applications related to groundwater processes, groundwater computing project.

**49555****Groundwater Modelling***5cp; 3hpw*

Provides the computer-modelling tools required for groundwater resource management. Topics include groundwater modelling of porous media, fractured rock and low permeability materials. Analogue, numerical analytical models. Matrix structure and inverse methods, stochastic modelling and characterisation of variability. Modelling multiphase fluids and regional groundwater flow. Applications to borefield management, salt water intrusion, mine dewatering, geotechnical problems.

**51357****Technical Communication***4cp; 4hpw*

This subject looks at technical communication, report writing and presentation. Topics covered include: visual communication of all types; legal problems of technical communications, including contracts and copyright; standard abbreviations and terminology; editing, preparation and submission of technical manuscripts for publication and/or printing; oral presentation of technical reports; participation in symposia; journal and library research; referencing; and the use of electronic communication media.

**51390****Communication in Industry**

*Offered by the Faculty of Humanities and Social Sciences*

*3cp; 2hpw*

This subject enhances students' skills in written and speech communication, and their understanding of communication principles and processes, with particular reference to communication in the workplace. Emphasis is on the essay, the report, the letter, and on interviewing and oral reporting techniques to ensure a high level of competence in all forms of workplace communication.

**60301****Treatment of Scientific Data**

3cp; 3hpw; prerequisites: 33171 Science Mathematics 1; 31870 Introduction to Microcomputers; subject coordinator: Associate Professor G Norton

Errors: error calculations, error propagation. Presentation of data and graphical analysis; population and frequency distributions; sampling techniques; Least-squares; applications of concepts to the physical sciences.

**65011****Chemistry 1 F/T**

6cp; 6hpw

Revision of basic concepts, atomic structure. Periodic table. Bonding. Stoichiometry. Heat changes in chemical reactions. Structure of matter. Changes of state. Redox reactions.

**65012****Chemistry 1 (LS)**

6cp; 6hpw

Chemistry as it is related to the Life Sciences. Basic concepts, atomic structure, periodic table, bonding stoichiometry, thermodynamics, structure of matter.

**65013****Chemistry 1 (SL)**

for Bachelor of Science/Bachelor of Laws combined degree students  
5cp; 6hpw

Revision of basic concepts, atomic structure. Periodic table. Bonding. Stoichiometry. Heat changes in chemical reactions. Structure of matter. Changes of state. Redox reactions.

**65021****Chemistry 2 F/T**

6cp; 6hpw

Chemical equilibrium. Acid-base theory. Reaction kinetics. Electrochemistry. Manufacture of chemicals. Introduction to organic chemistry.

**65022****Chemistry 2 (LS)**

6cp; 6hpw; prerequisite: 65012 Chemistry 1 (Life Sciences)

Chemical equilibrium and solubility. Reaction kinetics. Introduction to organic chemistry. Functional groups, reaction mechanism and stereochemistry.

**65023****Engineering Chemistry**

6cp; 6hpw; subject coordinator: Dr B Young

This lecture series covers the following topics: mole concept, stoichiometry, structure of the atom, atomic spectra, periodic table, chemical bonding, electrochemistry and corrosion, gas laws, change of state, colloids, solution equilibria, applied organic chemistry and the structure of solids.

**65025****Chemistry 2 (SL)**

for Bachelor of Science/Bachelor of Laws combined degree students  
5cp; 6hpw

Chemical equilibrium. Acid-base theory. Reaction kinetics. Electrochemistry. Manufacture of chemicals. Introduction to organic chemistry.

**65031****Thermodynamics**

3cp; 3hpw; prerequisites: 67201 Materials Science 1; 33172 Science Mathematics 2; or 65021 Chemistry 2 FIT; subject coordinator: Associate Professor J Byrne

First law of thermodynamics, internal energy and enthalpy changes in chemical and physical reactions. Entropy and the second and third laws of thermodynamics. Free energy and chemical equilibria. Phase equilibria. The thermodynamic properties of ideal and non-ideal solutions.

**65062****Extractive Metallurgy**

6cp; 6hpw; prerequisites: 65031 Thermodynamics; all Stage 1, 2 and 3 subjects

Occurrence of minerals. Comminution and the theory of time particles. Extractive metallurgy including physical separation methods, flotation, hydrometallurgy and pyrometallurgy.

**65071****Corrosion Technology for Engineers**

3cp; 3hpw; prerequisites: 65023 Engineering Chemistry; 67021 Materials Engineering 1; subject coordinator: Associate Professor R Jones

A detailed survey of the various forms of corrosion. The use of appropriate anti-corrosion techniques in terms of modern theory and practice. The economics of alternative anti-corrosion methods. The subject

extends the prior knowledge that engineers have of the mechanical behaviour of metals, so that corrosion resistance also is considered an important aspect of materials selection.

### 65101

#### Chemistry 1M

*6cp; 6hpw; assumed knowledge: core of HSC 2-unit chemistry or equivalent*

Preparation for practical work, atomic structure, periodic table, chemical bonding. Redox reactions, chemical energetics, properties of matter.

### 65201

#### Chemistry 2M

*6cp; 6hpw; prerequisite: 65101 Chemistry 1M or equivalent*

Chemical kinetics, chemical equilibrium, enthalpy and entropy, acid-base theory, complex ions, electrochemistry, manufacture of chemicals.

### 65202

#### Organic Chemistry I

*6cp; 6hpw; prerequisite: 65101 Chemistry 1M or equivalent; subject coordinator: Dr J Kalman*

Introduction to organic chemistry. Nomenclature, functional groups, reaction mechanisms, stereochemistry, chemical and instrumental analysis.

### 65301

#### Spectroscopy and Structure

*7cp; 6hpw; prerequisite: 65201 Chemistry 2M or equivalent; subject coordinator: Dr R Ashby*

An introduction to the theory and practice of structure determination spectroscopic techniques including UV-visible, infra-red, nuclear magnetic resonance and mass spectrometry.

### 65302

#### Inorganic Chemistry

*7cp; 6hpw; prerequisite: 65201 Chemistry 2M or equivalent; subject coordinator: Associate Professor A Baker*

Covalent bonding in inorganic molecules. Valence bond theory. Chemistry of the transition elements and introductory coordination chemistry. Crystal field theory. Chelating agents and applications in analytical chemistry.

### 65401

#### Analytical Chemistry I

*8cp; 6hpw; prerequisites: all Stage 2 subjects; 65302 Inorganic Chemistry; subject coordinator: Dr M Dawson*

Lecture and laboratory topics selected from: separation techniques – solvent extraction; distillation; precipitation; chromatography – normal phase, reversed phase and ion chromatography; types of columns; types of separation media; and mobile phases. Volumetric analysis – non-aqueous; complexometric; and redox.

### 65402

#### Organic Chemistry 2

*8cp; 6hpw; prerequisites: all Stage 2 subjects; 65301 Spectroscopy and Structure; subject coordinator: Associate Professor G Norton*

Nomenclature of polyfunctional compounds. Methods of structural elucidation. Aromatic reactions and syntheses. Carbanion reactions in aliphatic syntheses. Introduction to polymer chemistry. Carbohydrates and stereochemistry. Introduction to heterocyclic chemistry. •

### 65403

#### Electrochemistry

*4cp; 3hpw; prerequisites: all Stage 2 subjects; 65301 Spectroscopy and Structure; subject coordinator: Associate Professor R Jones*

Revision of basic electrochemical concepts (Nernstian behaviour and conductivity) covered in earlier stages. Molar conductivity and applications. Nature of the electrical double layer, single electrode potentials, thermodynamics and electrode equilibria. pH – potential (Pourbaix) diagrams – their construction, application and limitations. Ionic solutions, activity and activity coefficients – Debye-Huckel theory. Polarisation at electrode surfaces and basic electrode kinetics – Butler-Volmer relationship. Tafel relationships and behaviour. Mechanisms of selected reactions. Electrochemistry of energy conversion. Electrochemistry of corrosion processes. Experimental methods.

**65404****Chemical Thermodynamics**

*4cp; 3hpw; prerequisites: all Stage 2 subjects; 65301 Spectroscopy and Structure; subject coordinator: Associate Professor J Byrne*

Thermodynamic systems and processes. State and path functions. First law of thermodynamics. Standard reference states and calculation of standard enthalpy changes. Heat capacity and variation of enthalpy of reaction with temperature. Thermodynamically reversible and irreversible processes. Entropy function. Second law of thermodynamics. Variation of entropy with temperature. Third law. Absolute standard entropies. Standard and non-standard values for Gibbs free energy changes. Variation of  $G$  with extent of reaction. Equilibrium constants and the reaction isotherm. Fugacity, activity and deviations from ideal behaviour. Van Hoff isochor, Gibbs-Helmholtz equation and applications.

**65501****Analytical Chemistry 2**

*8cp; 6hpw; prerequisites: all Stage 3 subjects; 65403 Electrochemistry; 65401 Analytical Chemistry 1*

Lecture and laboratory topics selected from: electroanalytical chemistry – ion selective electrodes, voltametric methods; spectroscopic analysis – UV/VIS, emission spectroscopy, ICP-AES, flame and furnace AAS, X-ray fluorescence; radiochemistry; flow injection analysis; quality assurance.

**65502****Chemical Process Control**

*8cp; 6hpw; prerequisites: all Stage 4 subjects; subject coordinator: Dr B Young*

Process control – measurement, controllers, control valves, processes. Control systems mathematics – block diagram algebra, Laplace Transforms, frequency response. Unit operations – heat exchange, distillation, separation processes. Advanced process control – bypass, cascade, feedforward.

**65504****Chemical Safety**

*3cp; 2hpw; prerequisites: all Stage 1 subjects; 65201 Chemistry 2M; 65202 Organic Chemistry 1; subject coordinator: Dr H Patney*

Safety in Chemical Laboratories is covered in this subject. Topics include: various laboratory hazards and their prevention; NSW Occupational Health and Safety Act and the role of Worksafe and Workcover; the toxic effects of chemicals; classification of dangerous goods; precautionary labels and material safety data sheets; corrosives, oxidisers and explosives; compressed gases; personal protective equipment in the laboratory; and waste handling and the disposal of chemical, biological and microbiological waste.

**65551****Analytical Chemistry 2 (Advanced)**

*8cp; 6hpw; prerequisites: all Stage 3 subjects; 65401 Analytical Chemistry 1; 65403 Electrochemistry*

Additional material for Honours students: PC-based data acquisition and control. Additional assignment topics related to advanced chemical instrumentation techniques.

**65556****Forensic Examination of Physical Evidence I**

*4cp; 3hpw; prerequisites: all Stage 3 subjects; subject coordinator: Associate Professor W Stern*

This subject introduces students to the general concepts and methods used in forensic science in general, and in the collection and examination of physical evidence in particular. Lectures and laboratory work also examine crime scene investigation, forensic photography and fingerprints.

**65557****Forensic Toxicology I**

The aim of this subject is to familiarise students with the fundamental concepts of pharmacology and toxicology. Topics covered include basic pharmacological principles such as absorption, distribution, metabolism and excretion of xenobiotics. The subject includes an introduction to the Poisons Act and drugs that act on synaptic and neuroeffector junctional sites.

**65601****Environmental Chemistry**

*8cp; 6hpw; prerequisites: all Stage 4 subjects; 65501 Analytical Chemistry 2; subject coordinator: Dr M Dawson*

The chemical nature and control of natural and polluted systems in the atmosphere, geosphere, biosphere and hydrosphere. The use of modern analytical techniques in study of such systems.

**65602****Reaction Kinetics**

*4cp; 3hpw; prerequisites: all Stage 4 subjects; subject coordinator: Dr L Evans*

Rates of chemical reactions, including order determination and experimentally determined rate laws. The use of analytical techniques to monitor reaction course. Analysis of the mechanism(s) by which a reaction occurs. Heterogeneous reactions and simple collision theory. Activation energy and the effect of temperature on reaction rates. Critical evaluation of pharmacokinetic data, and implications of kinetics for optimisation of industrial processes.

**65603****Surface Chemistry**

*4cp; 3hpw; prerequisites: all Stage 4 subjects; subject coordinator: Dr R Ashby*

Interfacial phenomena, surface active agents, catalysis, rheology.

**65651****Environmental Chemistry (Advanced)**

*8cp; 6hpw; prerequisites: all Stage 4 subjects; corequisite: 65551 Analytical Chemistry 2 (Advanced); subject coordinator: Dr M Dawson*

Additional material for Honours students: Honours students will be required to submit two additional assignments and complete one additional, more challenging practical class. They will also be required to do additional reading from current research publications.

**65656****Forensic Examination of Physical Evidence 2**

*6cp; 4hpw; prerequisites: all Stage 4 subjects; 65556 Forensic Examination of Physical Evidence 1; subject coordinator: Dr C Roux*

This subject considers the collection, examination, identification and comparison of

physical evidence commonly found at a crime scene. Such evidence includes footwear impressions, tool marks, globes, firearms (weapon, bullet and cartridge case comparison, gunshot residues, range of fire), glass, soil and miscellaneous trace evidence. The lecture material is complemented by an extensive laboratory program.

**65657****Forensic Toxicology 2**

*8cp; 6hpw; prerequisites: all Stage 4 subjects; 65551 Analytical Chemistry 2 (Advanced); 65557 Forensic Toxicology 1; subject coordinator: Dr C Conn*

This subject covers the chemistry and pharmacology of drugs important in forensic toxicology such as ethanol, antidepressants and antipsychotic agents. Other topics include the toxicology of asphyxia, drugs in sport, solvent abuse and naturally occurring poisons. The subject has a strong emphasis on analytical aspects of forensic toxicology.

**65702****Applied Organic Chemistry 2**

*8cp; 6hpw; prerequisites: all Stage 4 subjects; subject coordinator: Dr J Kalman*

This subject looks at selected advanced topics in organic chemistry, focusing on organic reaction mechanisms, photochemistry and spectroscopic elucidation of organic structures.

**65703****Metallurgical Chemistry**

*8cp; 6hpw; prerequisites: all Stage 4 subjects; subject coordinator: Dr A Cameron*

Occurrence of minerals. Comminution and the theory of time particles. Extractive metallurgy including physical separation methods, flotation, hydrometallurgy and pyrometallurgy.

**65704****Coordination and Organometallic Chemistry**

*8cp; 6hpw; prerequisites: all Stage 4 subjects; subject coordinator: Associate Professor A Baker*

Spectral and magnetic properties of coordinating compounds. Structural chemistry including single crystal X-ray diffraction. Applications of thermodynamics and kinetics to inorganic chemistry. Organometallic chemistry: theory and industrial applications. Coordination chemistry and catalysis.

**65705****Corrosion Science**

8cp; 6hpw; prerequisites: all Stage 4 subjects;  
subject coordinator: Associate Professor R Jones

The course provides a detailed survey of the various forms of corrosion, and the use of appropriate anti-corrosion techniques are discussed in terms of modern theory and practice. Some attention is given to the economics of alternative anti-corrosion methods. Lectures are complemented by extensive practical work which emphasises the applied nature of the subject.

**65752****Applied Organic Chemistry 2 (Advanced)**

8cp; 6hpw; prerequisites: all Stage 4 subjects;  
subject coordinator: Dr J Kalman

Additional material for Honours students: interpretation of homonuclear and heteronuclear decoupling experiments and nuclear Overhauser effects. Fragmentation mechanisms in mass spectrometry. Photochemical reactions of aromatic compounds. Reactions involving cleavage of weak single bonds.

**65753****Metallurgical Chemistry (Advanced)**

8cp; 6hpw; prerequisites: all Stage 4 subjects;  
subject coordinator: Dr A Cameron

Additional material for Honours students: roast reduction calculations. Calculations of blast furnace charges. Solvent extraction. Computer analysis of grinding and flotation circuits.

**65754****Coordination and Organometallic Chemistry (Advanced)**

8cp; 6hpw; prerequisites: all Stage 4 subjects;  
subject coordinator: Associate Professor A Baker

Additional material for Honours students: kinetics and mechanisms of reactions of organometallic compounds. Library assignment. Advanced project work.

**65756****Forensic Examination of Physical Evidence 3**

6cp; 4hpw; prerequisites: all Stage 4 subjects;  
65556 Forensic Examination of Physical Evidence 1; subject coordinator: Dr C Roux

This subject provides further development in the application of the techniques of forensic examination of physical evidence. Topics include the forensic study of hairs and fibres, paints, various polymers and other microtraces. The technical examination questioned document is also considered (inks, paper, photocopy toner, etc.).

**65757****Narcotics and Drugs of Abuse**

5cp; 4hpw; prerequisites: all Stage 4 subjects;  
65551 Analytical Chemistry 2 (Advanced); 65557 Forensic Toxicology 1; subject coordinator: Dr M Dawson

The topics to be covered include sources of drugs, profiling, sampling protocol and the identification and analysis of opioids, amphetamines, hallucinogens etc.

**65758****Fire Investigation**

5cp; 4hpw; prerequisites: all Stage 4 subjects;  
65551 Analytical Chemistry 2 (Advanced); 65556 Forensic Examination of Physical Evidence 1; subject coordinator: Associate Professor W Stern

This subject seeks to show how a systematic scientific examination of a fire scene can lead to the establishment of the fire's cause and origin. Topics include the chemical processes involved in fires, the properties of building materials and fuels, spontaneous combustion, sampling and analysis of fire debris, and vehicle and commercial fires.

**65851****Project 1 (Chemistry)**

8cp

The project component of the Honours degree in Chemistry comprises this subject and 65852 Project 2. To complete the Project, students should be enrolled in two consecutive (not concurrent) semesters. Projects are generally carried out in the Department of Chemistry and should relate to current problems or developments in Chemistry. Students are expected to translate their project design into

action, developing an appropriate methodology, collecting data and subjecting them to critical evaluation and scientific presentation.

### 65852

#### Project 2 (Chemstry)

*16cp; prerequisite: 65851 Project 1*

The project component of the Honours degree in Chemistry comprises this subject and 65851 Project 1. To complete the project, students should be enrolled in two consecutive (not concurrent) semesters. Projects are generally carried out in the Department of Chemistry and should relate to current problems or developments in Chemistry. Students are expected to translate their project design into action, developing an appropriate methodology, collecting data and subjecting them to critical evaluation and scientific presentation.

### 65853

#### Honours Seminar

*8cp*

In this subject, advanced chemistry topics are further developed via lectures, direct reading and electronic data retrieval. The nature of specific topics presented will depend on staff interests and availability. Students are expected to demonstrate high level interpretation and communication skills.

### 65856

#### Research Project

*24cp; at least 25hpw; prerequisites: all Stages 1–7 subjects; subject coordinator: Dr M Dawson*

A research project on specific aspects of forensic science will be conducted under the joint supervision of a member of the academic staff of the University and an external (industrial) supervisor. Some of the work may have to be conducted at sites away from UTS.

### 65858

#### Honours Research Project

*24cp; 2 semesters; prerequisites: all Stages 1–7 subjects; subject coordinator: Associate Professor A Baker*

Defining a research project. Research aims and relationship to available time and resources. Establishing previous work and critical assessment of methodology and results. Appropriate research methods, data collection,

data manipulation, logical development of detailed complex arguments. Research ethics. Structure and presentation of research findings.

### 65990

#### Master's Thesis (Applied Chemistry)

*F/T*

### 65991

#### Master's Thesis (Applied Chemistry)

*P/T*

### 65995

#### Industrial Training (Applied Chemistry Honours)

*prerequisite: average mark of at least 65 for Stages 1–4; subject coordinator: Dr B Young*

A minimum of one semester working as a member of a group involved in professional practice in chemistry. The student will be placed in a challenging position requiring initiative, scientific judgment and team work.

### 65996

#### Industrial Training I (Applied Chemistry)

*subject coordinator: Dr B Young*

First six months full time.

### 65997

#### Industrial Training 2 (Applied Chemistry)

*subject coordinator: Dr B Young*

Second six months full time.

### 65998

#### Industrial Training (Applied Chemistry)

*P/T*

### 66011

#### Earth Science I

*6cp; 6hpw equiv.; subject coordinator: Mr B Dent*

The dynamic Earth: earth materials; earth structure and the evolution of the continents and oceans; geological history; geological structure of Australia; landscape development; groundwater; engineering geology; resource and environmental geology. Three full-day field excursions.

**66013****Earth Science I (SL)**

*5cp; 5hpw equiv.; for Bachelor of Science/Bachelor of Law combined degree students; subject coordinator: Mr B Dent*

The dynamic Earth: earth materials; earth structure and the evolution of the continents and oceans; geological history; geological structure of Australia; landscape development; groundwater; engineering geology; resource and environmental geology. One full-day field excursion.

**66014****Hydrogeology**

*6cp*

Provides a knowledge of geological occurrence and hydraulics of groundwater flow, exploration techniques, extraction engineering and field management.

**66015****Hydrogeochemistry**

*6cp*

Covers the chemical basis for understanding how the chemistry of groundwater evolves both naturally and in the case of contamination. Both practical field measurement and computer modelling will be covered.

**66016****Geophysics and Remote Sensing of Groundwater Resources**

*6cp*

A theoretical and practical examination of the geophysical and remote sensing techniques applicable to groundwater resources evaluation and other environmental problems.

**66017****Geopollution Management**

*6cp*

The relationship between groundwater contamination and water quality, together with appropriate waste management and disposal methods for minimal environmental impact. Contaminated land issues are also addressed.

**66018****Groundwater Geophysics**

*6cp*

This subject presents an advanced application of geophysical techniques for groundwater research and resource management, and includes contamination assessment and monitoring.

**66021, 66023****Groundwater Science Projects (M)**

**F/T, P/T**

*24cp*

These projects will provide students with the opportunity to research specific hydrogeology groundwater resource or contamination problems. The depth and extent of research will vary with credit points required. Topics include investigation consisting of one or more of: modelling, laboratory experiments, field work related to hydrogeology and groundwater management, contaminant transport and processes, waste disposal and groundwater impact.

**66022, 66024****Groundwater Science Projects (GD)**

**F/T, P/T**

*12cp*

As above but at a reduced scale.

**66025****Contaminated Site Management**

*6cp*

To develop an understanding of the methodology and technology used in the assessment and remediation of contaminated sites.

The subject content includes: regulatory requirements, site assessment methodology, physical, chemical and biological properties and behaviour of contaminants, health issues, risk assessment, site assessment technology, remediation techniques and operation.

**66032****Geology for Engineers**

*3cp; 3hpw; subject coordinator: Mr B Dent*

Nature of minerals; origin and classification of igneous, sedimentary and metamorphic rocks; rock weathering processes; landscape formation; rock slope stability; uses of rock in construction; structural features of rocks; geological mapping techniques; groundwater; earthquakes; site investigation.



**66061****Environmental Geology**

*3cp; subject coordinator: Mr B Dent*

Fundamental concepts in environmental planning. Geologic hazard recognition and planning. Environmental aspects of geological resource utilisation. Mine rehabilitation. Soil classification. landscape features; hydrogeology; geopollution issues.

**66062****Earth Systems and the Environment**

*4cp; 2hpw; subject coordinators: Prof E Leitch and Dr G Skilbeck*

Introduction to Earth Systems including life cycles of oceans, global sea level variation, atmosphere and climate evolution and change, greenhouse gases, the water cycle; evidence for the age of the Earth and the evolution of life; natural geological hazards, their causes and predictability; Earth resources and their sustainable use; energy production from fossil fuels and other sources; Antarctica; its resources and future; waste disposal.

**66101****Earth Science 1M**

*6cp; 6hpw; subject coordinators: Professor E Leitch and Mr B Dent*

For students in the Applied Geology degree course. Equivalent to 66011 plus a one-day field excursion in the Sydney region.

**66201****Geological Mapping**

*4cp; 3hpw; prerequisite: 66011 Earth Science 1 or 66101 Earth Science 1M; subject coordinator: Dr E Frankel*

Maps and aerial photographs; contours; stratigraphic principles and correlation; folds and faults; interpretation of geological maps; surveying and mapping techniques. Geological framework of Australia. Six-day field camp.

**66202****Lithology**

*2cp; 2hpw; prerequisite: 66011 Earth Science 1 or 66101 Earth Science 1M; subject coordinator: Mr B Dent*

Crystal symmetry and habit; crystal growth types; physical properties of minerals; ore mineral associations; field classification and hand specimen description of igneous,

sedimentary, metamorphic and volcanic rocks. Essentially a practical subject, includes hand specimen examination of common minerals and rocks.

**66203****Geodynamics**

*3cp; 3hpw; prerequisite: 66011 Earth Science 1 or 66101 Earth Science 1M; subject coordinator: Professor E Leitch*

Earth structure. Seismology. Earth magnetism. Gravity and isostasy. Radioactivity and geochronology. Internal heat and heat flow in the Earth. Crystal structure – oceanic and continental crust. Theory of sea-floor spreading. Continental drift and palaeomagnetism. Concept of plate tectonics. Features of divergent, transform and convergent plate margins.

**66301****Mineralogy and Petrology**

*2 semesters, 4cp per semester; prerequisite: 66202 Lithology; subject coordinator: Dr G Caprarelli*

Crystal symmetry and Miller Indices; optical theory; use of the polarising microscope; optical properties, chemistry and paragenesis of rock-forming minerals; crystallisation paths of igneous minerals: occurrence, mineralogy and texture of igneous rocks; nature of magma and its cooling behaviour; magmatic differentiation; sources of magma – nature of crust and upper mantle; igneous rock associations. Types of metamorphism and textures of metamorphic rocks; chemical equilibria and metamorphic mineral reactions; concept of metamorphic zones and facies; metamorphic rock association. Microscopic and megascopic description of rock types. Five-day field camp with 66302 Sedimentary Geology.

**66302****Sedimentary Geology**

*6cp; 5hpw; corequisite: 66301 Mineralogy and Petrology; subject coordinator: Dr E Frankel*

Nature and origin of sedimentary materials and stratigraphic sequences including processes of weathering, transportation, deposition and diagenesis. Sedimentology of principal depositional environments; petrographic and textural analysis of sediments; nature and identification of clay minerals; introduction to palaeontological techniques. Field work.

**66303****Geochemistry**

*3cp; 3hpw; corequisite: 66301 Mineralogy and Petrology; subject coordinator: Dr G Caprarelli*

Abundance and distribution of elements and their geochemical classification. Crystallo-chemical concepts and structure and classification of common minerals. Fundamentals of chemical thermodynamics and application of thermodynamics to geological systems. Isotopy. Aqueous geo-chemistry and its significance in chemical weathering chemical sedimentation, diagenesis and metamorphism.

**66401****Technical Communication**

*3cp; 4hpw; prerequisites: 66301 Mineralogy and Petrology; 66302 Sedimentary Geology; subject coordinator: Dr G Skilbeck*

The nature of technical communication, geological report writing and presentation. Visual communication: charts, graphs, line drawings, maps, statistics. Legal problems of technical communication: contracts, copyright. House style, standard abbreviations and terminology. Editing, preparation and submission of technical manuscript for publication and/or printing. Oral presentation of technical reports, participation in symposia. Journal and library research.

**66402****Structural Geology**

*7cp; 6hpw; prerequisites: 66301 Mineralogy and Petrology; 66302 Sedimentary Geology; subject coordinator: Associate Professor B Marshall*

Stress, strain, rheological concepts, and problems pertaining to rock deformation: classification, recognition and formation of fracture systems in brittle and transitional environments; classification, recognition and formation of structures in ductile environments: collection and analysis of structural data in mine, field and laboratory data presentation: mineralisation in the structural environment. Field work.

**66403****Economic Geology**

*4cp; 3½hpw; prerequisites: 66301 Mineralogy and Petrology; 66302 Sedimentary Geology; subject coordinator: Mr S Pecover*

Introduction to the nature of ore bodies: genesis, classification and laboratory methods

of investigating such deposits. Field guides to mineralisation: field investigation of mineralisation. Field work.

**66404****Resource Management**

*3cp; 3hpw; prerequisite: 66202 Lithology; subject coordinator: Mr S Pecover*

Determination of reserves and resources on a global scale. Definition of reserve categories in use in Australia. The structure and financing of mining companies including financial evaluation techniques using discounted cash flows. Stock exchange operation. Metal marketing and cartels. The New South Wales mining laws: comparison with law in other States. Government policies with respect to the mining industry and the effects of political decisions on mining operations; ethics in the mining industry and the geological profession.

**66405****Basin Analysis**

*4cp; 3hpw; prerequisites: 66201 Geological Mapping; 66302 Sedimentary Geology; 66406 Exploration Geophysics; subject coordinator: Dr G Skilbeck*

Techniques of stratigraphic dating and correlation; interpretation of modern and ancient depositional environments; palaeo-current analysis; provenance, dispersal and diagenesis; relations between basin structure, tectonism and sedimentation. Field work.

**66406****Exploration Geophysics**

*4cp; 3½hpw; prerequisites: 66203 Geodynamics; 66201 Geological Mapping; 31871 Computing for Science; subject coordinator: Dr G Skilbeck*

Introduction to common methods of air and ground geophysics; theory, technique and equipment; interpretation principles; limitations, particularly in differing parts of Australia. Applications of selected techniques in regional exploration, ground follow-up and target detailing. Down-hole methods of geophysics; geophysical logging. Integration of geophysics with other exploration techniques within ongoing exploration programs. Field work.

**66501****Engineering and Environmental Geology**

5cp; 6hpw and 4-day field excursion; corequisite: 66402 Structural Geology; subject coordinator: Mr B Dent

Fundamental concepts in environmental planning. Geologic hazard recognition and planning. Environmental aspects of geological resource utilisation. Mine rehabilitation. Soil classification. landscape features; hydrogeology; geopollution issues. Rheological properties of rocks and soils. Soil compaction for engineering purposes. Engineering rock mass concepts and classification. Engineering testing of rock and soil materials. Groundwater geology, hydrology, exploration and development. Soil and rock slope stability. Engineering geology in dam, reservoir, road and railway planning and design.

**66502****Advanced Petrology**

4cp; 3½hpw; prerequisite: 66301 Mineralogy and Petrology; corequisite: 66505 Advanced Structural Geology; subject coordinator: Dr G Caprarelli

Mineral stability fields in the crust. Constitution of the crust and upper mantle. Origin of basaltic magmas. Partial melting and fractional crystallisation hypotheses. The 'pyrolite' model. Orogenic igneous rock associations. Petrological evolution of the crust and upper mantle. Experimental metamorphic reactions. Metamorphic facies. Mineral parageneses in metamorphic rocks. Eclogites. Metamorphic belts. Metamorphism and crystal evolution. Field work.

**66503****Fossil Fuels**

4cp; 3½hpw; corequisites: 66302 Sedimentary Geology; 66405 Basin Analysis; subject coordinator: Dr E Frankel

World energy market. Geology of fossil fuel deposits including coal and associated strata, petroleum, natural gas and synfuels derived from oil shale, tar sands and other petroliferous sediments. Introduction to methods of resource size estimation. Field work.

**66504****Exploration Geochemistry**

2cp; 3hpw; corequisite: 66403 Economic Geology; subject coordinator: Mr S Pecover

Introduction to geochemical exploration; sampling theory; statistical data processing and presentation; sample security; soil, sediment stream, rock and vegetation surveys; design of a geochemical exploration program.

**66505****Advanced Structural Geology**

4cp; 3½hpw; prerequisites: 66402 Structural Geology; 66403 Economic Geology; corequisite: 66502 Advanced Petrology; subject coordinator: Associate Professor B Marshall

Elastic, plastic and viscous behaviour in relation to the deformation of mono- and poly-minerallic aggregates; microfabric studies – grain boundary relationships, preferred orientation and the application of the U-stage; theoretical advances in the formation of folds, foliations and lineations; metamorphism and deformation in space and time – progressive deformation relationships on hand-specimen, mine and regional scales; metamorphism, deformation and remobilisation of ore deposits; tectonics and ore distribution; the evolution with geologic time of structure, tectonics and ore deposits. Field work.

**66506****Advanced Geological Mapping**

3cp (field work); prerequisites: 66201 Geological Mapping; 66402 Structural Geology; subject coordinator: Professor E Leitch

Regional and detailed geological mapping using topographic, air photo and plan bases. Field measurement techniques. Position specification and location by visual, compass, altimeter and GPS methods. Recording field data. Use of information derived by remote sensing and geophysical surveys. Report preparation and data compilation. Presentation of geological maps and sections. Oral presentation of mapping results.

**66507****Project Seminar**

3cp; subject coordinator: Dr E Frankel

In preparation for 66604 Field Project, students are assigned seminar topics which include a literature search on an area of interest,

background reading on relevant theoretical topics, and practical or field exercises designed to develop skills applicable to the particular Field Project proposed.

### 66551

#### Advanced Structural Geology (Honours)

*5cp; prerequisites: all Stage 4 subjects; subject coordinator: Associate Professor B Marshall*

Elastic, plastic and viscous behaviour in relation to the deformation of mono- and poly-mineralic aggregates; microfabric studies – grain boundary relationships, preferred orientation and the application of the U-stage; theoretical advances in the formation of folds, foliations and lineations; metamorphism and deformation in space and time – progressive deformation relationships at hand – specimen, mine and regional scales; metamorphism, deformation and remobilisation of ore deposits; tectonics and ore distribution; the evolution with geologic time of structure, tectonics and ore deposits. Field work.

### 66552

#### Advanced Petrology (Honours)

*5cp; prerequisites: all Stage 4 subjects; subject coordinator: Dr G Caprarelli*

Mineral stability fields in the crust. Petrological constitution of the crust and upper mantle. Fractionation processes in igneous petrology. The generation of basaltic magmas. Partial melting and fractional crystallisation hypothesis. The diversity and occurrence of basaltic rocks. Orogenic igneous rock associations. Temporal and spatial distribution of andesites. Granite diversity and origin. Pyroclastic rocks in the volcanic succession. Experimental metamorphic reactions and metamorphic facies. Metamorphism and crustal evolution. Metamorphism of the mafic/ultramafic rocks – regional metamorphism, burial metamorphism, blueschists, eclogites, sea-floor metamorphism. Metamorphism of pelites – regional metamorphism, granulites, low pressure pelitic metamorphism. Field work.

### 66553

#### Fossil Fuels (Honours)

*5cp; prerequisites: all Stage 4 subjects; subject coordinators: Dr E Frankel and Dr G Skilbeck*

Overview of the world energy market and the historical development of the fuels industries. Geology of fossil fuels deposits, including coal

and associated strata, petroleum, natural gas and synthetic fuels derived from oil shale, tar sand and other petroliferous sediments. Methods of resource size estimation. Geological aspects of the occurrence of fossil fuels in Australia and Papua New Guinea is covered in a research assignment. Three-day field trip to examine coal industry in the Hunter Valley.

### 66601

#### Exploration and Mining Geology

*4cp; 4hpw; prerequisites: 66402 Structural Geology, 66403 Economic Geology; subject coordinator: Mr S Pecover*

Principles of project initiation and continuation; functions of the controlling on-site geologist; exploration programs and budgeting; critical path analysis. Prospect analysis using discounted cash flow methods. Relation of exploration programs to geological models. Prospecting methods and follow-up techniques. Drilling: commonly used methods; logging of drill products; interpretation of results. Drill-sections, level plans, grade and recovery predictions, reserves estimation. Mineral processing.

### 66602

#### Tectonics

*3cp; 3hpw; prerequisites: 66201 Geological Mapping, 66502 Advanced Petrology; subject coordinator: Professor E Leitch*

Origin and evolution of the Earth's continental crust. Change in tectonic regime and time. Large-scale geologic cycles, major Precambrian–Cambrian boundary divisions. Archaean geology and tectonics. Granite/greenstone and high-grade metamorphic terrains. Proterozoic crystal associations, special characteristics and tectonics. Reactivated basement models. Plate tectonics and crystal evolution. Plate tectonics and orogeny. Wilson cycle. Collision and activation orogenics. Tectonics of present-day plate margins. Case studies of the Red Sea/African Rift System (divergent), Gulf of California/San Andreas (transform) and Himalayan (convergent) boundaries. Detailed study of sea-floor spreading in the Mesozoic/Cenozoic. Concept of tectonostratigraphic terranes. Tectonic evolution of Australia.

**66603****Remote Sensing**

3cp; 3hpw; corequisite: 66201 Geological Mapping; subject coordinator: Mr S Pecover

Utilisation of differing parts of the electromagnetic spectrum in remote sensing. Distant and near remote sensing; radar and infra-red imagery; traditional black-and-white, and colour air-photography; multispectral photography and scanning; satellite imagery. Emphasis will be on geological applications of remote sensing in reconnaissance mapping, geotectonics, and mineral exploration. Practical work will predominantly involve principles of air-photo interpretation.

**66604****Field Project**

9cp; 9hpw; prerequisite: 66507 Project Seminar; subject coordinator: Dr E Frankel

This is an assignment to be carried out under supervision of a specified member of staff. The assignment combines a literature search, field mapping and/or sampling, and a short laboratory investigation. Assessment is based on a formal typed report submitted to the supervisor before the last week of the semester.

**66605****Advanced Fossil Fuels**

4cp; 4hpw; prerequisite: 66503 Fossil Fuels; subject coordinator: Dr E Frankel

Exploration and production techniques for coal and petroleum deposits. Reservoir engineering and development of petroleum fields. Assessment of coal and gas reserves. Geological factors in coal mine development and operation. Economic assessment and risk analysis.

**66606****Mineral Deposits**

4cp; 3hpw; prerequisites: 66402 Structural Geology; 66403 Economic Geology; subject coordinator: to be advised

Case studies of classical metallic and non-metallic mineral deposits; their genesis in the light of current theories of ore formation; evidence adduced from field and laboratory studies. Classification of mineral deposits relative to environment and method of formation. Field work.

**66607****Advanced Engineering Geology**

4cp; 4hpw; prerequisite: 66501 Engineering and Environmental Geology; subject coordinator: Associate Professor B Marshall

Quantification of geologic data for engineering purposes; stress and deformation in soil and rock masses, especially near surface excavations and underground openings; special techniques for field and laboratory investigations; evaluation and development of groundwater resources, probabilistic analysis of soil and rock slope stability.

**66608****Mineral Science Project**

2cp; 2hpw; subject coordinator: Dr G Skilbeck

A report and seminar prepared by the student on the mineral science project.

**66651****Convergent Margin Tectonics (Honours)**

3cp; prerequisites: Stage 5 Honours subjects; subject coordinator: Professor E Leitch

Review of geology and geophysics of convergent margins. Basic tectonic elements. Temporal and spatial variability of modern margins. Outline geology of the New England Fold Belt – an ancient convergent margin. Field study of Devonian and Carboniferous tectonic elements in New England – magmatic arc, arc-fringe, fore-arc basin, ophiolites, and off-scraped and underplated accretionary complexes. Critical appraisal of tectonic models, the tectonostratigraphic terrane approach.

**66652****Conceptual Models of Ore Deposits (Honours)**

3cp; prerequisites: Stage 5 Honours subjects; subject coordinator: Associate Professor B Marshall

Introduction to conceptual models for ore deposits; empirical/genetic approaches; metallogenic concepts for magmatic, hydrothermal, and sedimentary deposits; structural controls in ore formation; examples of world class deposits.

**66653****Applied Clastic Basin Analysis (Honours)***3cp; prerequisites: Stage 5 Honours subjects; subject coordinator: Dr G Skilbeck*

Detailed examination of clastic sedimentary environments with particular emphasis on sandstone body deposition and orientation. The applications of genetic stratigraphy and seismic stratigraphy are examined using real practical exercises on seismic and well data. On a field trip to the Sydney Basin and New England Fold Belt outcrops of fluvial, seashore marine and deep marine environments are examined in detail to demonstrate the three-dimensional nature of deposits.

**66654****Research Developments in Geoscience***3cp; prerequisites: Stage 5 Honours subjects; subject coordinator: Professor E Leitch*

The subject is based around a series of nine 50-minute seminars given by Doctoral students, academic staff and visiting professional geoscientists. Students will be required to read specified reference material prior to the seminars, and to discuss this material, together with points arising out of the presentation, during a closely following tutorial.

**66858****Project (Honours)***28cp; 2 semesters; prerequisites: Stage 5 Honours subjects; subject coordinator: Professor E Leitch*

Defining a research project. Research aims and relationship to available time and resources. Establishing previous work and critical assessment of methodology and results. Appropriate research methods, data collection, data manipulation, logical development of detailed complex arguments. Research ethics. Structure and presentation of research findings.

**66990****Master's Thesis (Applied Geology) F/T****66991****Master's Thesis (Applied Geology) P/T****66995****Industrial Training (Honours)***prerequisites: Stage 4 subjects; subject coordinator: Mr S Pecover*

A minimum of one semester working as a member of a group involved in professional practice in applied geology. The student will be placed in a challenging position requiring initiative, scientific judgment and team work.

**66996****Industrial Training 1 (Applied Geology)***prerequisites: 66201 Geological Mapping; 66202 Lithology; subject coordinator: Mr S Pecover*

The first period of at least six months' full-time relevant industrial employment is necessary to satisfy this subject. The employment must have the approval of the Head of Department of Applied Geology.

**66997****Industrial Training 2 (Applied Geology)***prerequisites: Stage 4 Applied Geology Course; subject coordinator: Mr S Pecover*

The second period of full-time relevant industrial employment. Only in exceptional circumstances, and with permission of the Head of Department, may formal subjects be undertaken concurrently with this subject.

**66998****Industrial Training (Applied Geology)****P/T***subject coordinator: Mr S Pecover***67011****Materials I***3cp*

An introductory course in the properties of building materials. Most commonly used materials are covered but not in depth.

**67021****Materials Engineering 1**

*3cp; prerequisites: 46110 Mechanics 1; 65023 Engineering Chemistry*

A basic introduction to materials science. It provides a foundation in terms of microscopic structure and composition for the understanding of the behaviour of engineering materials. Topics dealt with include atomic structure of solids, phase diagrams, properties of metals and alloys, corrosion, polymers and rubbers, ceramics, timber and composites.

**67022****Materials Science for Engineers**

*3cp; corequisites: 65023 Engineering Chemistry; 47127 Mechanics of Solids 1*

This subject deals with the basic properties of engineering materials. In a materials science section the major topics are classification and structure of solids; primary and secondary bonding; metals, polymers and ceramics, heat treatment and joining methods; durability and corrosion. In a second section of mechanical properties of materials the major topics are the behaviour of materials subjected to tensile and compressive loads: hardness; theories of failure. The lecture program is supported by a program of laboratory demonstrations and experiments.

**67023****Materials Technology**

*3cp; prerequisite: 68031 Engineering Physics 1 (Electrical)*

The objectives are to develop the student's familiarity with commonly used electrical engineering materials to the extent that he or she would classify them in order of hardness, strength, thermal and electrical conductivity, density, dielectric constant and permeability. Materials covered include ferrous and non-ferrous metals, plastics and ceramics. The subject includes the topics of measurement of material properties, and joining techniques. General production techniques and the selection methods are covered but the emphasis is placed on the properties and selection of metals ceramics, polymers and composites in electronic devices and instruments.

**67061****Materials Engineering 2**

*3cp; prerequisites: 33222 Engineering Mathematics 2B; 42631 Mechanics 3*

An introduction to the behaviour of mechanical vibrations. The content includes free and forced response of spring/mass/damper systems, two- and multidegree of freedom systems, torsional vibrations and transverse vibration of beams. Laplace transformation, mechanical impedance and matrix methods are used, and both analytical and computer-based numerical solutions are presented.

**67101****Introduction to Materials**

*6cp; corequisite: 65011 Chemistry 1 F/T; subject coordinators: Dr M Stevens and Dr G Heness*

A basic introduction to materials science. It provides a foundation in terms of microscopic structure and composition for the understanding of the behaviour of engineering materials. Topics include classification and structure of solids, phase diagrams, properties of metals, ceramics, polymers, timber and composites.

**67201****Materials Science 1**

*4cp; prerequisites: 65011 Chemistry 1 F/T; 68101 Physics 1; corequisites: 65021 Chemistry 2 F/T; 68201 Physics 2; 33171 Science Mathematics 1; subject coordinator: Dr M Stevens*

Introduction to the crystalline structure and physical properties of solids. Structure-sensitive and structure-insensitive properties. The properties of metals and metallic alloys in terms of modern theories. The control of structure and properties of commercially important alloys. Introduction to the structure and properties of polymer and ceramic materials and the techniques employed to modify their properties. Introduction to the mechanical testing of materials. The effects of stress state temperature straining rate and repetitive loadings on the behaviour of materials (creep, fatigue and brittle fracture).

**67203****Techniques in Materials Science**

*3cp; prerequisite: 67101 Introduction to Materials; subject coordinator: Dr G Heness*

This subject provides an understanding of the basic concepts of techniques used in materials science. This subject further develops some of the concepts introduced to the students in Introduction to Materials in order to prepare them for core materials subjects in Stages 4 to 6. The subject provides students with a number of practical skills that will be required in these subjects and an understanding of the more common materials characterisation techniques that they will encounter in later stages in the course. The students are also introduced to the concept of laboratory safety as it applies to typical materials laboratories.

**67303****Mechanical Properties of Materials**

*6cp; prerequisite: 67101 Introduction to Materials; corequisites: 33172 Science Mathematics 2; 67203 Techniques in Materials Science; subject coordinator: Dr G Heness*

This subject provides an understanding of the mechanical properties of materials by the use of standard mechanical tests and the determination of materials property data. The concepts of stress, strain, elasticity, plasticity and criteria for yielding and fracture are addressed and applied to a wide range of mechanical test methods and materials. The issue of fractography as a means failure analysis is also addressed. Basic statics is introduced to the student along with an introduction to fracture mechanics. This subject also ensures that the student develops the necessary laboratory and analysis skills required by professionals involved in the mechanical testing of materials for either research or quality assurance.

**67304****Physical Metallurgy**

*6cp; 6hpw; prerequisites: 67101 Introduction to Materials, 67203 Techniques in Materials Science; corequisite: 65031 Thermodynamics; subject coordinator: Dr WYeung*

This subject provides an understanding of the theory of phase transformations in metal and alloys. Solidification and solid-solid transformations of metals and alloys are studied in relevance to the phase transformation theory. Deformation

mechanism and annealing behaviour of metals and alloys are studied in terms of modern theory and practice. Attention is also given to application of the industrial processes and their effects on the microstructure-texture-property development of metallic materials.

**67305****Polymer Science**

*6cp; 6hpw; prerequisite: 65021 Chemistry 2 FIT; subject coordinator: Dr B H Stuart*

This subject provides an introduction to the chemistry and physics of polymers. Comprehensive coverage of the structures, reaction mechanisms and characterisation techniques of polymers is provided. Practical classes provide experience with relevant techniques and complement the theory presented in lectures. The applications of polymers are also addressed.

**67306****Traditional Ceramics**

*6cp; 6hpw; prerequisites: 67101 Introduction to Materials; 67203 Techniques in Materials Science; 65021 Chemistry 2 FIT; corequisite: 65031 Thermodynamics; subject coordinator: Dr A Ray*

Fundamentals of ceramic science and technology, ceramic phase diagrams – binary and ternary systems, ceramic structures and phase transformation, clay-based ceramics, cements and concretes, and glasses. Raw materials and manufacturing methods.

**67407****Physical Properties of Materials**

*6cp; 6hpw; prerequisites: 67101 Introduction to Materials, 33172 Science Mathematics 2; 68201 Physics 2; subject coordinator: Dr M Stevens and Prof J Unsworth*

An introduction to atomic structure and quantum mechanics serves to develop the band theory of solids at an intermediate level. These theoretical concepts are utilised in describing the electrical, thermal, magnetic and optical properties of metals, semi-conductors and insulators. The characteristics and structure of high temperature superconductors are discussed. The unique properties of these materials are emphasised via an examination of devices including capacitors, diodes, thermocouples, loudspeakers, recording heads, strain gauges, information storage, fibre optics and so on.



**67408****Industrial Metallurgy**

*6cp; 6hpw; prerequisites: 67303 Mechanical Properties of Materials; 67304 Physical Metallurgy; subject coordinator: Dr WYeung*

The subject provides an understanding of application of metallurgical principles and theoretical concepts to the present and developing metal processing technologies, including foundry and casting technology, metalworking processes, welding technology, surface finishing and powder metallurgical techniques. The theory and application of non-destructive testing techniques are studied for examination of metal components and structures. Attention is also given to the environmental impact and the latest recycling technology of metals and alloys.

**67409****Polymer Technology**

*6cp; 6hpw; prerequisites: 67305 Polymer Science; 67303 Mechanical Properties of Materials; subject coordinator: Dr B H Stuart*

This subject provides a comprehensive coverage of the properties of polymers and processing methods used in their manufacture. Practical classes provide experience with such processing methods and the relevant mechanical testing techniques.

**67410****Instrumentation for Materials Scientists**

*3cp; 3hpw; prerequisites: 67101 Introduction to Materials; 65011 Chemistry I F/T; 31871 Computing for Science; subject coordinator: Prof J Unsworth*

This subject provides a background in sensors, transducers, analogue and digital electronics, interfacing techniques and modern instrumentation relevant to the needs of materials scientists and chemists in the practice of their professions. The subject matter will be of an applied nature and will include: advantages of electronic techniques for measurements; methods of specification and purchase of instruments to achieve best technical value per dollar; DC and AC circuits; filters; input impedance and measurement; working voltage and power rating of components; transducers and sensors for measurement of pH, strain (e.g. strain gauges), temperature (e.g. thermocouples), displacement (e.g. LVDT), force, pressure, and

ion concentration; operational amplifiers; comparators; zero cross-over devices; phase measurement; negative feedback; bandwidth; 3dB limits; analogue to digital conversion; digital instruments, advantages; opto-electronic couplers; digital integrated chips and microprocessors; computer interfacing; data takers; examples of modern instruments used by chemists and materials scientists.

**67506****Technical Ceramics**

*6cp; 6hpw; prerequisites: 67306 Traditional Ceramics; 67304 Physical Metallurgy; 67303 Mechanical Properties of Materials; 67407 Physical Properties of Materials; subject coordinator: Dr B Ben-Nissan*

This subject covers the physical aspects of the Technical Ceramics. Structural imperfections are covered using Kroger-Vink notations and industrial electronic ceramics are introduced as practical examples. Free energy curves for ceramic materials are covered and spinel diagrams and related ferrite and aluminate structures are introduced. Diffusion, densification, sintering theories, grain growth and other sintering problems. Molecular engineering of advanced ceramics, oxides, nitrides, sialons in general. Advanced ceramics production methods. Glass ceramics, thermal coatings, mechanical properties, reliability and probability analysis in ceramic materials. Toughening mechanisms in ceramics. Magnetic and electronic and opto-electronic ceramics. Optical fibre production and technology.

**67507****Composites**

*4cp; 4hpw; prerequisite: 67303 Mechanical Properties of Materials; subject coordinator: Dr G Heness*

This subject covers the following topics: mechanical properties, fracture mechanics and failure analysis of polymer, metallic and ceramic matrix composites; properties of fibres, weaves, fabrics and pre-pregs, their manufacturing and processing requirements; properties of advanced materials and composites and their selection; advanced polymers, copolymers and polymeric matrix composites; and the design and properties of high temperature metal alloys and metal matrix composites.

**67553****Ceramics 3 (Honours)**

*4cp; prerequisites: 67401 Materials Science 3; 67303 Mechanical Properties of Materials; 67403 Ceramics 1; corequisite: 67501 Ceramics 2*

Structural imperfections and defect mechanisms using Kroger-Vink notations. Diffusion in ceramics, solid reactions, sintering theories, densification and grain growth. In addition to current production methods, modern production techniques such as nanoparticle powder technology, sol-gel developed thin and thick films, and ceramic membrane technology will be covered. Molecular engineering in ceramics through better chemistry for multicomponent and multilayer ceramics and interface interactions will be emphasised.

Mechanical properties will precede the design with brittle materials, fatigue life prediction in ceramics, reliability and probability analysis in ceramics engineering and manufacture.

Micromechanical models and their application to ceramics design, toughening mechanisms, ceramic matrix and cermet composites and near net shape ceramic production methods will also be covered.

Production and properties of thermal, magnetic, electrical and optoelectronic ceramic materials, sensor technology piezoelectric and pyroelectric ceramics.

**67554****Physical Metallurgy (Honours)**

*4cp; prerequisites: 67404 Physical Metallurgy 1; 67405 Physical Metallurgy 2; corequisite: 68071 Applied Physics (Materials)*

The application of metallurgical principles and theoretical concepts to the present and developing metals processing technologies, including foundry technology, welding technology, powder metallurgical techniques and surface finishing. The theory and application of non-destructive testing techniques applied to the examination of metal components and structures. Industrial excursions and technical inspections.

**67602****Surface Properties of Materials**

*4cp; 4hpw; prerequisites: 65031 Thermodynamics; 67409 Polymer Technology; 67408 Industrial Metallurgy; 67306 Traditional Ceramics; subject coordinator: Dr M Stevens*

This subject contains a detailed treatment of basic surface chemical concepts, techniques and applications of liquid and solid systems. Equilibrium thermodynamics is used to define surface energies. Adsorption/desorption phenomena are described via kinetic modelling techniques as well as by the unique properties in solution and their absorption characteristics. The control of the electrical nature of solid surfaces is examined and applied to the stability of colloidal systems. Much of the fundamental phenomena covered in the subject is applied to the understanding of adhesion, lubrication and wear.

**67605****Design and Selection of Materials**

*3cp; prerequisites: 67306 Traditional Ceramics; 67506 Technical Ceramics; 67305 Polymer Science; 67409 Polymer Technology; 67304 Physical Metallurgy; 67408 Industrial Metallurgy; 67507 Composites; corequisite: 67606 Corrosion and Degradation of Materials; subject coordinator: Dr B Ben-Nissan*

This subject is an examination of the design-making processes which an engineer/scientist employs to originate, evolve and produce a device, a machine component or structural system. Material selection and specification, a critical factor in this process, is examined with regard to material characteristics, in-service performance, aesthetic factors, the environment, and other considerations in the design process. Practical design and brainstorm sessions are used along with specialised practical design and material selection lectures.

**67606****Corrosion and Degradation of Materials**

*6cp; 6hpw; prerequisites: 67408 Industrial Metallurgy; 67506 Technical Ceramics; 67409 Polymer Technology; subject coordinators: Assoc Prof R Jones and Dr A Ray*

This subject provides a detailed survey of the forms and mechanisms of corrosion of metallic materials and the degradation of non-metallic materials. The use of appropriate non-

corrosion and anti-degradation methods is considered in terms of modern theory and practice. Attention is also given to the economics of materials selection and degradation protection and control techniques. Lectures are complimented by an extensive practical program which emphasises the applied nature of the subject.

**67607****Specialisation Project**

*8cp; prerequisites: up to and including Stage 5 of the Bachelor of Applied Science in Materials Science; subject coordinator: Dr B Ben-Nissan*

This subject involves the planning, execution, analysis and reporting of a research project. Students work individually under the supervision of a member of academic staff. The topic is chosen after consultation with an academic supervisor.

**67652****Advanced Materials and Characterisation**

*8cp; 6hpw; prerequisites: completion of Stages 1-5 of the Bachelor of Applied Science in Materials Science; subject coordinators: Prof J Unsworth and Dr A Ray*

This subject deals with advanced materials and advanced analytical methods. Modern theories of structure/property relationships based on thermodynamics and quantum and electro-magnetic theories. Analytical methods including electron microscopy, spectroscopy, radiation, thermal, electrical and magnetic techniques. Emphasis on interdisciplinary approach to the development of specialist materials and their characterisation.

**67751****Honours Project Proposal**

*4cp; 4hpw; prerequisites: completion of Stages 5 & 6 of the Bachelor of Applied Science (Honours) in Materials Science; subject coordinator: Dr M Stevens*

Defining and planning a research project. Research aims and relationship to available time and resources. Reviewing previous research work and critical assessment of methodologies and results.

**67851****Honours Project**

*20cp; 20hpw; prerequisites: completion of Stage 7 of the Bachelor of Applied Science (Honours) in Materials Science; subject coordinator: Dr M Stevens*

Application of appropriate research methods, data collection, data manipulation, logical development of detailed complex arguments. Research ethics. Structure and presentation of research findings. Preparation of articles for publication in journals and at conferences.

**67990****Master's Thesis (Materials Science)**

**F/T**

**67991****Master's Thesis (Materials Science)**

**P/T**

**67995****Industrial Training (Honours)**

*prerequisites: Honours Stages 5 and 6*

A minimum of one semester working as a member of a group involved in professional practice in materials science. The student will be placed in a challenging position requiring initiative, scientific judgment and team work.

**67996****Industrial Training 1 (Materials Science)**

Industrial training provides students with work experience relevant to their studies and an opportunity to apply their academic skills in the workplace. During the training period students learn to extend their knowledge of principles, techniques and technologies gained from the academic program and to integrate work and study experiences.

**67997****Industrial Training 2 (Materials Science)**

Industrial training provides students with work experience relevant to their studies and an opportunity to apply their academic skills in the workplace. During the training period students learn to extend their knowledge of principles, techniques and technologies gained from the academic program and to integrate work and study experiences.

**67998****Industrial Training (Materials Science)  
P/T****68011****Engineering Physics (Mechanical)***3cp; 3hpw; subject coordinator: Associate Professor P Logan*

A foundation physics course for mechanical engineering students. It covers the fundamentals of thermal physics, wave motion including sound and light, and electricity and magnetism.

**68012****Electrical Engineering I (Mechanical)***3cp; 3hpw; prerequisites: 68011 Engineering Physics (Mechanical); 33121 Engineering Mathematics 1A; subject coordinator: Dr D Green*

Covers the basic theory of electricity and magnetism and provides an introduction to the theoretical and practical aspects of electrical machines. The syllabus includes DC circuits transients, AC circuits, magnetic fields, electromagnetic induction, magnetic materials, magnetic circuits, DC machines, multiphase circuits, transformers, induction motors and synchronous machines.

**68021****Engineering Physics (Civil)***6cp; 6hpw; corequisites: 33120 Engineering Mathematics 1; 47117 Statics; subject coordinator: Associate Professor P Logan*

This is a foundation physics subject for civil engineering students. It provides an understanding of fundamental concepts in dynamics, electromagnetism, optics and thermal properties of matter. Students are introduced to the basic techniques of measurement.

**68031****Engineering Physics I (Electrical)***6cp; 6hpw; corequisite: 33120 Engineering Mathematics 1; subject coordinator: Associate Professor P Logan*

This is a foundation physics subject for electrical engineering students. It covers the fundamentals of dynamics and statics, fluid mechanics, and thermal physics. Students are introduced to the basic techniques of measurement.

**68032****Engineering Physics 2 (Electrical)***3cp; 3hpw; prerequisites: 33120 Engineering Mathematics 1; 68031 Engineering Physics I (Electrical); subject coordinator: Associate Professor P Logan*

This is a foundation physics subject for electrical engineering students. It covers the fundamentals of waves and optics, atomic and nuclear physics, and includes an introduction to magnetism.

**68033****Engineering Physics 3 (Electrical)***3cp; 3hpw; prerequisites: 68032 Engineering Physics 2 (Electrical); 67023 Materials Technology (recommended)*

Dielectric materials: fundamentals; classification of dielectrics; practical applications; relationship between atomic and bulk dielectric properties; dielectric breakdown.

Magnetic materials: classification of materials by magnetic properties; bulk magnetic properties and their measurement; magnetic materials for practical applications. Superconductivity: historical development and applications, categories of materials, electrical and magnetic behaviour.

**68034****Electrical Power Generation***3cp; 3hpw; prerequisite: 68031 Engineering Physics I (Electrical); subject coordinator: Associate Professor P Logan*

A course on energy and power for electrical engineering students. It covers the laws of thermodynamics: T-S diagrams; different thermodynamic cycles including the Otto, Diesel and steam engines; refrigeration cycles, thermal generation technology; nuclear reactors; nuclear fusion; MHD; solar energy; alternative energy including wind, hydro, waves, tidal and geothermal; the distribution and storage of energy including pumped storage and batteries; the efficient use of energy; pollution; the economics, politics and planning of energy production and use.

**68035****Communication Physics***3cp; 3hpw; subject coordinator: Professor A Moon*

Basic aspects of electromagnetic wave propagation and attenuation in specific media. Real boundary problems, distributed source

and multiwavelength effects: involving interference, diffraction, reflection, and image formation and processing. Waveguides and optical fibres. Sources and detectors of radiation. Electro-optic, acousto-optic and integrated optoelectronics.

**68041****Physics I (Life Sciences)**

6cp; 6hpw; subject coordinator: Associate Professor P Logan

General introduction to mechanics, wave motion, optics, thermal physics, properties of matter and modern physics.

**68071****Applied Physics (Materials)**

4cp; 4hpw; prerequisite: 68201 Physics 2

This subject is specifically designed for materials science students. It covers interference and diffraction, lasers, optical fibres, thick lenses, lens aberrations, photometry, the basic principles of photography, image analysis, polarisation, vacuum systems, deposition techniques, thin films, glow discharges, ion beams, thermal sensors and important diagnostic techniques such as ultrasonics and radioisotopes.

**68081****Physics I (SL)**

for Bachelor of Science/Bachelor of Laws combined degree students

5cp; 4hpw; corequisite: 33170 Basic Science Mathematics or 33171 Science Mathematics 1; subject coordinator: Associate Professor P Logan

Introduction to the fundamental laws of mechanics, thermal physics, properties of matter.

**68082****Physics 2 (SL)**

for Bachelor of Science/Bachelor of Laws combined degree students

5cp; 6hpw; prerequisite: 68081 Physics I (SL); corequisite: 33171 Science Mathematics 1; subject coordinator: Associate Professor P Logan

Introduction to electrostatics, electromagnetism and circuit analysis, waves and optics, and radiation physics.

**68101****Physics I**

6cp; 6hpw; corequisite: 33170 Basic Science Mathematics or 33171 Science Mathematics 1; subject coordinator: Associate Professor P Logan

Introduction to the fundamental laws of mechanics, thermal physics, properties of matter.

**68201****Physics 2**

6cp; 6hpw; prerequisite: 68101 Physics 1; corequisite: 33171 Science Mathematics 1; subject coordinator: Associate Professor P Logan

Introduction to electrostatics, electromagnetism and circuit analysis, waves and optics, and radiation physics.

**68301****Physics 3**

3cp; 3hpw; prerequisites: 68201 Physics 2; 33171 Science Mathematics 1; subject coordinator: Dr R Woolcott

Classical physics: law of universal gravitation; Doppler effect; introduction to statistical analysis. 20th-century physics: discovery of charged particles, concept of quantisation; nature of the atom; Rutherford experiment; Bohr theory; extension of Bohr theory; atomic structure. Special Theory of Relativity. X-rays nature and diffraction. Nature of nucleus; radioactivity, particle detectors. Introduction to elementary particles.

**68302****Applied Optics**

3cp; 3hpw; prerequisite: 68201 Physics 2; corequisites: 33172 Science Mathematics 2; 33173 Science Mathematics 3; subject coordinator: Associate Professor P Logan

Polarisation; refraction at a plane and curved surfaces; thin lenses, thick lenses; colour and dispersion of light; the effects of stops; photometry; lens aberrations and lens design; intensification and enhancement; absorption, scattering and spectroscopy.

**68303****Electrotechnology**

*3cp; 3hpw; prerequisite: 68201 Physics 2; corequisites: 33172 Science Mathematics 2; 33173 Science Mathematics 3; subject coordinator: Mrs S Hogg*

Basic electrostatics, magnetism and electromagnetism. Magnetic materials. Integral form of Maxwell's equations. Alternating currents using complex impedance. Electrical measurements and machinery, transformers, three-phase. AC/DC generators and motors.

**68304****Electronics I**

*6cp; 6hpw; prerequisites: 68201 Physics 2; 33172 Science Mathematics 2; subject coordinator: Dr R Cheary*

Review of AC and DC circuit theory, semiconductor theory, diodes and bipolar transistors, basic transistor circuits, introduction to digital electronics, logic gates, latches and counters, JFET and JFET amplifiers, frequency characteristics and feedback in amplifiers, operational amplifiers, oscillators and power electronics.

**68311****Physics 3**

*6cp; 5hpw; prerequisites: 68201 Physics 2; 33171 Science Mathematics 1 or equivalent; subject coordinator: Dr R Woolcott*

Discovery of charged particles, concepts of quantisation, nature of the atom, Rutherford experiment, Bohr theory, expansion of Bohr theory, atomic structure, special theory of relativity, X-rays nature and diffraction. Nature of nucleus, nuclear forces, radio-activity, particle detectors. Refraction at a plane and curved surfaces, thin lenses, thick lenses, colour and dispersion of light, the effects of stops, photometry, lens aberrations and lens design, image intensification and enhancement, polarisation, absorption, scattering and spectroscopy.

**68312****Applied Physics I**

*6cp; 6hpw; prerequisites: 68201 Physics 2; 33171 Science Mathematics 1; 31870 Introduction to Microcomputers or 45116 Engineering Practice; subject coordinator: Assoc Prof R Cheary*

Experimentation and scientific inquiry. Review of electricity and magnetism and electrical measurements. Uncertainties in measurement,

accommodating uncertainties in an analysis, graphical analysis of data. Writing and structuring technical and scientific reports. Using the laws of physics to design equipment and experiments, analysing and interpreting experimental results.

**68401****Quantum Physics I**

*3cp; 3hpw; prerequisites: 68301 Physics 3; 33172 Science Mathematics 2; 33173 Science Mathematics 3; subject coordinator: Dr R Woolcott*

Brief historical introduction, the Schrödinger equation. Time-independent solutions for harmonic oscillator, infinite and finite square wells, hydrogen atom, potential steps and barriers. Angular momentum. Orthonormality, interpretation of solutions.

**68402****Applied Mechanics**

*3cp; 3hpw; prerequisites: 68201 Physics 2; 33221 Engineering Mathematics 2A; subject coordinator: Mrs S Hogg*

Particle kinetics in various coordinate systems. Vibrations: free, forced and damped vibration of single and coupled oscillators. Energy methods for particles and for rigid body systems. Angular momentum in two and three dimensions. Introduction to fluid mechanics; flow of ideal incompressible and compressible fluids. Flow of real fluids; Navier Stokes equation. Similitude. Applications.

**68403****Thermodynamics and Energy**

*3cp; 3hpw; prerequisite: 68201 Physics 2; subject coordinator: Associate Professor P Logan*

Applications of basic ideas of thermodynamics to the analysis of power generation, refrigeration, heat pumps. Methods of power production: hydrocarbons, alternative energy, energy storage and transportation, solar energy. Temperature measurement; thermo-couple, optical pyrometer, resistance thermometry.

**68404****Electronics 2**

*3cp; 3hpw; prerequisite: 68304 Electronics 1*

Revision of logic gates, Boolean algebra, Karnaugh maps. Decoding and multiplexers. Flip-flops, structure of counting circuits, digital data storage, registers and memory, RAM, ROM, PROM, parallel-serial conversion, arithmetic circuits, D-A/A-D conversion.

**68405****Vacuum and Thin Film Physics**

*3cp; 3hpw; prerequisite: 68201 Physics 2; subject coordinator: Dr P Swift*

Vacuum systems; pumps, system operation and design, gauges, leak detection and mass spectrometry. Thin film deposition techniques. Glow discharge sputtering, ion beams. Surface processing. Cryogenics.

**68406****Computational Physics**

*4cp; 4hpw; prerequisites: 60301 Treatment of Scientific Data; 31871 Computing for Science; 68201 Physics 2; 33221 Engineering Mathematics 2A; subject coordinator: Dr M Braun*

This subject is an introduction to scientific programming. Topics include: basics of programming development; pseudo-random number generation; Monte Carlo techniques; finite difference techniques for ODES; Fourier transform; DFT; FFT; convolution and correlation; and image processing techniques.

**68411****Physics 4**

*6cp; 6hpw; prerequisites: 68201 Physics 2; 33171 Science Mathematics 1; subject coordinator: Mrs S Hogg*

Quantum physics: brief historical introduction. The Schrodinger equation. Time-independent solutions for harmonic oscillator, infinite and finite square wells, hydrogen atom, potential steps and barriers. Angular momentum. Orthonormality. Interpretation of solutions. Mechanics: particle kinetics, vibrations forced and free, energy methods for particles and rigid body systems. Fluid mechanics.

**68412****Applied Physics 2**

*6cp; 6hpw; prerequisites: 68201 Physics 2; 33172 Science Mathematics 2 or equivalent; subject coordinator: Associate Professor P Logan*

This course seeks to provide the student with a good basis in thermodynamics, energy, vacuum technology and thin film fabrication. This includes the applications of basic thermodynamics to the analysis of power generation, refrigeration and heat pumps. Methods of energy production, including renewable and nuclear energy, energy storage and transport. Temperature measurement. Vacuum system principles, design and

operation. Rotary and diffusion pumps. Vacuum gauges. Thin film deposition. The vacuum and thin film section of the course is laboratory based.

**68501****Nuclear Physics**

*3cp; 3hpw; prerequisite: 68401 Quantum Physics 1; subject coordinator: Dr R Woolcott*

Core: basic properties of nucleus, scattering theory, nuclear forces, nuclear models, nuclear reactions, passage of energetic particles through matter, nuclear instrumentation. Lobe: fundamental particles, quarks and leptons, 'standard theory', grand unified theories, other current theories. Pass students take the core and a brief summary of the lobe plus extra laboratory work. Honours students take the core and the lobe in more detail.

**68502****Field Theory**

*3cp; 3hpw; prerequisites: 33330 Physical Mathematics; 68303 Electrotechnology; subject coordinator: Dr G Anstis*

Solution of electrostatic and magnetostatic problems using Laplace and Poisson equations. Separation of variables in rectangular coordinates; method of images. Field in a rectangular trough. Maxwell's equations in integral and differential form; derivation. Power flow, Poynting vector. Electromagnetic waves in unbounded media. Skin effect. Reflection of waves at boundaries.

**68503****Materials Physics**

*3cp; 3hpw; prerequisites: 68301 Physics 3; 68303 Electrotechnology; subject coordinator: Dr D Green*

Dielectric materials: fundamentals; classification of dielectrics; practical applications; relationship between atomic and bulk dielectric properties; dielectric breakdown.

Magnetic materials: classification of materials by magnetic properties; bulk magnetic properties and their measurement; magnetic materials for practical applications. Superconductivity: historical development and applications, categories of materials, electrical and magnetic behaviour.

**68504****Microprocessors in Instrumentation**

*3cp; 3hpw; prerequisites: 31871 Computing for Science; 68304 Electronics 1; subject coordinator: Dr A Fischer-Cripps*

This subject covers the following topics: computer architecture; assembly language; decoding, system timing, buffering and latches; programmable interface adaptors; data flow; 1/0 control; Forth language; and LabView. The subject focuses mainly on the Motorola 68000 microprocessor, but the principles covered are directly applicable to the Intel range of microprocessors with only minor modification. Emphasis is on lab work and project type experiments offered towards the end of semester.

**68505****Solid-state Physics**

*3cp; 3hpw; prerequisite: 68401 Quantum Physics 1; subject coordinator: Dr J Schulte*

Electrons in solids; free electrons, ICAO, band theory, nearly free electron, tight binding. Insulators, metals and semiconductors: electrical and optical properties of semiconductors. Lattice vibrations; phonons, specific heat, thermal conductivity and expansion.

**68508****Project A**

*6cp; 2 semesters*

A pass project in Applied Physics.

**68511****Physics 5**

*6cp; 5hpw; prerequisites: 68411 Physics 4; 33221 Engineering Mathematics 2A (Elec) or equivalent; subject coordinator: Dr G Anstis*

An introduction to the interaction of solids with electromagnetic fields. Maxwell's equations, quantum mechanics and statistical mechanics are used to provide a basic understanding of a number of technologically important phenomena including dielectric and magnetic properties, electrical conductivity and solid-state lasers.

**68515****Technology and Innovation Forum**

*3cp; 3hpw; prerequisite: one industrial experience period; subject coordinator: Professor G Smith and Dr J Warner*

This subject provides an introduction to the technical, financial, legal and personal aspects of the innovation and research-development-commercialisation cycle. Forums will cover the basics of the research and development process, intellectual property and confidentiality, business plans and financing mechanisms, design, production and marketing issues, and the importance of an international perspective.

**68516****Techniques of Materials Analysis**

*6cp; 3hpw; prerequisites: 67202 Introduction to Crystallography; 68301 Physics 3; 68302 Applied Optics; subject coordinator: Dr D Green*

X-ray generation, absorption and scattering; space group theory; crystal diffraction theory; application to structure analysis; defects and deformations in crystal, accurate cell dimensions. Quantitative XRF and XRD.

Electron microscopy; electron optics, transmission electron microscopy and scanning electron microscopy. Image formation and contrast mechanisms. Electron diffraction. X-ray microprobe analysis.

**68553****Computer Modelling of Physical Systems**

*3cp; 3hpw; prerequisites: 68406 Computational Physics; 68505 Solid-state Physics; 68502 Field Theory; 68601 Quantum Physics 2*

Particle methods in modelling. Monte Carlo techniques. Numerical solution of ordinary and partial differential equations that arise in the modelling of physical systems.

**68556****Advanced X-ray Techniques**

*4cp; 3hpw; prerequisites: 68301 Physics 3; 67202 Introduction to Crystallography; 33330 Physical Mathematics; subject coordinator: Professor A Moon*

Review of X-ray and neutron scattering theory, coherent and incoherent scattering, intensity calculations for various diffraction systems. Thermal scattering and extinction. Crystal structure refinement and quantitative analysis, Laue symmetry and diffraction pattern



calculations. Powder diffractometry, convolution and Fourier transform, mathematical analysis of instrumental diffraction profiles, diffraction line profile analysis of crystallite size, strain and defective structures.

### 68557

#### Advanced Electron Microscopy Techniques

*4cp; 3hpw; prerequisites: 68301 Physics 3; 68302 Applied Optics; 33330 Physical Mathematics; subject coordinator: Professor A Moon*

Image formation in an electron microscope. Diffraction theories. Contrast mechanisms. The transmission and scanning electron microscope. Microprobe and nanoprobe analysis.

### 68601

#### Quantum Physics 2

*3cp; 3hpw; prerequisite: 68401 Quantum Physics 1; corequisite: 33330 Physical Mathematics; subject coordinator: Mrs S Hogg*

Quantum mechanics; time-independent perturbation theory, variational principle, applications. Rotational and vibrational spectra of molecules. Multi-electron atoms. Hartree approximation. Interpretation of quantum theory.

### 68602

#### Physical Optics

*3cp; 3hpw; prerequisites: 68502 Field Theory; 68302 Applied Optics; subject coordinator: Dr P Swift*

Classical physical optics; dispersion, Fresnel equations; polarisation; interference and interferometry; diffraction, the use of Fourier transformers in diffraction; spatial filtering; laser cavities and amplification; coherence, holography, fibre optics.

### 68603

#### Applied Thermodynamics

*3cp; 3hpw; prerequisites: 68403 Thermodynamics and Energy; 33221 Engineering Mathematics 2A; subject coordinator: Dr G Anstis*

Thermodynamic functions and their applications; phase changes, chemical reactions. Statistical physics; thermodynamic probability; Bose, Fermi-Dirac and Boltzmann statistics; Boltzmann's distribution; the partition function; specific heats. Maxwell velocity distribution. Introduction to kinetic theory; mean free path, calculation of coefficients of thermal conductivity and viscosity.

### 68604

#### Principles of Instrumentation

*3cp; 3hpw; prerequisite: 68406 Computational Physics; corequisite: 33330 Physical Mathematics*

Characteristics of measurement; the role of electronics in instrumentation; signal conditioning; performance characteristics of instruments; noise and its reduction; analysis of signals and instruments.

### 68605

#### Transducers and Devices

*3cp; 3hpw; prerequisites: 68304 Electronics 1; 68505 Solid-state Physics; subject coordinator: Dr L Kirkup*

Device physics. Transducers; p-n junction: field effect transistor; microwave devices. Applications: pressure, flow, vibration, acceleration, strain, position, angle. Optical detection: photonic, thermal, wave-interaction (heterodyne). IR, optical, noise, figure of merit, signal and background noise limitations.

### 68608

#### Project B

*3cp*

An extension of 68508 Project A which is a pass project in Applied Physics.

### 68611

#### Physics 6

*6cp; 5hpw; prerequisite: 68511 Physics 5; subject coordinator: Dr P Swift*

As a final stage subject, this course provides advanced work in the areas of quantum mechanics, nuclear physics, and physical optics. Quantum mechanics: matrix representation, spin, angular momentum, harmonic oscillators, ladder operators, light. Nuclear physics: nuclear forces, models of the nucleus, accelerators, analytical use of nuclides, particle physics, nuclear astrophysics. Physical optics: Fresnel equations, ellipsometry, interference, diffraction, the laser, fibre optics.

### 68652

#### Device Physics

*6cp; 6hpw; prerequisites: 68505 Solid-state Physics; 68602 Physical Optics; 68404 Electronics 2; subject coordinator: Professor G Smith*

Electronics; p-n junction diodes, npn and pnp transistors, field effect transistors. Photonics; detectors and sources of radiation spectral properties, laser diodes, LED, photodiodes,

heterodyne systems, signal and background noise, detectability, thermal noise, bit error rate. Anisotropic media, acousto- and electro-optics. Optical modulation. Integrated opto-electronics. Transducers: piezoelectric devices for velocity, acceleration, strain sensors, position and angle sensors including laser gyroscope.

### 68655

#### Advanced Solid-state Physics

4cp; 3hpw; prerequisites: 68505 Solid-state Physics; 33330 Physical Mathematics

Band structure of solids: tight-binding method, nearly free electron model. Electron dynamics in electric and magnetic fields; low dimensional systems. Lattice dynamics: phonons, Umklapp processes, harmonic and anharmonic potentials. Other topics: superconductivity; phase transitions.

### 68711

#### Physics IS

for Computing sub-major students  
8cp

Details are as for 68041.

### 68712

#### Engineering Physics (Civil) S

for Computing sub-major students  
8cp

Details are as for 68021.

### 68713

#### Physics for Electronics S

8cp; 6hpw; subject coordinator: Associate Professor P Logan  
for Computing sub-major students

A foundation course for the sub-major in electronics. It covers basic mechanics, wave motion and optics: electrostatics, electromagnetism and circuit analysis. An option, recommended in special cases only, is to replace the wave motion and optics with further mechanics including rotational motion.

### 68714

#### Electricity and Magnetism S

for Computing sub-major students  
4cp; 3hpw; prerequisite: 68101 Physics I

Introduction to electrostatics, electro-magnetism and circuit analysis.

### 68721

#### Physics 2 S

for Computing sub-major students  
8cp

Details are as for 68201.

### 68731

#### Physics 3 S

for Computing sub-major students  
4cp

Details are as for 68301.

### 68732

#### Applied Optics S

for Computing sub-major students  
4cp

Details are as for 68302.

### 68733

#### Electrotechnology S

for Computing sub-major students  
4cp

Details are as for 68303.

### 68734

#### Electronics I S

for Computing sub-major students  
8cp

Details are as for 68304.

### 68741

#### Quantum Physics I S

for Computing sub-major students  
4cp

Details are as for 68401.

### 68742

#### Applied Mechanics S

for Computing sub-major students  
4cp

Details are as for 68402.

### 68743

#### Thermodynamics and Energy S

for Computing sub-major students  
4cp

Details are as for 68403.

**68744**

**Electronics 2 S**

*for Computing sub-major students  
4cp*

Details are as for 68404.

**68751**

**Nuclear Physics S**

*for Computing sub-major students  
4cp*

Details are as for 68501.

**68753**

**Materials Physics S**

*for Computing sub-major students  
4cp*

Details are as for 68503.

**68754**

**Microprocessors in Instrumentation S**

*for Computing sub-major students  
4cp*

Details are as for 68504.

**68755**

**Solid-state Physics S**

*for Computing sub-major students  
4cp*

Details are as for 68505.

**68761**

**Quantum Physics 2 S**

*for Computing sub-major students  
4cp*

Details are as for 68601.

**68763**

**Applied Thermodynamics S**

*for Computing sub-major students  
4cp*

Details are as for 68603.

**68764**

**Principles of Instrumentation S**

*for Computing sub-major students  
4cp*

Details are as for 68604.

**68858**

**Project (Honours)**

*24cp; 2 semesters; prerequisite: 68997 Industrial Training 2 (Physics)*

The project is carried out over two semesters under the supervision of a member of academic staff of the Department of Applied Physics and, if appropriate, an external supervisor. At the end of the first semester the student's work will be assessed on the basis of a short report. Towards the end of the project the student is required to present a talk to a meeting of academic staff. The final report will represent not only the results of the student's work but also an understanding of their significance, an appreciation of other relevant work in the area of the project and an understanding of the underlying physics of the methods employed.

**68943**

**Approved External Subject**

*3cp*

**68946**

**Approved External Subject**

*6cp*

**68990**

**Master's Thesis (Applied Physics) F/T**

**68991**

**Master's Thesis (Applied Physics) P/T**

**68995**

**Industrial Training I  
(Applied Physics Honours)**

*5hpw; prerequisite: preliminary selection into the Honours course in Applied Physics, knowledge of workshop practice and an appreciation of laboratory safety principles*

Students will work for a period of one semester (at least 18 weeks) on a project or projects which involve the application of physical principles to technological problems of some economic importance. The project will be carried out under the direction of an industrial and an academic supervisor.

**68996**

**Industrial Training I (Physics)**

**68997**

**Industrial Training 2 (Physics)**

**69311****Occupational Health and Safety in Society***3cp; 2hpw*

This subject will cover the psychological, political and sociological dimensions of occupational health and safety, and present them within the context of the overall social system. It will highlight the complexity and diversity of working environments, and the importance of the human agency in constructing and changing them. It will also explore the strategies available to create safer and healthier working situations.

**69312****Occupational Hazard Analysis***6cp; 4hpw*

This subject will deal with the identification of the major categories of both safety and health hazards, the analytical techniques and management programs appropriate for dealing with them and the development of policies in occupational health and safety. Models of accident and disease causation, techniques of investigation, emergency hazards and risk assessment will also be covered.

**69313****Organisational Behaviour and Communication***3cp; 2hpw*

This subject examines the behaviour of people in organisations, and the dynamics of interpersonal and intergroup behaviour. Topics include: interpersonal perception, attitudes and values, motivation, communications, group behaviour, conflicts, leadership, organisation change and adaptation.

**69323****Human Factors/Ergonomic Design***3cp; 2hpw*

The role of ergonomics/human factors in the creation of a healthy, safe and productive work environment will be covered, including the principles and techniques used in this discipline. The subject will include the principles of ergonomic design and their application to product and equipment design to combine safety with functionality.

**69324****Biological Hazards and Toxicology***3cp; 2hpw*

This will be an introduction to biological hazards in the workplace, including allergens in airconditioning systems, legionellosis, infecting disorders, food poisoning, and other job associated risks. It will also discuss the principles of environmental and human toxicology, including toxic gases, dusts and chemicals and test methods, hygiene and sanitation.

**69325****Data Analysis in Occupational Health and Safety***3cp; 2hpw*

The collection and organisation of data, and access to and use of databases are important aspects of the effective management of the occupational health and safety function. This subject will develop understanding and proficiency in these areas with special reference to occupational health and safety and workers' compensation information systems and reference material databases.

**69332****Chemical Safety (OHS)***3cp; 2hpw*

This subject will deal with the hazardous effects of chemicals on people and the methods of handling and storing chemicals to minimise risks to health and safety.

**69334****Occupational Health Services***3cp; 2hpw*

This subject will cover the principles underlying the establishment and functioning of an effective occupational health service within an organisation including its role in assessment of the workplace, health assessment, the management of illness and injury and rehabilitation of injured workers.

**69335****People and the Physical Environment***3cp; 2hpw*

People have a continuing and dynamic interaction with their physical surroundings, and the processes of this interaction must be understood so that they can be designed for and controlled. The subject will deal with both

those interactions which are a part of normal processes, such as noise, vibrations and heat, and those which are random and unplanned events. The first of these can be quantitatively assessed and controlled, whereas the latter requires the application of probability and reliability techniques.

### 69336

#### **Evaluating Occupational Health and Safety (Construction Industry)**

*6cp; 4hpw; prerequisites: completion of 2 semesters of the Graduate Diploma in Occupational Health and Safety*

This subject focuses on the importance to the occupational health and safety manager of identifying and accessing occupational health and safety research literature sources in order to keep abreast of current issues and emerging technologies in the building construction industry. It is designed to encourage the development of skills in accessing and critically evaluating occupational health and safety research literature in its treatment of current issues in the building and construction industry as well as to develop skills and confidence in evaluating and communicating such information.

### 69341

#### **Risk Management**

*6cp; 4hpw*

This subject introduces the following three aspects of risk, integrating them by use of a case study, supported by audiovisual material and assignments.

1. Risk as an intellectual factor which may be analysed and expressed in numerical terms, generally based on frequency and consequence. Methods of qualifying and quantifying these factors are identified.
2. Risk as a feature of the world of management, commerce and technology. This is illustrated by references to cases in each of those sectors. Risk is examined under a series of headings ranging from risk forecasting to risk litigation. Ways in which an enterprise can protect itself against the consequences which may follow at each step from accepting risk are also explored.
3. Risk as a personal factor which must be faced individually and by managers, together with suggestions for how risks can best be dealt with.

### 69342

#### **Legal Aspects of Occupational Health and Safety**

*3cp; 2hpw*

Occupational health and safety is covered by a wide range of legislative Acts and regulations, both State and federal. This subject will introduce students to the important aspects of this legislation, its interpretation, and the implications for the organisation and management of the occupational health and safety function.

### 69343

#### **Occupational Health and Safety Management**

*3cp; 2hpw*

This subject will bring together the management aspects of occupational health and safety through group exercises and case studies. It will deal with the role of the occupational health and safety manager in industry, motivation for health and safety, industrial relations issues, current concepts in safety and health, data analysis and collection and the use of records, training for occupational health and safety, and economic aspects of losses associated with accidents, injuries and ill health.

### 69351

#### **Occupational Health and Safety Project**

*12cp*

Students are required to undertake a substantial research project in an area of specialisation in occupational health and safety which is of interest and relevance to them. They will be guided and supervised by a member of academic staff from that area. They may also be required to undertake additional coursework in research methods and/or in the specialisation area to supplement the research program.

### 69353

#### **Research Proposal (Occupational Health and Safety)**

*12cp; 6hpw (average) over 2 semesters; corequisite: 69351 Occupational Health and Safety Project*

This subject complements 69351 Occupational Health and Safety Project. Each student works independently to review relevant research

literature in order to develop a viable research question suitable for investigation in 69351. Students then formulate a specific research plan including selection of appropriate data collection and analysis methods and scheduling the sequence of steps that will be required to answer the question within the available time frame. There is a formal lecture component dealing with research issues. Student seminars and written reports based on different stages of their projects provide experience in writing and presenting research communications.

### 91207

#### Plants in the Landscape

*8cp; 6hpw; prerequisite: 91206 Plant Production*

This subject is designed to develop the student's understanding of the uses of plant materials (especially woody plants) in the landscape as part of the function of open space management. The subject considers the benefits of plants, techniques for selecting appropriate plants of good quality for particular purposes and sites, methods of establishing these plants and management techniques necessary to maintain plant health, including the diagnosis and management of plant problems. Integral to this subject are site visits to open space developments around Sydney and discussions with the managers of these areas.

### 91224

#### Horticultural Production Management

*4cp; 3hpw; prerequisites: 91229 Horticultural Financial Management; 91206 Plant Production*

Through this subject, the student is expected to develop an understanding of the technical aspects of nursery management and plant production. Cost-benefit analysis will be made of the daily operations of commercial enterprises ranging from plants produced in tissue culture to open area growth of flowers, to the intensive controlled growth of potted plants in greenhouses. Also covered will be the technical aspects of personnel management, and seasonal and budgetary factors involved. Cost-benefit analysis of physical, biological and human resources will be considered. Long-term and construction design of plant production units will be discussed.

### 91229

#### Horticultural Financial Management

*4cp; 3hpw*

This subject is normally taken in Stage 5 of the course. The principles and practices of business management in a horticultural enterprise are introduced. The subject includes an introduction to accounting methods, balance sheets, stock control, management and legal issues.

### 91230

#### Landscape Design

*3cp; 3hpw; subject coordinator: Dr J Tarran*

This subject introduces students to landscape studies by considering the significance and interrelationships of landscape, horticulture and human societies in the past, present and future. The subject considers the impact of humans on the landscape, the history of people/plant/landscape interactions including the history of gardens, and the process of landscape design in relation to current practice in Australia.

### 91231

#### Horticulture 1

*6cp; 6hpw; subject coordinator: Dr R McConchie*

This subject introduces students to a wide variety of plant materials used in urban (environmental) horticulture. Plant materials studied include annual, perennial, herbaceous, woody, exotic and native plant species. These plant materials are studied within the context of their uses for the enhancement of urban surroundings. The subject also introduces the student to plant morphology and anatomy in relation to plant function, through the study of plant organs and tissues, with a particular focus on vegetative biology. Also studied are techniques of plant propagation, both sexual and asexual, including seeds, cuttings, budding, grafting, layering, separation and division.

### 91232

#### Horticulture 2

*6cp; 6hpw; prerequisite: 91231 Horticulture 1; subject coordinator: Dr R McConchie*

This subject introduces students to a wide variety of plant materials used in urban (environmental) horticulture. Plant materials studied include annual, perennial, herbaceous, woody, exotic and native plant species. These

plant materials are studied within the context of their uses for the enhancement of urban surroundings. The subject introduces students to plant morphology and anatomy in relation to plant function, through the study of plant organs and tissues, with a particular focus on reproductive biology. Also studied are techniques of plant propagation, by both sexual and asexual means. The subject provides an introduction to irrigation systems used in nurseries and open space areas, including computerised systems, and methods of greenhouse environmental control.

### 91233

#### Plant Production and Growth Media

*6cp; 6hpw; prerequisites: 65012 Chemistry 1 (LS); 91312 Biology 2; subject coordinator: Dr L De Filippis*

Cultivation of both exotic and native plants of value in urban horticulture. Skills necessary for the cultivation, selection and modification of stocks for particular situations are developed. The principles of water use, irrigation and associated problems within nurseries and intensive cultivation systems are covered. Also studied are the physical and chemical properties of horticultural potting mixes; methods of analysis; supply of nutrients, water, air and ions; management of potting mixes; and problems with mixes. Formulation and use of growth media; media used in hydroponics.

### 91234

#### Uses of Australian Plants

*6cp; 6hpw; prerequisite: 65022 Chemistry 2 (LS); corequisite: 91309 Australian Biota; subject coordinator: Dr K Johnson*

The potential of Australian plants for horticultural exploitation e.g. cut flowers, essential oils, source of foods and pharmaceuticals are considered. Identification of Australian plants as promising future plant crops, difficulties experienced in propagation and cultivation and status of this area of horticulture. Students are asked to write a research proposal for a chosen plant to be developed as a horticultural crop with an emphasis on problems related to growing plants in controlled environments or in open situations. Australian tree species which could substitute for exotic trees in urban street planting, or as wind breaks. This subject involves field trips to wildflower farms, botanic gardens and national parks. There is also a four-day field trip during a study week.

### 91236

#### Plant Tissue Culture

*4cp; 3hpw; prerequisite: 91314 Microbiology 1; subject coordinator: Dr K Johnson*

An introduction to plant cell and tissue culture, and the application of these techniques to cloning, somatic embryogenesis, somaclonal variation, anther and pollen culture, disease indexing and pathogen elimination. The program includes media preparation, nutrient and growth substance requirements; transplanting hardening-off stages of in vitro grown plants. Students are also introduced to experiments involving plant tissue culture technology. Special emphasis is given to Australian indigenous and rare flora.

### 91237

#### Plant Pathology

*6cp; 6hpw; prerequisite: 91314 Microbiology 1; subject coordinator: Dr K Johnson*

This subject provides knowledge of the main group of plant pathogens causing plant diseases, understanding of their mode of attack and a prevention from spread are discussed. The recognition of signs and symptoms is introduced. Influence of environmental conditions on disease development. Methods of prevention are discussed. Visits to Plant Quarantine at Rydalmere, Narara Research Station and Nursery are arranged. Collection, preservation and identification of plant pathogens form a component of this subject.

### 91270

#### Plant Physiology

*6cp; 6hpw; prerequisite: 91312 Biology 2; subject coordinator: Associate Professor R Buckney*

Plant interactions with their environment. The acquisition of carbon dioxide, water and nutrients by plants. Photosynthesis. Responses of plants to environmental stress and the recognition of stress conditions. Measurement of plant function and of factors affecting plant performance.

### 91271

#### Plant Genetics and Breeding

*8cp; 6hpw; prerequisite: 91314 Microbiology 1; subject coordinator: Dr L De Filippis*

Biochemical and cellular processes including molecular genetics and control of genetic activity in cells, and environmental influences amongst individuals and populations. The

program introduces students to cloning, somatic cell genetics and hybridisation. The work also includes the control of cell activity by DNA and protein synthesis, and hormonal control of plant processes. The importance of cytoplasmic inheritance will be introduced as will the genetic manipulation of the plant genome. Traditional methods of plant breeding and production of pure seed and stocks will also be covered.

### 91280

#### **Current Urban and Environmental Issues A**

*4cp; 3hpw; prerequisites: completion of Stages 1–4; subject coordinator: Head, Department of Environmental Biology and Horticulture*

To be undertaken only following prior negotiation on the part of the student with a full-time member of academic staff regarding individual supervision and, in addition, requires special permission of the Head of Department. The subject involves a variable amount of class, desk or field studies. To be undertaken in exceptional circumstances.

### 91281

#### **Current Urban and Environmental Issues B**

*6cp; 4hpw; prerequisites: completion of Stages 1–4; subject coordinator: Head, Department of Environmental Biology and Horticulture*

To be undertaken only following prior negotiation on the part of the student with a full-time member of academic staff regarding individual supervision and, in addition, requires special permission of the Head of Department. The subject involves a variable amount of class, desk or field studies. To be undertaken in exceptional circumstances.

### 91282

#### **Current Urban and Environmental Issues C**

*8cp; 6hpw; prerequisites: completion of Stages 1–4; subject coordinator: Head, Department of Environmental Biology and Horticulture*

To be undertaken only following prior negotiation on the part of the student with a full-time member of academic staff regarding individual supervision and, in addition, requires special permission of the Head of Department. The subject involves a variable amount of class, desk or field studies. To be undertaken in exceptional circumstances.

### 91283

#### **Undergraduate Research Project**

*8cp; 6hpw (average); prerequisites: completion of Stages 1–3; subject coordinator: Dr J Tarran*

This subject is an elective which should normally be taken during the final semester of study for the Environmental Biology or Urban Horticulture degrees. The subject involves the planning, execution, analysis and reporting of a research project. Students work in small groups under the supervision of a member of academic staff, sharing acquired data but producing individual reports. This subject may involve compulsory field work. There is a formal lecture component dealing with research issues.

### 91303

#### **Experimental Design in Ecology**

*3cp; 3hpw; prerequisites: 91312 Biology 2; 33105 Introductory Biometrics; 91395 Biocomputing; subject coordinator: Dr D Morrison*

The principles and practice of biological experimentation. The essential steps in experimental design and analysis, and their roles. The sources of experimental variability and the ways of effectively dealing with them. The logic of experimental and statistical hypothesis testing. The uses and limitations of these statistical tests in biology: multifactor analysis of variance, correlation, regression, chisquare.

### 91306

#### **Terrestrial Ecosystems**

*4cp; 3hpw; prerequisites: 91309 Australian Biota; 91307 Community and Population Ecology; 91329 Ecological Sampling; subject coordinator: Associate Professor R Buckney*

This subject provides an advanced understanding of the characteristics and functioning of terrestrial ecosystems and is designed to strengthen and develop skills in the acquisition and analysis of data from terrestrial systems. Patterns and processes in terrestrial ecosystems. The influence of soil, fire, climate and history on the characteristics of terrestrial environments. Causes and effects of degradation of terrestrial systems; management issues.

This subject includes a compulsory field excursion which may be conducted before commencement of semester.



**91307****Community and Population Ecology**

*3cp; 3hpw; prerequisites: 91312 Biology 2; 91395 Biocomputing; subject coordinator: Dr D Booth*

This subject provides a foundation in the characteristics and functioning of populations and communities in terrestrial and aquatic ecosystems. It includes exploration of population and community processes, including inter- and intraspecific interactions and the origins of temporal and spatial patterns in communities and populations of plants and animals.

This subject may include a compulsory field excursion which could be conducted before commencement of semester.

**91308****Australian Soils**

*3cp; 3hpw; prerequisites: 65012 Chemistry 1 (LS); 91311 Biology 1 or equivalent; subject coordinator: Associate Professor R Buckley*

The formation of soil and its characteristics. Soil classification and distribution in Australia. The biota of Australian soils and their role in ecosystem function. Plant-soil interactions and the importance of soils in determining ecosystem composition and structure. Soil analytical techniques; quality assurance and control in soil analysis.

**91309****Australian Biota**

*6cp; 6hpw; prerequisite: 91312 Biology 2*

The principles and practice of taxonomy and evolutionary biology. The limitations and usefulness of taxonomic tools in botany and zoology. The major Australian groups of plants, vertebrates and invertebrates. The biogeography of Australian plants and vertebrates. The design and use of identification keys. Collection, identification and preservation of specimens from the field.

**91311****Biology 1**

*6cp; 6hpw*  
*This subject, together with 91312 Biology 2, constitutes a foundation course in biological sciences in the Faculty.*

Diversity of living organisms and their interaction with one another and the environment. Characteristics of living things; cellular basis of life; principles of classification;

characteristics of kingdoms of living organisms and their sub-groups; genetics, evolution and natural selection; ecological principles, energy flow, nutrient cycles, community and ecosystems.

**91312****Biology 2**

*6cp; 6hpw; prerequisite: 91311 Biology 1 or equivalent*

Interrelationship between structure and function in living systems at two levels of organisation: cellular and organismic. Cell structure and physiology: molecular architecture of cells; cellular reactions and metabolism; molecular basis of heredity and information transfer. Animal physiology – mechanisms of movement, gas exchange and circulation, nutrition and digestion, osmoregulation and excretion among animal groups. Plant physiology – anatomy and physiology of flowering plants, nutrition, photosynthesis, transport. Physiological adaptations of Australian native species of animals and plants to the specific environments.

**91313****Biochemistry I**

*6cp; 6hpw; prerequisites: 91311 Biology 1; 65022 Chemistry 2 (LS)*

Bioenergetics and physical biochemistry: energy flow and transformation, laws of thermodynamics, free energy considerations in equilibrium and steady-state situations; electrolyte behaviour, pH and proton equilibria; colligative properties, osmotic pressure; chemical kinetics, catalysis and enzyme action. Structure and function of biological molecules emphasising structural, energy-providing and informational characteristics: carbohydrates, lipids, amino acids, peptides, proteins (including enzymes), nucleosides, nucleotides, nucleic acids. Replication and repair of DNA; recombinant DNA. Protein synthesis. Basic concepts of metabolic pathways; energetics of metabolism.

**91314****Microbiology I**

*6cp; 6hpw; prerequisite: 91312 Biology 2*

An introduction to the structure, function and taxonomy of the bacteria, fungi, protozoa and viruses. Several key topics in the study of microbiology will be surveyed, including microscopy, microbial ecology, the microbe in

its environment, microbial growth and physiology, pathogenesis, sterilisation and disinfection procedures, chemotherapy and laboratory techniques for safe handling of micro-organisms.

### 91315

#### **Biomonitoring**

*3cp; 3hpw; prerequisites: 91312 Biology 2; 91317 Human Biology; corequisite: 91314 Microbiology 1*

The dynamics of natural and disturbed aquatic and terrestrial ecosystems; effects of industrial pollution on these ecosystems are investigated. Effects of pollution include chemical changes such as pH fluctuations, increases in concentrations of heavy metals and organic chemicals such as pesticides and detergents; biological contaminants resulting from sewage, garbage and changes in the balance of the natural micro-organisms' biota. Sampling procedures; estimates of biomass and productivity; methods of data analysis. This subject includes field excursions.

### 91316

#### **Bioinstrumentation and Physiological Systems**

*6cp; 6hpw; prerequisites: 68041 Physics 1 (LS); 91317 Human Biology*

Concepts of electricity, electronic and computerised instrumentation, transducers, signal processors, recording and display equipment. Application of instrumentation in the measurement of clinical and biological parameters. Signal transduction mechanisms involving ion channels and neurotransmitter receptors in excitable cells. Integration and control mechanisms in the cardiovascular, respiratory and nervous system.

### 91317

#### **Human Biology**

*6cp; 6hpw; corequisite: 91312 Biology 2*

Basic gross anatomy and detailed study of microscopic structure of the human body. The structure and function of tissues and organs are related to a model of control mechanism in order to emphasise the process of homeostasis. Whenever possible, an attempt is made to integrate morphological, physiological and biochemical details in each of the functional units in the human body.

### 91318

#### **Ecological Modelling**

*4cp; 3hpw; prerequisite: 91307 Community and Population Ecology; subject coordinator: Dr D Booth*

This subject provides an understanding of the importance and application of models in ecology. It includes an exploration of the different types of models used in modern ecological investigations and provides the necessary skills to evaluate their usefulness and limitations.

### 91319

#### **Concepts in Biochemistry**

*8cp; 6hpw; prerequisites: 91311 Biology 1 or equivalent; 65022 Chemistry 2 (LS)*

This subject is available only to students not enrolled in the undergraduate degrees in Biomedical Science, Biotechnology or Environmental Biology.

An introduction to the major areas of biochemistry. Bioenergetics, biochemical equilibria and steady state, basic enzyme kinetics, solution properties of biomolecules. Structure and function of biological molecules emphasising structural, energy-providing and informational characteristics: carbohydrates, amino acids, proteins, lipids, nucleotides, nucleic acids. Replication and repair of DNA, recombinant DNA, RNA and protein synthesis. Basic concepts of metabolic pathways.

### 91320

#### **Biochemistry 2**

*6cp; 6hpw; prerequisite: 91313 Biochemistry 1*

Principles of catalysis. Purification properties and nomenclature of enzymes. Vitamins and enzyme cofactors. Localisation of enzymes. Regulation of enzyme action at cellular and molecular levels. Cellular role of ATP. Oxidative phosphorylation and the mitochondrion. The electron transport chain. Glucose catabolism and anabolism. The glycolytic sequence. The pentose phosphate pathway. The citric acid cycle. Fatty acid synthesis. Oxidation of fatty acids. Membrane models. Breakdown of proteins and metabolism of amino acids. One-carbon metabolism. Synthesis and degradation of nucleotides.

**91323****Mapping and Remote Sensing**

*4cp; 3hpw; prerequisites: 91395 Biocomputing; 91303 Experimental Design in Ecology; 91329 Ecological Sampling; subject coordinator: Associate Professor R Buckney*

Vegetation and habitat mapping. Air photo interpretation of a defined area. Geographical Information Systems (GIS): design, interpretation and database construction. Applications of remote sensing, including aerial photographs and satellite data; image classification, rectification and spectral manipulation. Introduction to associated technologies such as Global Positioning Systems (GPS) and multispectral scanning.

This subject may involve an intensive practical session during a non-teaching week.

**91324****Environmental Toxicology**

*8cp; 6hpw; prerequisites: 91303 Experimental Design in Ecology; 91329 Ecological Sampling; subject coordinator: Associate Professor P Miller*

Biological and chemical principles of pest control: the safe use of pesticides. Methods of toxicological testing for pesticides, heavy metals and other hazardous chemicals, in air, soil and water, using biological assays of animals and plants.

**91325****Open Space Management**

*4cp; 3hpw; prerequisites: 91229 Horticultural Financial Management; 91207 Plants in the Landscape*

Designed to develop the student's understanding of the operation and management of open space amenity areas, such as landscaped parks and gardens, bushland and reserves, and urban streets. Several case studies in open space management are examined and the importance of obtaining accurate information for decision making is highlighted. The subject considers management functions including planning in relation to long-term and short-term goals, organising resources, staff recruitment and development, directing staff and evaluating the achievement of goals.

**91326****Analytical Biochemistry**

*6cp; 6hpw; prerequisite: 91313 Biochemistry I*

Modern analytical methods in biochemistry with emphasis on instrumentation and underlying principles. Qualitative biochemical analysis. Spectroscopic methods (spectrophotometry, spectrofluorometry, flame emission and absorption photometry, magnetic resonance methods). Separation methods (chromatography, electrophoresis, centrifugation). Electrochemical methods (potentiometry and ion electrodes, polarography). Introduction to radiochemistry. Errors in analysis. Immunoassay methods. Implications of biochemical equilibria in analysis. Molecular biology techniques.

**91327****Environmental Management Procedures**

*4cp; 3hpw; prerequisites: completion of Stages 1–4; subject coordinator: Associate Professor K Brown*

Environmental legislation of NSW and Australia and their associated regulations. Socioeconomic factors in environmental decision making and management. Environmental impact assessment and planning processes. Application of environmental quality criteria in pollution control. Economic and other instruments in environmental management. The application of scientific methods and data in environmental protection and management.

**91328****Environmental Microbiology**

*4cp; 3hpw; prerequisite: 91314 Microbiology I; subject coordinator: Dr B Bloomfield*

Nature of micro-organisms. Factors affecting occurrence and growth of micro-organisms. Kinetics and measurement of microbial growth. Ecology of microbial populations and communities. Microbial activities in natural ecosystems. Utilisation of microbial activities in bioremediation and environmental management.

**91329****Ecological Sampling**

*3cp; 3hpw; prerequisites: 91312 Biology 2; 33105 Introductory Biometrics; 91395 Biocomputing; subject coordinator: Dr D Morrison*

Measurement and analysis as part of the resource management process. Techniques for estimating the abundance of sedentary and

mobile organisms. Techniques for biomass and productivity estimation. Ecological sampling procedures and designs. Techniques for analysing univariate and multivariate data.

### 91330

#### Microbiology 2

*6cp; 6hpw; prerequisite: 91314 Microbiology 1*

Microbial physiology and basic applied microbiology. Bacterial physiology – nutrition, energetics; biosynthesis and growth. Mechanisms and use of growth and physiological reactions in diagnostic and applied microbiology. Features of, and factors influencing, the microbial flora of habitats such as the higher animal body, soils, water supply and disposal systems and foods. The survival, growth and death of such flora; methods for identification and quantitation. Introduction to bacterial genetic systems and processes. Anti-microbial substances in the environmental, hospital and laboratory environments.

### 91331

#### Microbiology 3

*8cp; 6hpw; prerequisite: 91330 Microbiology 2*

Public health microbiology. Basic epidemiological principles; mathematical formulation of epidemics; sociological aspects. The public health laboratory environment; food, water and airborne diseases; exotic and notifiable diseases; zoonoses. Epidemiological tracing methods; biotyping; serotyping; bacteriophage typing; bacteriocin (BLIS) typing; molecular typing. Control measures; hygiene; sanitation; disinfection; sterilisation; vaccines, vaccination procedures and vaccination programs.

### 91332

#### Molecular Biology 1

*8cp; 6hpw; prerequisites: 91314 Microbiology 1; 91313 Biochemistry 1; corequisites: 91330 Microbiology 2 and/or 91320 Biochemistry 2*

Introduction to the basis of present-day molecular biology. Key concepts and procedures in bacterial and bacteriophage genetics, including mutation, recombination and mechanisms of genetic exchange, utilising plasmids, transposons and viruses. Introduction to the principles and procedures underlying DNA manipulation methods in the molecular biology laboratory, including the molecular cloning, selection and analysis of recombinant DNA.

### 91335

#### Molecular Biology 2

*8cp; 6hpw; prerequisite: 91332 Molecular Biology 1*

Structure and organisation of the eukaryotic genome. Control of genome expression by regulation of RNA synthesis, processing and translation. Development and differentiation. Techniques and application of hybridisation, sequencing, polymerase chain reactions and Western blotting. Preparation of DNA libraries. Clinical applications of molecular biology in inherited disease detection and infectious disease diagnosis.

### 91338

#### Clinical Bacteriology

*8cp; 6hpw; prerequisite: 91331 Microbiology 3*

Quantitative methods, reliability studies, automation, data processing and numerical analysis in clinical microbiology. Pathogenic micro-organisms: their handling (including safety requirements), cultivation, isolation and relationship to the indigenous flora of humans and animals. A detailed study of staphylococci, streptococci, coryne-bacteria, mycobacteria, neisseria, enteric bacteria, pasteurillae, pseudomonads and spirochaetes. Antibiotics and antibiotic sensitivity testing.

### 91340

#### Transfusion Science

*8cp; 6hpw; prerequisites: 91354 Anatomical Pathology; 91355 Haematology 1; 91351 Immunology 1*

This subject covers the following topics: human blood groups; principles of donor blood compatibility and antigen/antibody reactions; detection and identification of serum antibodies; blood products; the safety of the blood supply and minimisation of transmission of infectious diseases; investigation of transfusion reactions; haemolytic disease of the newborn; blood groups in forensic investigations; platelet and leucocyte immunohaematology; transfusion in critical care situations; legal aspects of transfusion of blood products; stem cell transplantation; and cytokine stimulation of haemopoiesis.

**91344****Clinical Biochemistry 1**

*8cp; 6hpw; prerequisite: 91320 Biochemistry 2*

Principles of clinical biochemistry. Laboratory hazards and quality control including appropriate statistics as used in clinical biochemical laboratories. Introduction to calculations and analyses of clinically important substances. Pre-analytical procedures. Qualitative analysis as exemplified by urine analysis. Quantitative analysis as exemplified by inorganic phosphorus analysis. Spectroscopic identification of normal and abnormal haemoglobin pigments. Blood sugar estimations and basis of abnormalities of carbohydrate metabolism. Principles of clinical enzymology with particular reference to the methodology. Principle of automation involving discrete and continuous flow methods.

**91345****Clinical Biochemistry 2**

*8cp; 6hpw; prerequisite: 91344 Clinical Biochemistry 1*

Measurements of homeostasis and its malfunction. Liver and kidney function and disorders. Regulation of electrolyte, water and acid-base balance. Serum protein patterns in health and disease. Abnormalities of lipid metabolism. Radio immunoassay, hormone evaluation with special emphasis on thyroid function, isoenzymes, malabsorption syndromes, vitamin levels in clinical investigation.

**91347****Toxic Materials in the Environment**

*4cp; 3hpw; prerequisites: completion of Stages 1–4*

Pathways of toxic substances in the environment. Transfer mechanisms between the different environment compartments. Bioaccumulation and biotransformation. Environmental legislation: the NSW Environmental Acts and their associated regulations; comparison of the Federal Acts with those from other States; significance of socioeconomic factors on decision making in environmental impact assessment; objectives, contents and procedures for the preparation of environmental impact statements.

**91350****Principles of Pharmacology and Toxicology**

*4cp; 3hpw; prerequisite: 91317 Human Biology; 91313 Biochemistry 1*

General principles governing drug action. Drug receptor interactions. Dose-response measurements in pharmacology and toxicology. Effects of drugs and toxic substances on the cardiovascular system, the central nervous system, the respiratory system. Effects of drugs and toxic substances on metabolic and excretory function. Carcinogens and teratogens. Specific classes of toxic substances.

**91351****Immunology 1**

*3cp; 3hpw; prerequisites: 91354 Anatomical Pathology; 91314 Microbiology 1 or 91313 Biochemistry 1*

This is a core subject for the Biomedical Sciences and Biotechnology courses that is designed to introduce the basic concepts of immunology. The subject is structured so that it follows the course of an immune response, from initial non-specific reactions to the development of adaptive responses and immunological memory. Emphasis is given to the basic concepts that underlie the recognition of foreignness and the response to infection. The practical sessions introduce students to a variety of cellular and serological techniques that are the cornerstones of immunological analysis. In addition, special interactive teaching sessions are used to explore contemporary topics in immunology.

**91352****Eukaryotic Microbiology**

*8cp; 6how; prerequisites: 91314 Microbiology 1, 91332 Molecular Biology 1; 91351 Immunology 1*

This subject covers the following topics: parasitism; biology of parasitic worms including nematodes, trematodes and cestodes; biology of parasitic protozoa including the sporozoans, flagellates, amoeba and ciliates; arthropods as vectors of disease; clinical parasitology; molecular biology of parasites; immunity and vaccine development; biology of fungi; fungal pathogenicity and infection; antiparasitic and antifungal therapy; and biotechnological applications of fungi.

**91354****Anatomical Pathology**

*6cp; 6hpw; prerequisites: 91312 Biology 2; 91317 Human Biology; 65022 Chemistry 2 (LS); subject coordinator: Dr T Szynda*

This subject provides a basic knowledge of disease processes, the body's responses to them, the preparation and staining of mammalian tissues for microscopic examination of organ structure, and light microscopic appearance of diseased tissues.

The subject also introduces the chemistry of biological dyes and their uses in the laboratory to highlight normal tissue structures and to demonstrate pathological tissue changes that occur during disease development.

This is all integrated to present an understanding of disease with its morphological appearance and the laboratory techniques used to interpret structural tissue changes that occur in disease states.

**91355****Haematology I**

*3cp; 3hpw; prerequisites: 91354 Anatomical Pathology; 91314 Microbiology I or 91313 Biochemistry I*

Structure, function and morphology of normal blood and bone marrow. Haemostasis and haematopoiesis. Automated laboratory equipment used in haematology. Introduction to haematological disease and the significance of haematological changes in disease.

**91358****Haematology 2**

*8cp; 6hpw; prerequisite: 91355 Haematology I*

Disease processes related to hereditary, acquired, benign and malignant disorders of haematological systems. Correlation of physiological processes, pathological states and diagnostic tools in haematology. Light microscopic morphological examination of peripheral blood and bone marrow in disease and correlation of these findings with indices and cell counts obtained by automated laboratory equipment. Procedures for detection and precise diagnosis of anaemias, haemostatic disorders, haemoglobin disorders and haematological malignancies. Introduction to cytogenetics; prenatal diagnosis of genetic disease; genetic counselling and cancer cytogenetics.

**91359****Immunology 2**

*8cp; 6hpw; prerequisite: 91351 Immunology I*

Provides current concepts of modern immunology to students who have some basic understanding of the subject, and an appreciation of the wide spectrum of applied immunology in medicine, research and industry. Specialised areas of immunology covered include genetics of antibody diversity; structure of antibodies, T-cell receptor and MHC molecules; cytokines; monoclonal antibodies; clinical immunology and techniques applicable in both diagnostic and research laboratories including enzyme-linked immunoassays; cell separations and flow cytometry.

**91363****Animal Ecophysiology**

*6cp; 6hpw; prerequisite: 91360 Quantitative Ecology*

Basic concepts in ecophysiology; limiting factors, lethal limits, acclimation. Patterns of physiological responses to natural and selected manufactured stressors. Coordination of physiological processes with environmental factors; neuro-endocrine control of life cycles and physiological responses, stress syndrome. Population changes; basic animal population dynamics, structure, growth and regulation of populations. This subject includes a field excursion.

**91364****Aquatic Ecology**

*8cp; 6hpw; prerequisites: 91362 Plant Ecophysiology; 91363 Animal Ecophysiology*

Australian water resources and the hydrological cycle. Structural components and functional processes of aquatic ecosystems; physical, chemical and biological features; energy flows and nutrient cycles. Distinctive features of lakes, rivers and streams, estuaries, coastal lagoons and the sea. Assessment and monitoring of water pollution problems; water quality and biological surveillance. Management of polluted and disturbed aquatic habitats. Management of water supply reservoirs. This subject will involve a number of field excursions including an excursion in February preceding enrolment.

**91368****Bioprocessing**

*8cp; 6hpw; prerequisite: 91330 Microbiology 2*

Fermentation technology; processes of formation and extraction of useful products of microbial, animal and plant cells; the microbiological, physiological and biochemical bases of industrially useful fermentations in the food, beverage, pharmaceutical and other relevant industries; unit operations and processing procedures in industrial fermentations. Computer interfacing and control procedures for fermentation systems. Economic and other factors impinging on the operation of fermentation industries. Industrial visits and a literature project are undertaken in this subject.

**91369****Applied and Environmental Microbiology**

*8cp; 6hpw; prerequisite: 91330 Microbiology 2*

Foods and waters as microbial ecosystems. Factors affecting their contamination by microorganisms of spoilage and public health significance. Indicator organisms and the microbiological monitoring of foods and waters. Quality control in food production and water management. Waste treatment processes for industrial and domestic wastes. Bioremediation of contaminated aquatic and terrestrial ecosystems.

Industrial visits are an important component of this subject.

**91370****Field Studies: Semi-arid Ecology**

*8cp; 6hpw (run over 10–14 day excursion to far-western NSW in July every third year, alternating with 91371 i.e. a major field elective every 18 months)*

This and other electives are normally taken in senior stages of the degree course. It can thus be assumed that students will have a thorough knowledge of basic ecology (see also elective field study subjects 91371 and 91375). The aim of the subject is to broaden students' understanding of environmental biology and its management applications by demonstration and experimentation outside the Sydney Basin. The importance of water and water management, rangeland management and national parks management of dry areas will be included, along with ecological studies of factors determining the composition and

structure of semi-arid vegetation. Assessment will involve submission of a log book/journal and a project report or presentation, to be completed after the field excursion.

**91371****Field Studies: Mountain Ecology**

*8cp; 6hpw (run over 10-day excursion to south-eastern NSW in December every third year, alternating with 91370 i.e. a major field elective every 18 months)*

This and other electives are normally taken in senior stages of the degree course. It can thus be assumed that students will have a thorough knowledge of basic ecology (see also elective field study subjects 91370 and 91375). The aim of the subject is to broaden the student's understanding of environmental biology and its management applications by demonstration and experimentation outside the Sydney Basin. The student will be introduced by demonstration and experimentation to the ecology of tall forests and mountain areas, the management of mountain forests, the impacts of forestry operations, and the management of national parks and wilderness areas. Assessment will involve submission of a log book/journal, and a project report or presentation, to be completed after the field excursion.

**91373****Applied Mycology**

*3cp; 3hpw; corequisite: 91330 Microbiology 2*

Introduction to fungal structure and function. Fungal classification. Fungi in bioprocessing, clinical disease, and biodegradation.

**91375****Field Studies: Marine Sciences**

*4cp; 3hpw; (run over 6-day excursion to Jervis Bay or similar south coast area of NSW, currently offered twice each year in January/February and July)*

This and other electives are normally taken in senior stages of the degree course. It can thus be assumed that students will have a thorough knowledge of basic ecology (see also elective field study subjects 91370 and 91371). The aim of the subject is to broaden the student's understanding of environmental biology and its management applications by demonstration and experimentation outside the Sydney Basin. The student will be introduced by demonstration and experimentation to a

variety of marine, estuarine, and littoral ecosystems, and the management principles and practices in each zone.

This excursion is seen as part of the interinstitutional field studies series of the Australian Marine Sciences Consortium (AMSC) which includes 20 member universities in Australia and New Zealand, the Australian Institute of Marine Science, the Australian Defence Force Academy, and the Royal Australian Naval College. Instructors in a range of relevant disciplines come from member institutions, and investigations include chemical, biological, geological and physical oceanography, in addition to the biology of fishes, benthic fauna, plants and sediments.

In accordance with the guidelines for AMSC excursions, UTS supervisors will assess a report submitted on the final day of the field trip.

### 91376

#### Environmental Measurement

*3cp; 3hpw; prerequisites: 91312 Biology 2; 33105 Introductory Biometrics; 91395 Biocomputing*

Measurement and analysis as part of the resource management process. Techniques of estimating population size and density of sedentary organisms; sampling methods, assessments and data analysis in aquatic and terrestrial systems. Techniques for sampling multispecies communities and mobile organisms. Estimations of biomass and productivity. This subject involves an excursion to develop skills of field identification of organisms and measurement techniques, aquatic and terrestrial.

### 91377

#### Cytopathology

*16cp; 6hpw, for 2 semesters; prerequisites: 91354 Anatomical Pathology; 91355 Haematology I*

Instruction in the interpretation and diagnosis, at the light microscope level, of cell samples from a variety of anatomical sites. Morphologic features of cells in normal states, effects of inflammation, physiologic patterns, hormonal effects, changes due to specific organisms and viruses, premalignant and malignant conditions and the effects of treatments on cell morphology and smear patterns. Instruction on cell samples from the female genital tract, respiratory tract, alimentary tract, urinary tract, serous cavities, central nervous system, breast and thyroid with emphasis on fine

needle aspiration samples. Principles and procedures of specimen collection, preparation and staining, reporting methodology and laboratory procedures are covered. Epidemiologic and aetiologic factors in premalignant and malignant diseases and special procedures which complement cytopathologic diagnosis are included.

### 91379

#### Environmental Science for Engineers

*4cp; 3hpw; equivalent to 91380*

This is an introductory biological science elective subject available only to students who are currently enrolled in an undergraduate degree with the Faculty of Engineering. Content is as for 91380 Concepts in Environmental Science.

### 91380

#### Concepts in Environmental Science

*3cp; 3hpw*

This subject is available only to students who are not currently enrolled in an undergraduate degree within the biological and biomedical sciences or Faculty of Engineering.

This subject provides an introduction to major principles of biological science, particularly in the field of ecology. The biosphere – a complexly balanced system involving the cycling of materials and continuous flow of energy; and the increased impacts on the biosphere of science, technology, industrialisation and population pressures.

### 91382

#### Introduction to Biological Fluids

*3cp; 2hpw; prerequisites: 65401 Analytical Chemistry I; 65557 Forensic Toxicology I; corequisite: 65657 Forensic Toxicology 2; subject coordinator: Dr T Sztynka*

This subject introduces the nature of biological fluids, their chemical composition, the biochemistry of their important components, and their value and relevance in forensic evidence gathering. Different methods for the identification of various biological fluid components will be examined along with the techniques which are used to identify, classify and differentiate the individual people from whom the fluids were collected or from whom they may have been derived. Levels of probability of the sample coming from a given individual will be considered, with discourse about levels of certainty and use of population statistics.



**91388****Concepts in Biology***6cp; 6hpw*

This is an elective subject available to students from Physical Sciences and from other faculties. The subject is designed as a one-semester introductory course in biology, suitable as an elective subject for students in Physical Sciences, providing an introduction to the major principles of biological science, and the importance of this branch of science in a world of advanced technology. Life exists in general on three planes of organisation: cell, organism and population. Life is self-perpetuating, diverse and evolving. The biosphere represents a complexly balanced system involving a cycling of materials and a continuous flow of energy. Science, technology, industrialisation and population pressures are all having increasing impacts on the biosphere.

**91389****Biology 1 (SL)**

*for Bachelor of Science/Bachelor of Laws students  
5cp; 6hpw*

*This subject, together with 91390 Biology 2 (SL),  
constitutes a foundation course in biological  
sciences in the Faculty.*

Diversity of living organisms and their interaction with one another and the environment. Characteristics of living things; cellular basis of life; principles of classification; characteristics of kingdoms of living organisms and their sub-groups; genetics, evolution and natural selection; ecological principles, energy flow, nutrient cycles, community and ecosystems.

**91390****Biology 2 (SL)**

*for Bachelor of Science/Bachelor of Laws students  
5cp; 6hpw; prerequisite: 91389 Biology 1 (SL) or  
equivalent*

Interrelationship between structure and function in living systems at two levels of organisation: cellular and organismic. Cell structure and physiology: molecular architecture of cells; cellular reactions and metabolism; molecular basis of heredity and information transfer. Animal physiology – mechanisms of movement, gas exchange and circulation, nutrition and digestion, osmoregulation and excretion among animal groups. Plant physiology – anatomy and physiology of flowering plants, nutrition,

photosynthesis, transport. Physiological adaptations of Australian native species of animals and plants to the specific environments.

**91395****Biocomputing**

*3cp; 3hpw; prerequisite: 33103 Statistics for Life  
Sciences or 91201 Horticultural Experimentation*

Introduction to computers and programs in the biological sciences. Analysis of the operation of computer systems with emphasis on principles of hardware architecture, operating systems, editors and file management. Comparison of various types of computers, IBM PC, Macintosh, mainframe, and various software packages available for the biological and biomedical sciences.

**91398****Special Reading Assignment –  
Life Sciences***4cp*

To be undertaken only following prior negotiation on the part of the student with a full-time member of academic staff regarding individual supervision. In addition, requires special permission of the Associate Dean.

**91399****Individual Project – Life Sciences***8cp*

To be undertaken only following prior negotiation on the part of the student with a full-time member of academic staff regarding individual supervision. In addition, requires special permission of the Associate Dean.

**91403****Medical Imaging***6cp; 3hpw*

Nuclear medicine: radioisotopes, physics, use; instrumentation: gamma camera, rectilinear scanner, PET, SPECT; image quality and artefact. Radiology: generation, detection and properties of X-rays – DSA, CT; magnetic resonance imaging, ultrasound.

**91404****Physics in Medicine***5cp; 3hpw*

Radiotherapy sources of radiation; radiation beam parameter; measurement of therapy level radiation; simulators; dose distribution,

brachytherapy; quality assurance; safety; non-ionising radiation: lasers, UV. Ultrasound: generation, detection and properties of ultrasound – B and M mode scanning, electronic array scanning.

## 91405

### Bioelectronics

*6cp; 3hpw; corequisite: 91436 Advanced Mathematics in the Life Sciences*

Basic concepts of electronic measurement techniques, signals, transducers, electronic processing, display; basic electrical concepts and measurements: charge, current voltage and resistance in simple circuits, thevenin equivalence. Frequency dependent circuits: inductors, capacitors, impedance and reactance, RC, RL and RLC circuits, simple filters. Semi-conductors, diodes, FET and junction transistors. Amplifiers: operational. Digital logic: simple gates and truth tables, flip-flops, counters, registers, monostables, analogue to digital conversion. Data displays and recorders: principles of recorders and oscilloscopes. Power distribution and electrical safety.

## 91406

### Project (Clinical Measurement) F/T

*32cp; 4½hpw, 4 semesters; corequisites: all foundation subjects*

Candidates are required to undertake a project and prepare a report. The project is designed to introduce them to problem-solving situations in applied fields relevant to their interests and/or professional experience. Projects may take the form of experimental investigations, design studies, extensive critical reviews or other suitable activities. If possible, projects will be chosen in cooperation with hospital and medical institutions so that candidates have some introduction to professional practice. The project will be completed in accordance with the Rules for Master's degree (by coursework).

## 91407

### Project (Clinical Measurement) P/T

*32cp; 9hpw, 2 semesters; prerequisites: all foundation subjects*

Equivalent to 91406.

## 91408

### Principles of Biocomputing

*5cp; 3hpw; prerequisite: some knowledge of basic mathematics and statistics is assumed*

Essential hardware and software for personal computers, peripherals and interface components typically used for computer-assisted experiments and instrumentation in a clinical laboratory setting. Case study of the considerations in computer interfacing a laboratory instrument and appropriate processing of signal and raw data. General software packages used in the laboratory setting. Introduction to the Internet.

## 91410

### Principles of Clinical Biochemistry

*5cp; 3hpw*

Introduction to core concepts in clinical biochemistry and their practical implementation. Laboratory hazards; appropriate statistical methods for quality control of laboratory results, reference ranges and diagnostic sensitivity and specificity. Pre-analytical procedures. Qualitative analysis, as exemplified by urine analysis and the spectroscopic identification of normal and abnormal haemoglobin pigments. Quantitative analysis, as exemplified by inorganic phosphorous analysis. Blood sugar estimations and abnormalities of carbohydrate metabolism. Principles of clinical enzymology with particular reference to the steps required for method optimisation. Principles of automation using discrete and continuous-flow methods. Introduction to the clinical biochemistry literature.

## 91411

### Biochemical Pathophysiology

*6cp; 3hpw; prerequisite: 91410 Principles of Clinical Biochemistry*

Role of the clinical biochemistry laboratory in patient care, with emphasis on the biochemical indications of underlying pathology. Measurement of homeostasis and its malfunction, as seen in regulation of electrolyte, water and acid-base balance, and liver and kidney function and disorders. Serum protein patterns in health and disease. Abnormalities of lipid metabolism. Radio-immunoassay and related techniques and their role in hormonal evaluation with special emphasis on thyroid function. Isoenzymes; malabsorption syndromes; vitamin levels in clinical investigation.

**91412****Biomedical Sciences 1***10cp; 6hpw*

This subject may be undertaken only with special permission of the Course Coordinator, Clinical Biochemistry.

**91413****Biomedical Sciences 2***10cp; 6hpw*

This subject may be undertaken only with special permission of the Course Coordinator, Clinical Biochemistry.

**91414****Analytical Biochemistry Project 1***5cp; 3hpw*

This subject may be undertaken only with special permission of the Course Coordinator, Clinical Biochemistry.

**91415****Analytical Biochemistry Project 2***6cp; 3hpw*

This subject may be undertaken only with special permission of the Course Coordinator, Clinical Biochemistry.

**91417****Clinical Laboratory Management***6cp; 3hpw; prerequisite: 91411 Biochemical Pathophysiology*

The planning, staffing, organising and control of a clinical laboratory to achieve effective and efficient delivery of services. Problem identification and use of performance indicators, aspects of accounting and finance, total quality management and quality circles. Labour relations. Ethical and legal considerations affecting laboratory personnel.

**91419****Case Studies in Clinical Biochemistry***6cp; 3hpw; prerequisite: 91411 Biochemical Pathophysiology*

Interactive discussion of a variety of case studies derived from different areas of clinical biochemistry, illustrating significance of laboratory quality control, metabolic inter-relationships, and the necessity for considering a patient's complete case history in order to gain a true perspective.

**91421****Principles of Human Biology***10cp; 6hpw; prerequisite: knowledge of basic biological concepts is assumed*

Basic human organisation – tissues, fluids, skeletal and muscular systems. Biological control systems – essentials of control systems, the nervous and hormonal systems. Integrated structure and function of cardiovascular, lymphatic, respiratory, gastrointestinal, renal and reproductive systems. Introductory human genetics – human variability, basic population genetics, mutations, problems of counselling.

**91423****Clinical Biochemistry – Advanced Aspects A***10cp; 6hpw; prerequisite: 91410 Principles of Clinical Biochemistry*

Toxicology and drug metabolism; modern methods for the screening, identification and quantitation of drugs of abuse. Clinical biochemistry of foeto-placental function, gastrointestinal function, the porphyrias and the catecholamines. Principles and practice of instrument evaluation. Advanced techniques in clinical biochemistry; IR spectroscopy, GLC, GC/mass spectrometry, HPLC, ion-selective electrodes.

**91424****Clinical Biochemistry – Advanced Aspects B***10cp; 6hpw; prerequisite: 91410 Principles of Clinical Biochemistry*

Chemical pathology of liver and kidney function; pathophysiological effects of alcohol abuse, viral infection and choleostasis. The endocrine tissues; thyroid, adrenal and gonadal function. Theoretical and practical aspects of immunoassay. Inborn errors of metabolism; screening methods and investigation of the genome. Chemical diagnosis of diabetic states, hypertension and myocardial infarction. Immunological disorders; detection and diagnosis.

**91426****Analytical Techniques in Biochemistry***10cp; 6hpw*

Survey of modern techniques for analysis of biochemical samples, emphasising instrumentation, underlying principles and

critical evaluation. Spectroscopic methods: spectrophotometry, spectrofluorimetry, atomic emission and absorption photometry, mass spectrometry, magnetic resonance. Separation methods: chromatography, electrophoresis, centrifugation. Electrochemical methods: potentiometry and ion-selective electrodes, polarography. Immunoassay strategies. Introduction to radiochemical tracers. Molecular biology techniques. Errors in analysis. Implications of biochemical equilibria and kinetics in analysis.

### 91433

#### **Biostatistics**

*6cp; 3hpw; corequisite: 91408 Principles of Biocomputing or equivalent*

Review of parametric and non-parametric statistics applied to the clinical field; population distributions, tests of significance, selection of suitable statistical tests, analysis of variance, correlation and regression analysis, experimental design. Use of major computer packages (SPSS, minitab) for statistics.

### 91434

#### **Radiation Protection**

*5cp; 3hpw*

Principles and techniques of radiological protection including basic physics; radiation, its sources and properties; radiation units; detection and measurement principles; health physics instruments; radiation dosimetry (ionising and non-ionising); principles of radiation control; radiation protection standards; shielding fundamentals; principles of radioactive waste disposal; safety design of nuclear laboratories; administrative aspects of radiological protection; legal aspects; accelerators and cyclotrons; transport of radioactive materials.

Note: Students may be required to attend lectures at the Australian School of Nuclear Technology, Lucas Heights.

### 91436

#### **Advanced Mathematics in the Life Sciences**

*5cp; 3hpw; prerequisite: some knowledge of basic mathematics is assumed*

Calculus: differentiation, integration, numerical methods of integration. Complex numbers: j operator, summation, multiplication. Linear and vector algebra: matrix operations,

inversions, determinants. Differential equations: ordinary and partial, solutions. Transformations: Fourier, Laplace, inverse transformations, DFT, FFT, correlations. Number theory: binary, octal, decimal, hexadecimal. Boolean algebra.

### 91437

#### **Advanced Bioinstrumentation**

*5cp; 3hpw; prerequisite: equivalent to Certificate in Electronics and Computing in Life Sciences and Certificate in Human Biology*

Review of impedance concepts, complex number and vector techniques, application to RLC circuits. Analogue filters; steady-state and transient response, anti-aliasing. Operational, instrumentation and biomedical amplifiers, high impedance techniques. Analogue building blocks, active filters, frequency to voltage converters. Review of digital logic concepts and functions: flip-flops, monostables, counters, counting systems, displays. Analogue/digital interconversions, comparison of methods. Electronic noise: sources, avoidance, reduction methods. Electronic construction techniques.

### 91438

#### **Biosensors and Transducers**

*5cp; 3hpw*

Biocompatibility. Electrodes – ECG, EEG, neurophysiology, pacemakers etc. Pressure – invasive, non-invasive. Light – oxygen monitoring in Hb, CCDs. Displacement, strain, angular measurement. Temperature. Electrochemical electrodes – pH, ion selective. Biosensors. Doppler ultrasound. Hardware and manufacturing.

### 91439

#### **Physiological Measurement**

*6cp; 3hpw*

Blood flow – ultrasound, radioisotope techniques, electromagnetic effects. Cardiac output – Fick technique, radioisotopes. Neurological and electro-physiological studies – EEG, ECG, heart, nerve and brain stem, evoked potential membrane physiology, electrical propagation. Respiratory measurements/spirometry. Implantable devices – telemetry of information. Audiometry. Biomagnetic and impedance imaging.

**91440****Experimental Design and Methods**

*4cp; 3hpw; equivalent to 98903 Experimental Design and Resources Management and 91477 Research Design and Methods*

The focus of this subject is the role and significance of experimental design and analysis in natural environmental systems. The emphasis will be on experimentation, survey techniques, and the construction and interpretation of statistical models.

**91441****Principles of Toxicology**

*8cp; 6hpw; equivalent to 91448 Introduction to Toxicology*

Strand A: Historical development of toxicology and environmental toxicology. The sources and behaviour of the main classes of toxic substances in the environment, their effects on tissues, organs, organisms and ecosystems. Introduction to community ecology and ecological processes. Environmental toxicology and human and occupational health. National and international standards for toxicological testing.

Strand B: The use of mammalian species in toxicity testing. Examination of the effects of the main classes of natural and artificial poisons on specific organ systems of mammals. Care and maintenance of laboratory animals and special problems associated with their use in toxicity testing. Mutagenesis, carcinogenesis and teratogenesis.

**91453****Project Proposal  
(Clinical Biochemistry)**

*6cp; prerequisite: completion of 3 semesters of coursework*

Formulation of a proposal for an investigatory or developmental project in clinical biochemistry, suitable for completion over two semesters of part-time project work within the context of 91456 and 91459. The student is required to define the project aims in consultation with an academic supervisor, conduct a preliminary literature review, design the experimental approach and submit them in the form of a written project proposal.

**91456****Project 1 (Clinical Biochemistry)**

*10cp; prerequisite: 91453 Project Proposal (Clinical Biochemistry)*

Students are required to complete 91456 (six hours per week) and 91459 (nine hours per week) project subjects extending over two semesters, based on the project proposal submitted in 91453 or an equivalent written proposal. Projects are generally carried out at the student's place of employment and should relate to current problems or developments in clinical biochemistry in the working laboratory. Students are expected to translate their project design into action, developing appropriate methodology, collecting data and subjecting it to critical evaluation and scientific presentation. The project will be completed in accordance with the Rules for Master's degree (by coursework) students.

**91459****Project 2 (Clinical Biochemistry)**

*16cp; prerequisite: 91453 Project Proposal (Clinical Biochemistry)*

See subject description for 91456 Project 1 (Clinical Biochemistry).

**91461****Physiological Modelling**

*5cp; 3hpw; prerequisite: 91408 Principles of Biocomputing*

An introduction to the analysis of dynamic behaviour in biological and physical systems, with emphasis on the development of suitable mathematical models. General development of models; philosophy, variables, states, signal flows and parameters. Computational block models; simulations using THTSIM. Expression-based modelling languages. Example biological models; compartment models, driven models, nonlinear models. Integration errors. Validation of dynamic models against data.

**91462****Digital Processing of Signals  
and Images in Medicine**

*5cp; 3hpw*

Linear systems, Fourier transforms in 1D and 2D; stochastic properties of signals; sampling and quantisation; discrete Fourier transformation, FFT; Z transform; digital filter structures, properties; IIR and FIR filters; image point operations; image filters; image transforms.

**91463****Hardware for Clinical Data Acquisition and Control***6cp; 6hpw*

Typical hardware systems in the Life Sciences. CPU operation, microprocessor operations, memory, I/O interfacing, DMA. Turbo debugger environment. Display hardware, text mode, memory mapping, monochrome, CGA, EGA, VGA. Keyboard operation. Business architecture. Communications hardware. Peripheral systems (real world interfacing), data acquisition and control boards, frame grabbers, CCD/video, controllers, IEEE 488 interface bus, RS232C and centronics connections.

**91464****Laboratory Biocomputing***5cp; 3hpw*

Intel Assembler language. Use of Turbo Assembler debugger. Accessing systems hardware, data acquisition and control cards and interface cards. Interfacing to other languages (e.g. TURBO, Pascal). Use of Interrupts (DOS, BIOS, Hardware and interrupt handlers). Why and when to use Assembler code. Applications in medicine and biology.

**91465****Advanced Programming – Life Sciences***5cp; 3hpw; prerequisites: 91408 Principles of Biocomputing; 91436 Advanced Mathematics in the Life Sciences or equivalent*

Interfacing programs with medical and biological applications. Advanced Pascal features, records and sets, dynamic structures, pointers, database structures, interrupt handlers, graphics, port instructions. Clinical interface programming using data acquisition and control boards. Data acquisition programming languages – interface drivers.

**91471****Biochemical and Analytical Toxicology***12cp; 6hpw; equivalent to 91444 Analytical Techniques in Toxicology and 91445 Biochemical Toxicology*

Biochemical mechanisms involved in entry, transformation and removal of toxic substances in plants, animals and selected micro-organisms. Application of

immunological methods in investigating the toxicological responses in various organisms. Introduction to techniques and instrumentation used for toxicological testing of environmental and biological samples. The use of biochemical and immunological entities or changes in levels as early-warning biomarkers of pollution and environmental stress. The place of such markers in environmental risk assessment and management.

**91472****Field Surveillance, Fate and Management of Toxic Substances***12cp; 9hpw; equivalent to 91443 Environmental Management, 91446 Field Surveillance and Management of Toxic Substances, 91447 Environmental Accumulation and Transformation of Toxic Substances; prerequisites: 91441 Principles of Toxicology or 91448 Introduction to Toxicology; 91433 Biostatistics or 91474 Statistics in Bioscience*

Field monitoring for the effects of toxic substances. Use of biological indices to assess impact of toxic substances. Application of bioassay data to natural ecosystems. Pathways of toxic substances in the environment. Transfer mechanisms between different environment compartments. Bioaccumulation and biotransformation. Environmental legislation: the NSW Environmental Acts and their associated regulations; comparison of the Federal Acts with those of the States; significance of socioeconomic factors on decision making in environmental matters; cost-benefit analysis and prediction of social impact; environmental impact assessment; objectives, contents and procedures for the preparation of environmental impact statements.

**91473****Bioassays/Toxicological Testing***8cp; 6hpw; equivalent to 91442 Toxicological Testing/Bioassays; prerequisites: 91441 Principles of Toxicology or 91448 Introduction to Toxicology; 91433 Biostatistics or 91474 Statistics in Bioscience*

Toxicity tests to determine acute and chronic effects of toxic substances on a wide range of organisms e.g. fish, invertebrates, plants. Analysis and interpretation of results. The use of bioassays and other toxicological testing methods in the formulation of environmental quality guidelines and in environmental monitoring and management.

**91474****Statistics in Bioscience**

*4cp; 3hpw; equivalent to 91433 Biostatistics; corequisite: 91408 Principles of Biocomputing or equivalent*

Review of parametric and non-parametric statistics applied to the clinical field; population distributions, tests of significance, selection of suitable statistical tests, analysis of variance, correlation and regression analysis, experimental design. Use of major computer packages (SPSS, minitab) for statistics.

**91475****Environmental Toxicology Project P/T**

*24cp; 2 semesters; equivalent to 91450 Project (Environmental Toxicology) P/T and 91460 Project (Environmental Toxicology) F/T; prerequisites: include all foundation subjects*

All Master's candidates must undertake a project and prepare a report. Enrolment in this subject would normally require a credit average or better in the coursework. The project is designed to introduce them to problem-solving situations in applied fields relevant to their interests. Projects may take the form of experimental investigations, design studies, extensive critical reviews or other suitable activities. If possible, projects will be chosen in cooperation with employers so that candidates have some introduction to professional practice. Via this project students must indicate an understanding of the place of environmental toxicology in environmental management, towards the goal of ecologically sustainable use of our natural resources. The project will be completed in accordance with the Rules for Master's degree (by coursework) students.

**91476****Environmental Toxicology Project F/T**

*24cp; 1 semester; equivalent to 91450 Project (Environmental Toxicology) P/T and 91460 Project (Environmental Toxicology) F/T; prerequisites: include all foundation subjects*

All Master's candidates must undertake a project and prepare a report. Enrolment in this subject would normally require a credit average or better in the coursework. The project is designed to introduce them to problem-solving situations in applied fields relevant to their interests. Projects may take the form of experimental investigations, design

studies, extensive critical reviews or other suitable activities. If possible, projects will be chosen in cooperation with employers so that candidates have some introduction to professional practice. Via this project students must indicate an understanding of the place of environmental toxicology in environmental management, towards the goal of ecologically sustainable use of our natural resources. The project will be completed in accordance with the Rules for Master's degree (by coursework) students.

**91477****Research Design and Methods**

*4cp; 3hpw; prerequisites: all first semester subjects*

The focus of this subject is the role and significance of experimental design and analysis in natural coastal systems. The emphasis will be on experimentation, survey techniques, and the construction and interpretation of statistical models.

**91478****Economics of Coastal Resources**

*4cp; 3hpw*

Concentrates on the fundamental economic principles that underlie the allocation of coastal resources. The concept of ecologically sustainable development will be considered within an economic framework, and its significance to coastal resources will be assessed. Case studies and applications of environmental economic techniques to coastal resource management problems will be investigated.

**91479****Coastal Zone Law**

*4cp; 3hpw; prerequisites: completion of first year of studies*

A survey will be made of those areas of law that are designed to control or regulate environmental quality of coastal resources. The subject covers the common law heritage and the major statutory and common law controls over pollution, use of land, terrestrial, aquatic, and heritage resources. The emphasis will be on Australian legislation in comparison with that of other countries.

**91480****Epidemiology and Disease Control***4cp; 3hpw equivalent*

Definition of epidemiological terms. Methods for the theoretical and mathematical formulation of epidemic disease outbreaks. Illustration and discussion of epidemics and outbreaks of infectious disease using specific human and animal case studies.

**91481****Current Topics in Medical Microbiology***6cp; 3hpw equivalent extending over 2 semesters*

Offered with the Centre for Infectious Disease and Microbiology (CIDM), Westmead Hospital, and some classes/sessions will be held at the hospital. Classes will be presented by staff from UTS and CIDM and by invited guest lecturers. In this subject a survey of selected topics in clinical microbiology will be undertaken. The precise mix of topics presented will vary from year to year, but will include a range of current problems or recent developments in diagnostic clinical microbiology.

**91482****Human Parasitology***5cp; 4hpw equivalent*

A review of parasitic protozoa and helminths of medical and veterinary importance in both Australasia and the South-East Asian region. Standard procedures for specimen handling and laboratory diagnosis. Molecular and other advanced methods of specimen testing.

**91483****Human Fungal Disease***4cp; 3hpw equivalent*

Structure, function and classification of fungi, with special reference to those of human and animal disease significance in Australasia and the South-East Asian region. Growth procedures and laboratory identification of fungal disease agents. Developments in fungal diagnostic procedures.

**91484****Project (Medical Physics) F/T***32cp; corequisites: all foundation subjects*

Candidates are required to undertake a project and prepare a report. The project is designed to introduce them to problem-solving situations in applied fields relevant to their

interests and/or professional experience. Projects may take the form of experimental investigations, design studies, extensive critical reviews or other suitable activities. If possible, projects will be chosen in cooperation with hospital and medical institutions so that candidates have some introduction to professional practice. The project will be completed in accordance with the Rules for Master's degree (by coursework) students.

**91485****Human Viral Disease***5cp; 4hpw equivalent*

The nature of viruses, multiplication, classification and identification procedures. Tissue culture practice, diagnostic virology and serology. Contribution of molecular methods to viral diagnosis. Selected viral diseases will be considered as individual case studies.

**91486****Management of the Microbiology Laboratory***4cp; 3hpw*

Organising, operating, staffing and controlling the clinical diagnostic laboratory. Method and equipment evaluation; reporting and accreditation. A perspective on accounting and financial control; legal and ethical considerations and constraints.

**91487****Research Methodology – Medical Microbiology***3cp; 2hpw*

Overview of approaches to research; defining the problem, planning the experimental work; interpretation of laboratory data; critical review of published work.

**91488****Molecular Microbiology – Techniques and Diagnosis***8cp; 2hpw lectures plus 1 week intensive practical session, during semester break, 6hpw equivalent*

Key concepts and procedures in molecular biology, including bacterial and bacteriophage genetics, mutation and DNA exchange. Plasmids, transposons and other mobilisable genetic elements. DNA isolation, manipulation and cloning procedures. Molecular biology applied to the diagnostic laboratory for organism identification and characterisation.



**91489****Project (Medical Physics) P/T**

32cp; 2 semesters; prerequisites: all foundation subjects

Equivalent to 91484.

**91490****Research Proposal Design – Medical Microbiology**

4cp; 3hpw equivalent

This subject complements 91487 and introduces the student to the preparation of internal laboratory reports, funding submissions, research proposals and material for scientific publication. The student will develop a detailed proposal for a research project.

**91491****Research Project – Medical Microbiology P/T**

24cp; 2 semesters

An individual research project in an area of individual interest or a work-related topic. The project will be developed in advance in consultation with the Course Coordinator and other academic staff involved in the teaching of the Master's degree program. The project may be carried out in the Faculty's laboratories, or externally by arrangement.

**91492****Research Project – Medical Microbiology F/T**

24cp; 1 semester

As for 91491 Research Project – Medical Microbiology P/T.

**91493****Biosystems**

4cp; 3hpw

This is an introduction to biological sciences for graduates with little or no prior experience in this discipline. Characteristics of living things; the cell as a unit of life, its structure and function. Continuity of life – genetics of cells, individuals, populations. Evolution; classification of living organisms. Interactions at various levels of organisation in living systems – molecules and cells, organs, organisms, populations and total communities of many species. Animal and plant responses

to natural and human-induced stresses in aquatic and terrestrial environments. Manipulation by humans of plant and animal genetics and environment and its consequences. Experimental aspects of biological sciences.

**91498****Special Reading Assignment P/G – Life Sciences**

6cp

This reading assignment can be undertaken only following negotiation by the student with a full-time member of academic staff to gain agreement to be individually supervised. It also requires special permission of the appropriate Subject Coordinator and Associate Dean.

**91499****Individual Project P/G – Life Sciences**

10cp

This individual project can be undertaken only following negotiation by the student with a full-time member of academic staff to gain agreement to be individually supervised. It also requires special permission of the appropriate Subject Coordinator and Associate Dean.

**91607****Research Methods 1**

4cp; 4hpw

This subject is an introduction to the scientific method and its importance to the acupuncture profession. It deals with basic research issues: theories and models; independent, dependent and confounding variables; and the influence of the placebo effect. It also examines the philosophical basis of positivist, empiricist and analytical approaches to scientific endeavours.

**91608****Research Methods 2**

4cp; 4hpw; prerequisite: 91607 Research Methods 1

This subject builds on material provided in Research Methods 1. It provides the student with a solid grasp of the research process in health sciences and encourages research into acupuncture. As such, it is an important foundation for students in undertaking an independent research project.

**91609****Biomedical Science Upgrade***8cp; 4hpw*

This subject is designed for practising acupuncturists with a background of training in the biomedical sciences. The aim of the course is to consolidate existing knowledge and extend it in areas particularly relevant to acupuncture such as neuroscience, pathophysiology and microbiology.

**91650****Introduction to Environmental Biology**

This is an introductory biological science elective subject available only to students who are currently enrolled in an undergraduate degree with the Faculty of Engineering. This subject provides an introduction to major principles of biological science, particularly in the field of ecology. The biosphere – a complexly balanced system involving the cycling of materials and continuous flow of energy; and the increased impacts on the biosphere of science, technology, industrialisation and population pressures.

**91651****Environmental Microbiology for Engineers***prerequisite: 91650 Introduction to Environmental Biology*

This subject is only available to students enrolled in an undergraduate degree in the Faculty of Engineering. The subject introduces students to the nature of living organisms classified as microorganisms and the significance of microbial activities for engineering or processes involving environmental impacts. The subject provides an overview of the growth characteristics of microorganism and the environmental factors which influence their growth. Microorganisms are dealt with in the context of decomposition processes, transformations of chemicals in biogeochemical cycles, as potential pathogens in water and groundwaters, in wastewater treatment, corrosion processes and public health. Their potential uses in bio-remediation and bio-reclamation are also discussed.

**91701****Introductory Medical Science 1***6cp; 6hpw; subject coordinator: Ms J Wyndham*

This subject provides an introduction to the anatomy and physiology of the healthy human body. Lectures are complemented by an appropriate practical program. The content includes: the levels of organisation in the body; basic anatomy, anatomical terms, surface anatomy and body regions and overview of major organ systems. Transport of materials across membranes, osmosis diffusion, active transport. The basic concepts of microscopy and the histology of tissues and major organ systems. The general structure and functional significance of the major organ systems. Basic microbiology and aseptic technique. The basic concepts of modern genetics. Chromosomes, mitosis and meiosis, DNA, RNA, transcription, translation. Mutations and oncogenes. Genetic inheritance, disorders and pedigrees. The structure, function and histology of the integumentary system, the musculoskeletal system, the gastrointestinal system, cardiovascular, lymphatic and renal systems. The chemical principles related to enzyme action and kinetics and the chemical reactions in digestion.

**91702****Introductory Medical Science 2***6cp; 6hpw; prerequisite: 91701 Introductory Medical Science 1; subject coordinator: Ms D Edwards*

This subject completes the coverage of the anatomy and physiology of the body systems begun in Introductory Medical Science 1. It is also designed to foster an appreciation of the interactions between and control of all body systems. Independent learning as well as critical analysis and communication skills will also be developed in this unit. Topics include: structure and function of the respiratory, endocrine, nervous, reproductive and immune systems along with relevant clinical applications in each system.

**91703****Physiological Systems***6cp; 5hpw; prerequisite: 91702 Introductory Medical Science 2; subject coordinator: Dr D Martin*

This subject extends the knowledge and understanding of cellular elements of the body and of certain body organ systems that were introduced in the subjects Introductory

Medical Science 1 and 2. It provides an understanding of control systems, principles of mass transfer and compartmental systems analysis and how these principles apply to the body. Ion channels and membrane transport processes. Circulation and cardiovascular system. Control of metabolism and endocrine system. Formation and excretion of urine. Regulation of extracellular fluid composition and volume. Lecture material complemented by practicals, tutorials and directed self-study modules.

### 91704

#### Behavioural Sciences

*6cp; 4hpw; prerequisite: 33105 Introductory Biometrics, 91703 Physiological Systems; subject coordinator: Dr D Cobbin*

The overall aim of this study is to demonstrate the significance of contributions of theories and practices from the behavioural sciences to effective medical theory and practice. Key concepts, principles and theories from the behavioural sciences that have particular relevance to the medical sciences are explored within the framework of selected health care and medical scenarios such as chronic pain, the placebo effect, depression, cardiovascular disease, health promotion. Content provides an introduction to the field of behavioural medicine which addresses the application of theory and practice of the behavioural sciences to the theory and practice of modern medicine. Students have practical experience in the application of principles from cognitive learning theory in design and completion of behavioural monitoring and self-management programs.

### 91705

#### Medical Devices and Diagnostics

*6cp; 6hpw; prerequisites: 68201 Physics 2; 91703 Physiological Systems; subject coordinator: Associate Professor L Holley*

This subject provides an introduction to the principles of operation and use of typical devices encountered in medical practice. Specific emphasis is given to various methods of transducing information from the body such as pressure, internal voltage signals, oximetry temperature. Principles of active stimulation of various organs such as heart, muscle and cochlear are also taught. Medical overview of the regulatory framework imaging modalities explored is also given.

### 91706

#### Neuroscience

*8cp; 6hpw; prerequisite: 91703 Physiological Systems; corequisite: 91707 Pharmacology 1; subject coordinator: Dr D Martin*

This subject provides an advanced understanding of the physiological basis of the nervous system. Physiology of excitable tissue. Structure, function and control of ion channels. Functions of the nervous system, with special reference to systems including complex reflex systems, control of posture and movement, cutaneous, deep and visceral sensation, central regulation of visceral function, vision, hearing and equilibrium, smell and taste, arousal mechanisms, sleep and electrical activity of the brain, autonomic nervous system, neural basis of instinctual behaviour and emotions. Higher functions of the nervous system. Neural nets and cybernetics. Case studies of disease states in the nervous system. Lecture material is complemented by practicals, tutorials and self-directed study modules. Emphasis on student presentation of case studies and seminars.

### 91707

#### Pharmacology I

*8cp; 6hpw (average); prerequisites: 91320 Biochemistry 2; 91703 Physiological Systems; corequisite: 91706 Neuroscience; subject coordinator: Dr G Nicholson*

This subject provides the introductory principles governing drug and xenobiotic action to be developed further in Pharmacology 2. It is designed to foster a problem-solving approach to pharmacology with particular emphasis on applying molecular pharmacology concepts to pathophysiological problems. Major objectives will be to develop the concepts of dose response relationships and the specificity of drug action. Therapeutic index and the concept of selective toxicity. Pharmacokinetic factors and their role in pharmacotherapy. Chemical neurotransmitters, ion channels and receptors as determinants of drug action in the central and peripheral nervous systems. Clinical efficacy of the major pharmacology drug classes used in the treatment of pathophysiological processes involving the cardiovascular, renal and nervous systems. Lectures are complemented by a tutorial/practical program which emphasises the clinical nature of the subject and develops lecture material using a variety of experimental, tutorial, computer-simulation and case-study approaches.

**91708****Psychophysiology**

*8cp; 6hpw; prerequisite: 91704 Behavioural Sciences; subject coordinator: Associate Professor A Craig*

This subject builds on material provided in Behavioural Sciences. It provides the student with a solid grasp of the relationship between mind and behaviour with emphasis upon the underlying physiological mechanisms. Implications for health are emphasised throughout the course. The unit will encourage the student to evaluate the connections believed to occur between attitudes, behaviour, lifestyle, physiology, and health outcome. Lectures are complemented by practical workshops and discussion in tutorials.

**91709****Pharmacology 2**

*8cp; 6hpw (average); prerequisite: 91707 Pharmacology 1; subject coordinator: Dr G Nicholson*

This subject develops and extends the principles governing drug and xenobiotic action covered in Pharmacology 1. Objectives are to further develop the concept of receptors as cellular determinants of drug and xenobiotic action and to develop the concepts of modulated receptors and ion channels in determining anaesthetic drug action. The clinical efficacy of the major pharmacology drug classes used in the treatment of diabetes and respiratory and musculoskeletal systems disorders. Endogenous opioids in pain control mechanisms and the interaction of opioid analgesics with these systems. Selective toxicity in the treatment of microbial, viral and protozoal infections. Toxicokinetic factors, defence mechanisms, cellular reactivity, receptors and binding sites as determinants of target organ toxicity. Drugs in the conception and birthing process. Carcinogens and teratogens. Specific classes of toxic substances. Lectures are complemented by a tutorial/practical program which emphasises the clinical nature of the subject and develops lecture material using a variety of experimental, tutorial, computer simulation and case-study approaches.

**91777****Master's Thesis  
(Biol and Biomed) F/T**

This research project can be undertaken only following negotiation by the student with a full-time member of academic staff in order to gain agreement to be individually supervised. It also requires special permission of the appropriate Head of Department and Associate Dean.

**91778****Master's Thesis  
(Biol and Biomed) P/T**

This research project can be undertaken only following negotiation by the student with a full-time member of academic staff in order to gain agreement to be individually supervised. It also requires special permission of the appropriate Head of Department and Associate Dean.

**91987****PhD Thesis  
(Biol and Biomed) P/T**

This research project can be undertaken only following negotiation by the student with a full-time member of academic staff in order to gain agreement to be individually supervised. It also requires special permission of the appropriate Head of Department and Associate Dean.

**91988****PhD Thesis  
(Biol and Biomed) F/T**

This research project can be undertaken only following negotiation by the student with a full-time member of academic staff in order to gain agreement to be individually supervised. It also requires special permission of the appropriate Head of Department and Associate Dean.

**91997****Professional Experience  
(Biol/Biom) F/T**

Part-time students employed full-time in an area relevant to their course, should enrol in this subject in every semester for which they are employed.

**Note:** While such enrolment will be listed on the academic record to indicate employment while studying, Professional Experience subjects do not incur a HECS liability.

**91999****Professional Experience  
(Biol/Biom) P/T**

All full-time students employed part-time in an area relevant to their course should enrol in this subject in **every** semester for which they are employed.

**Note:** While such enrolment will be listed on your academic record to indicate your employment while studying, Professional Experience subjects do not incur a HECS liability.

**98711****Coastal Resource Policy**

*4cp; 3hpw*

This introductory subject provides pointers to most aspects of the course, starting with a consideration of the definition of the coastal zone and coastal resources. Discusses regulatory frameworks, in Australia and overseas, and the roles of organisations involved in coastal resource management. The interdisciplinary nature of coastal resources problems, conflicts and issues will also be considered.

**98712****Estuarine and Coastal Chemistry**

*4cp; 3hpw*

Focuses on basic environmental chemistry of estuarine and ocean waters, and freshwater inputs from river systems. The significance of levels and changes in such parameters as pH, salinity, temperature, dissolved oxygen, stratification, turbidity and the presence of pollutants will be examined.

**98713****Hydraulics**

*4cp; 3hpw*

An introduction to physical processes in rivers, estuaries and marine waters. Stream flows, mixing patterns, generation processes of water waves and tides, and sediment-transport processes will be dealt with. The interactions of these processes with coastal engineering activities will be emphasised.

**98714****Introductory Coastal Geology**

*4cp; 3hpw*

Deals with geological materials, processes and depositional environments within the coastal zone. Implications of these resources for environmental and management strategy formulation will be explored.

**98715****Biological Resources and Assessment**

*8cp; 6hpw*

Strand A:  
(replaces 98904 Coastal Biological Resources)

Freshwater, estuarine and marine biological resources and their exploitation will be examined. Problems of productivity against a background of regulations will be studied, and the major management requirements for ecologically sustainable development of coastal resources will be addressed.

Strand B:  
(replaces 98905 Resource Management and Assessment)

Introduces methodologies of biological surveys, field measurement, sampling, analysis and assessment in coastal systems. The principles of baseline surveys, bio-monitoring, and impact assessment in systems such as mangroves, saltmarshes, seagrass beds, estuarine and lagoon waters and sediments, and marine systems will be developed.

**98716****Physical Geology of the Coastal Zone**

*4cp; 3hpw; corequisites: 98714 Introductory Coastal Geology or 98601 Coastal Geology; 98713 Hydraulics or 98401 Estuarine and Coastal Hydraulics; 98715 Biological Resources and Assessment or 98905 Resource Measurement and Assessment or equivalents*

The development of coastal systems through time will be considered. Topographic and bathymetric maps and their interpretation will be introduced. The nature and dynamics of sandy barrier coasts, coral reefs, cliff-dominated erosive coasts, and aggregates of mineral resources and their exploitation will be examined. Geological implications in coastal zone management and planning will be considered.

**98717****Coastal Resource Planning**

*8cp; 6hpw; prerequisite: 91479 Coastal Zone Law or 98701 Law and Coastal Resources*

Strand A:

(replaces 98202 Coastal Planning and Development)

The aims of planning will be analysed: functional, economic, social, environmental and aesthetic. The planning process in theory will be explored, and the reality of planning processes will be compared and contrasted with the theoretical models. Case studies from Australian coastal areas and overseas examples will be used.

Strand B:

(replaces 98906 Coastal Resource Management 2)

An overview will be given of the nature and sources of problems in coastal resource management. The complementary roles of technical and regulatory approaches will be compared. The balance of development and conservation will be explored with respect to policies relating to: public land; urban and industrial development; dunes, beaches, and mineral sands; estuaries, ports and marina developments; fisheries resources and products; hazard and risk assessment; and total catchment management.

**98718****Pollution Assessment**

*4cp; 3hpw*

Concentrates on the sources, impacts and control of pollutants on coastal systems. The ecological characteristics of natural and disturbed habitats will be compared. The ecological and public health impacts of pollution will be considered. The objectives, approaches, design and evaluation of monitoring programs will be studied, including remote sensing and other techniques. Oil spill fingerprinting and clean-up strategies will be introduced, and the role of regulatory and management agencies considered.

**98719****Recreation, Tourism and Natural Resource Management**

*4cp; 3hpw; corequisite: 98717 Coastal Resource Planning or 98906 Coastal Resource Management 2 or equivalent*

*Management 2 or equivalent*

Examines the management issues arising from the use of coastal areas for leisure. The Australian coast, particularly its natural areas, is a significant site for recreation and tourist activities. To ensure that these areas are managed sustainably, it is essential to consider the impacts and implications of this use for the natural coastal systems and to develop techniques that will allow this use to continue.

**98720****Integrated Coastal Resource Management**

*8cp; 6hpw; prerequisites: all first and second year subjects*

Strand A:

(replaces 98908 Integrated Environmental Assessment and Management)

As Integrated Environmental Assessment (IEA) and Integrated Environmental Management (IEM) require analysis of complex systems which cannot be undertaken from a single disciplinary base, this subject is for advanced students only. It synthesises the multidisciplinary content of the preceding modules through application to specific cases. Students will be required to think holistically; to undertake complex systems analysis; and to select and apply philosophies, concepts, methodologies and techniques appropriate to the particular problem. An IEA/IEM case study will be completed, with tight budgetary, time and performance requirements.

Strand B:

(replaces 98203 Coastal Management and Administration)

Deals with the human aspects of management for organisations that have some responsibility over coastal resources. It examines both internal matters, such as organisational structure and function, as well as external issues, such as conflict resolution and negotiation with other groups in the community. It recognises that coastal resource management goals can be achieved only by organisations which are themselves effectively managed, and which deal appropriately with external groups that have an impact on the achievement of these goals.

**98721****Coastal Resource Project***12cp; 8hpw*

Normally in their final semester, students will complete the requirements for the Master's degree by carrying out an individual coastal resource management research project, submitting a report, and giving an oral presentation of the work and its significance. The project may be in the form of laboratory or field investigations, a management review, a case study, or similar undertaking appropriate to the student's individual needs and interests.

**99502****Foundations of TCM***6cp; 5hpw; subject coordinator: Ms M Garvey*

The theoretical and philosophical components of the subject have a continuing and progressive application in all aspects of TCM. This subject provides a broad foundation for the traditional Chinese medical view of health, disease aetiology and diagnostic systems and principles of treatment which will be built upon throughout the training program. Pulse diagnosis, one of the cornerstones of the traditional Chinese diagnostic system, is included in this subject.

**99509****Special Points and Systems***5cp; 5hpw; prerequisites: all subjects of Stage 2; subject coordinator: Dr S P Zhang*

This subject examines the functions of categories of acupuncture points and the use of these points in various theoretical perspectives. In particular the six division, triple heater and four radical theories are studied in the context of disease progression through body levels. The eight extra and antique point systems provide additional perspectives from which to view health, illness and the flow of *qi*.

**99511****History and Philosophy of TCM***6cp; 6hpw; prerequisites: 99571 Chinese Diagnostic System; 99509 Special Points and Systems; corequisites: 99575 Advanced Chinese Diagnosis; subject coordinator: Associate Professor C Rogers*

This subject studies the theoretical structure of traditional Chinese medicine and its influence upon the holistic approach to healing and preventative therapy. It focuses on the classical literature of Chinese medicine and some of the more complex theories arising from it.

**99517****Project Workshops***3cp; 2hpw; prerequisite: 91607 Research Methods 1; corequisite: 91608 Research Methods 2; subject coordinator: Associate Professor C Rogers*

These workshops are designed to assist the student to bridge the gap between reflection on desirable areas of investigation and the submission of concrete projects. The workshops provide an atmosphere that encourages discussion and the sharpening of the students' focus on specific aims and objectives in essay writing. Mentoring groups are established that will guide the student through the development of his or her essay to its completion.

**99521****Clinical Acupuncture***5cp; 5hpw; prerequisites: all subjects of Stage 5; corequisites: all acupuncture subjects of Stage 6; subject coordinator: Mr W Cochran*

In the final year of training the student will be responsible for patient care, treatment and clinical management under the supervision of a practitioner. This subject prepares the student for this increased degree of clinical responsibility, as well as integrating material and skills previously studied.

**99527****Hospital Training in China**

*One month of hospital internship at Guangzhou University of Traditional Chinese Medicine, People's Republic of China (optional); 6cp (may be approved as fulfilling 50 per cent of cp requirement for 99538 Clinical Internship (A&M)); prerequisite: completion of coursework for the Bachelor of Health Science in Acupuncture*

Experiencing first-hand the full acceptance of acupuncture within the cultural and medical framework of China increases the self-confidence of the student. After an initial introduction and briefing period, students enter the affiliated hospital system of the College of Acupuncture under the direction of the doctor in charge of the acupuncture outpatients' department.

**99528****An Introduction to Tai Qi Chuan***3cp; 3hpw*

*Tai Qi Chuan* is one of the physical therapies of traditional Chinese medicine. This elective subject introduces basic forms of these rhythmic exercises which aim to increase health and wellbeing. Together *qi gong* and *tai qi* subjects provide a traditional method for maintaining health.

**99529****A Systems View of Life***3cp; 3hpw*

Concepts of traditional Chinese medicine that stem from a holistic world view differ from the fragmented and mechanistic view that has dominated European thought for the past 300 years. This elective subject offers an encompassing conceptual model for all sciences and a bridge between differing world views.

**99530****Philosophy, Religion and Culture***3cp; 3hpw; prerequisite: 99502 Foundations of TCM*

This elective subject widens the future practitioners' concepts of health and health care attitudes among their own cultural group and that of other cultural groups. Two societies are examined: multicultural Australia and modern China.

**99531****The Subtle Dimensions of Healing***3cp; 3hpw*

In the ancient texts acupuncture therapy was linked with a range of other factors bearing on health care, such as music and aroma. This elective introduces some of these areas which can subsequently be explored as personal interest determines. It contributes to professional competency by extending the student's ability to identify and work with interrelated dimensions of the healing process.

**99532****Social Crisis***3cp; 3hpw; prerequisite: 92167 Foundations of Helping and Caring*

This elective subject is designed to make the acupuncture student aware of the implications of various types of crisis situations they may encounter in practice, and the impact such events may have on patients and their families. This subject identifies community resources and informs the student of what happens after referral.

**99533****Acupuncture Health Politics in Australia***3cp; 3hpw*

As part of the elective program this subject widens understanding of attitudes and health care politics among various professional groups, including acupuncturists. Acupuncture has formed a part of the wide consumer and health care challenge to orthodox medicine, both in Australia and overseas, and future practitioners should understand the issues and the role of the acupuncture profession in this process.

**99535****Nutrition in a Traditional Chinese Medical Context***3cp; 3hpw*

This elective subject is designed to assist in the clinical practice of acupuncture in the Australian social setting by equipping the future practitioner with the necessary skills to advise patients on the appropriate use of vitamins, minerals, foods and diets. It builds on the concepts of food therapy that are a basic aspect of the concordances of traditional Chinese medicine.



**99536****First Aid**

*St John's Ambulance course or approved training organisation; Note: This subject does not carry academic credit.*

It is required that all students hold a current senior certificate in first aid, or equivalent qualification, before undertaking an internship in a clinic of the College of Acupuncture as a 'student-practitioner'.

**99537****Independent Research Project (Postgraduate)**

*7cp; prerequisites: 91607 Research Methods 1; 91608 Research Methods 2*

This is an area of self-directed study based on previous training, clinical experience and wide reading in acupuncture and allied subjects. The project provides the student with the opportunity to extend his/her knowledge through undertaking acupuncture research.

**99538****Clinical Internship (A&M)**

*12cp; 250 hours of supervised clinical practice and completion of 20 case histories; prerequisites: satisfactory completion of all Stage 1–6 subjects; subject coordinator: Mr C X Yang*

The student experiences the full range of practitioner responsibilities under the supervision of a clinical manager. This area of training is accomplished in the outpatient clinic of the College of Acupuncture which provides low-cost acupuncture services to the public.

**99539****Pathophysiology I (TCM)**

*6cp; 6hpw; prerequisite: 91602 Health Sciences 2; subject coordinator: Ms M Wilson*

The immune system and its role in resistance to disease. The main groups of micro-organisms which affect humans – their biology, concept of normal flora, opportunistic pathogens and compromised host. Epidemiology. Methods of limiting spread of micro-organisms and controlling infection. Alterations in endocrine function. Alterations in musculoskeletal function. Alterations in nutrition and metabolism. Alterations in motility, malabsorption. Alterations in function of the liver. Hepatitis. Alterations in gallbladder function. Diabetes; types, acute and chronic complications.

**99540****Pathophysiology 2 (TCM)**

*6cp; 6hpw; prerequisite: 99539 Pathophysiology I (TCM); subject coordinator: Ms J Wyndham*

Cellular homeostasis and normal and abnormal cellular growth and development. Diseases of blood. The major classes of cardiovascular disorders and their evolution from normal control mechanisms. The major respiratory disease processes and their relationship to normal respiratory function and defence mechanisms. The major urinogenital disorders of males and females including acute and chronic renal failure, prostatitis, dysmenorrhoea, disorders of menopause. The major types of fluid and electrolyte disturbances and their contribution to altered homeostasis. Selected nervous system disorders including epilepsy and Parkinson's disease. Basic principles of pharmacology with specific emphasis on drugs used in the treatment of cardiovascular, respiratory, renal and nervous system disorders. Principles of absorption, metabolism, distribution and excretion of drugs and how they relate to onset and duration of action. Mechanisms of action and side effects of therapeutic groups of drugs that affect organ systems. Principles of anaesthesia and analgesia. Interactions of drugs both beneficial and adverse. Problems of toxicity, tolerance and addiction.

**99543****Qi Gong: Its Use in Acupuncture**

*3cp; 3hpw*

*Qi gong* is an ancient aspect of health care in traditional Chinese medicine that is reemerging in China as a major part of the practitioner's own health care regime. This elective subject introduces *qi gong* breathing and concentration which calms the mind and aids in the restoration of health. The use of *qi gong* by the practitioner is also reputed to increase the effectiveness of *tuina* (Chinese massage).

**99544****Clinical Aspects of Acupuncture I**

*6cp; 3hpw*

Graduate students who enrol in this course do so after at least three years of training in traditional Chinese acupuncture. It is assumed that they have mastered the basic concepts of traditional acupuncture and in this, and similar acupuncture subjects, they are asked to

demonstrate their competence. The graduate student is therefore encouraged to contribute, as a professional acupuncture practitioner, to discussion through a seminar/workshop environment and to participate in scholarly debate on specified topics.

### 99545

#### **Clinical Aspects of Acupuncture 2**

*6cp; 3hpw*

As the student is already familiar with all the basic concepts of traditional acupuncture, this subject focuses upon the analysis of disease states and the critical evaluation of various treatment protocols. Students will present and analyse specified disease states and examine the value of differing approaches to treatment.

### 99546

#### **Clinical Review (Clinical Practice)**

*3cp; 3x2 contact hours – lecture/workshop; 30 clinical hours; prerequisites: 91609 Biomedical Sciences Upgrade; 99545 Clinical Aspects of Acupuncture 2; corequisite: 99584 Clinical Features of Disease*

This subject provides a practical review of competency in the responsible delivery of acupuncture services within a working clinical environment. To achieve this the graduate student assumes an internship role within the University's acupuncture clinic dealing directly with the public as an acupuncture practitioner.

### 99547

#### **Clinical Aspects of Acupuncture 3**

*6cp; 3hpw; prerequisites: 99544 Clinical Aspects of Acupuncture 1; 99545 Clinical Aspects of Acupuncture 2*

This is the final subject in a series of three seminar/workshop-based learning environments that explore the major areas of acupuncture therapeutics. It is expected that students will consolidate and extend their knowledge through the quality of individual contributions to the learning experience of the group, the stimulation of open debate, and the exchange of knowledge from various backgrounds and clinical frameworks.

### 99548

#### **Introduction to Traditional Acupuncture Theory**

*5cp; 3hpw*

This subject is designed to introduce biomedically trained health practitioners to some of the major theoretical foundations of acupuncture. It explains the traditional concept of *qi* (energy) and its interrelationship with the body in health and disease. The focus of the course is the acupuncture treatment of musculoskeletal disorders and sports injuries and therefore the emphasis of this subject is on the traditional Chinese medicine theories that underpin the acupuncture treatment of these disorders.

### 99549

#### **Point Location**

*4cp; 3hpw*

Accurate point location is an essential skill for competent acupuncture practice. Emphasis is given to those points that are of major importance in the delivery of musculoskeletal acupuncture therapy. Points will be examined in relation to their location, depth, action, special precautions and contra-indications. All classes are provided in a workshop environment.

### 99550

#### **Research Workshops I**

*3cp; 2hpw*

A critical examination of current research is an important aspect of all graduate studies. This course provides opportunities for students to evaluate several areas of recent investigation. This work is undertaken in an interactive workshop environment and opportunities are provided for students to develop and design their own research models which can be analysed and discussed in the light of a growing awareness of the neuro-humeral effects of acupuncture therapy.

### 99551

#### **The Chinese Medical Approach to Health and Disease**

*5cp; 3hpw; prerequisite: 99548 Introduction to Traditional Acupuncture Theory*

This subject provides the student with an understanding of the major causes and types of disease from the traditional Chinese viewpoint. It familiarises the future specialist

acupuncture practitioner with the overall objectives of treatment. The student also gains a knowledge of Chinese medical terminology that will assist them in wider reading.

### 99552

#### **The Chinese Model of Qi and its Pathways**

*4cp; 3hpw; prerequisite: 99548 Introduction to Traditional Acupuncture Theory*

The physiology of energy and its pathways extend the students' knowledge of the *jing luo* (channel) system in relation to the practice of musculoskeletal acupuncture and the enhancement of sporting performance. It not only provides an understanding of how to influence energy but, through an awareness of energy production, enables the practitioner to utilise methods of assisting athletic performance and recovery from injury.

### 99553

#### **Clinical Practice I**

*3cp; 3hpw; prerequisites: 99548 Introduction to Traditional Acupuncture Theory; 99549 Point Location; corequisites: 99551 The Chinese Medical Approach to Health and Disease; 99552 The Chinese Model of Qi and its Pathways*

Clinical experience gives an immediacy and a sense of purpose to specialised acupuncture education. It is provided to graduate students within the University's acupuncture clinics. These clinics are open to the public and are staffed by qualified practitioners assisted by students. Before entering the clinical environment students are provided with pre-clinical training to ensure that they are familiar with clinical requirements and regulations. Students will then take up the role of clinical assistant that enables them to gain valuable experience.

### 99554

#### **Acupuncture Diagnosis of Musculoskeletal Disorders**

*5cp; 3hpw; prerequisites: 99551 The Chinese Medical Approach to Health and Disease; 99552 The Chinese Model of Qi and its Pathways*

Correct diagnosis is an essential aspect of selecting appropriate treatment. These workshop sessions provide a hands-on approach to the diagnosis of musculoskeletal disorders according to the principles of traditional Chinese medicine. By this stage students will understand the theoretical basis

for the correct diagnosis of a number of musculoskeletal problems. Practice is provided in the traditional Chinese medical assessment of joint and soft tissue disorders, paralysis, sports injuries, rheumatic and arthritic conditions.

### 99555

#### **Therapeutic Techniques and Tuina (Chinese Massage)**

*4cp; 3hpw*

This component develops treatment skills by combining and applying the techniques of acupuncture, acupressure and *tuina*. This will enable the student to provide effective and safe therapeutic skills appropriate to their level of training as practitioners in their own clinics or under supervision in the University's outpatient clinics.

### 99556

#### **Research Workshops 2**

*3cp; 2hpw; prerequisite: 99550 Research Workshops 1*

This subject builds on the work undertaken in 99550 Research Workshop 1. The participating student, having acquired an understanding of the special needs of research in acupuncture, and some of the mechanisms implicated in the acupuncture effect, is at this stage required to design a small research proposal into an aspect of acupuncture. It is expected that the proposal will deal with an area of musculoskeletal therapy or sports medicine that could be a feasible area of research.

### 99557

#### **Acupuncture Treatment of Musculoskeletal Disorders**

*5cp; 3hpw; prerequisites: 99554 Acupuncture Diagnosis of Musculoskeletal Disorders; 99555 Therapeutic Techniques and Tuina*

This subject builds on the theoretical foundation of traditional acupuncture and the work undertaken in 99554 Acupuncture Diagnosis of Musculoskeletal Disorders. In that subject the student developed skills in evaluating the condition of the patient by integrating diagnostic information and proposing appropriate approaches to treatment. In this subject the student takes the process to the next stage and applies treatment under the supervision of the lecturer. This complements the role of the graduate student in 99559 Clinical Practice 2.

**99558****Acupuncture Microsystems***4cp; 3hpw; prerequisite: 99549 Point Location*

The special areas of acupuncture demonstrated and practised in this subject have wide application in the general practice of acupuncture as well as musculoskeletal areas. Microsystems are generally used to reinforce and enhance the action of body acupuncture but they may also be used as a system on their own, particularly in emergency situations such as the treatment of minor sports injuries. Much of the information contained in this subject is applicable in the areas of sports medicine and pain control.

**99559****Clinical Practice 2***3cp; 3hpw; prerequisite: 99553 Clinical Practice 1; corequisite: 99557 Acupuncture Treatment of Musculoskeletal Disorders*

This subject provides practical experience in the responsible delivery of acupuncture services within a working clinical environment. The student has experienced this environment as an assistant to a practitioner during the first part of the program. The graduate student now assumes an internship role within the University's acupuncture clinic as an acupuncturist, specialising in musculoskeletal acupuncture and acupuncture sports medicine.

**99560****Introduction to TCM***6cp; 5hpw; corequisite: 99557 Acupuncture Treatment of Musculoskeletal Disorders; subject coordinator: Associate Professor C Rogers*

An introduction to the basic theoretical concepts of traditional TCM that provides an overview of the program and helps to bridge the gap between the biomedical and traditional Chinese approach to health. The subject offers foundation knowledge and skills for the practice of TCM. It provides the traditional physiology of the 12 organs and 14 major channels.

**99561****Clinical Theory and Clinic – Level I (A&M)***3cp; workshop and clinical observation sessions: 2hpw; Clinical Assistant Level 1: 15 hours; corequisites: 99560 Introduction to TCM; 99502 Foundations of TCM; 99563 Health Sciences I (TCM); subject coordinator: Mr C XYang*

Approximately 20 per cent of the undergraduate training program is devoted to gaining clinical experience in preparation for becoming a qualified TCM practitioner. This subject prepares students for the role of clinical assistant and introduces them to the clinical environment.

**99562****Clinical Theory and Clinic – Level I (CHM)***3cp; workshop and clinical observation sessions: 2hpw; Clinical Assistant Level 1: 15 hours; corequisites: 99560 Introduction to TCM; 99502 Foundations of TCM; 99563 Health Sciences I (TCM); subject coordinator: Mr C XYang*

Approximately 20 per cent of the undergraduate training program is devoted to gaining clinical experience in preparation for becoming a qualified TCM practitioner. This subject prepares the student for the role of clinical assistant and introduces them to the clinical environment.

**99563****Health Sciences I***6cp; 6hpw; subject coordinator: MS J Wyndham*

This subject provides an introduction to the anatomy and physiology of the healthy human body. Lectures are complemented by an appropriate practical program. The subject includes the following: the levels of organisation in the body; basic anatomy, anatomical terms, surface anatomy and body regions and overview of major organ systems. Transport of materials across membranes, osmosis diffusion, active transport. The basic concepts of tissues and major organ systems. The general structure and functional significance of the major organ systems. Basic microbiology and aseptic techniques. Chromosomes, mitosis and meiosis, DNA, RNA. The structure, function and histology of the integumentary system, the musculoskeletal system, the gastrointestinal system, cardiovascular, lymphatic and renal systems. Nutrition, enzyme action indigestion.

**99564****The Physiology of Qi**

*4cp; 3hpw; prerequisites: 99560 Introduction to TCM; 99502 Foundations of TCM; subject coordinator: Dr S P Zhang*

This subject extends the students' knowledge of the *jing luo* (channel) system in relation to the clinical practice of acupuncture. It also provides an understanding, not only of how to balance energy, but of the mechanisms of energy production and methods of assisting this system of production – an important aspect of preventative therapy.

**99565****Point Location I  
(and Treatment Techniques)**

*6cp; practicals and tutorials: 4hpw; workshops: 14 hours; prerequisites: all subjects of Stage 1; corequisite: 99564 The Physiology of Qi; subject coordinator: Ms M Garvey*

This subject deals with the location, depth, action, special precautions and contra-indications, from both an anatomical and traditional acupuncture viewpoint, of the major acupuncture points that will be used in clinical practice. This module complements the knowledge of point function provided in Introduction to TCM and The Physiology of Qi. Practical experience is provided by the introduction of acupressure and basic treatment techniques.

**99566****Introduction to Botany**

*4cp; 3hpw; subject coordinator: to be advised*

In this subject the student is familiarised with the aspects of botany that are relevant to the practice of Chinese herbal medicine. This includes the identification of plants, and parts of plants, and familiarity with their growing requirements.

**99567****Introduction to  
Chinese Herbal Medicine**

*6cp; 6hpw; prerequisite: all subjects of Stage 1; corequisite: 99566 Introduction to Botany; subject coordinator: to be advised*

This subject provides introductory information about the basic properties and functions of Chinese herbs and forms an essential foundation for an understanding of Chinese herbal formulae.

**99568****Clinic – Level 2 (A&M)**

*4cp; Clinical Assistant Level 2: 15 hours; prerequisites: all subjects of Stage 1; corequisites: 99570 Health Sciences 2; 99564 The Physiology of Qi; subject coordinator: Mr C X Yang*

Clinical training is provided through the clinical program of the College of Acupuncture at the specialist TCM centre provided by the University. It is open to the general public.

**99569****Clinic – Level 2 (CHM)**

*4cp; Clinical Assistant Level 2: 15 hours; prerequisites: all subjects of Stage 1; corequisites: 99570 Health Sciences 2; 99567 Introduction to Chinese Herbal Medicine; 99566 Introduction to Botany; subject coordinator: to be advised*

Clinical training is provided through the clinical program of the College of Acupuncture at the specialist TCM centre provided by the University. It is open to the general public.

**99570****Health Sciences 2**

*6cp; 6hpw; prerequisites: 99563 Health Sciences 1; subject coordinator: Ms D Edwards*

This subject completes the survey of healthy human anatomy and physiology begun in Health Sciences 1. Specifically it examines the endocrine, nervous, reproductive and respiratory systems including concepts of control systems and system interactions within the body. It also completes an introduction to basic microbiological concepts of disease transmission, sterilisation and asepsis. This unit also examines chemical and physical concepts that underpin the bioscience component. These include chemical measurement, solutions, chemical reactions involving carbohydrates, lipids and proteins, pH and acid-base analysis along with the physical principles of gas pressure, temperature and flow, electricity and transmission of light and sound.

**99571****Chinese Diagnostic System**

*5cp; 5hpw; prerequisites: 99560 Introduction to TCM; 99502 Foundations of TCM; corequisite: 99509 Special Points and Systems; subject coordinator: Mr C Zaslowski*

This subject provides a deeper understanding of the objectives, application and therapeutic

conclusions inherent in the traditional Chinese diagnostic system. It provides practical workshops in advanced pulse diagnosis that complement the theoretical work being offered in Special Points and Systems.

### 99572

#### Chinese Herbal Formulae

*5cp; 5hpw; prerequisites: all TCM subjects of Stage 2; corequisite: 99571 Chinese Diagnostic System; subject coordinator: to be advised*

Chinese herbal medicine utilises herbal combinations to treat illness. In this subject the major herbal formulae are evaluated together with their appropriate application. Students are encouraged to discriminate between various treatment strategies.

### 99573

#### Clinic – Level 3 (A&M)

*4cp; Clinical Assistant Level 3: 20 hours; prerequisites: all subjects of Stage 2; corequisite: 99539 Pathophysiology 1 (TCM); 99571 Chinese Diagnostic System; 99509 Special Points and Systems; subject coordinator: Mr C X Yang*

Clinical training is continued through the College of Acupuncture.

### 99574

#### Clinic – Level 3 (CHM)

*4cp; Clinical Assistant Level 3: 20 hours; prerequisites: all subjects of Stage 2; corequisites: 99539 Pathophysiology 1 (TCM); 99571 Chinese Diagnostic System; 99572 Chinese Herbal Formulae; subject coordinator: to be advised*

Clinical training is continued through the College of Acupuncture.

### 99575

#### Advanced Chinese Diagnosis

*6cp; 6hpw; prerequisites: 99571 Chinese Diagnosis; corequisite: 99511 History and Philosophy of TCM; subject coordinator: Mr C Zaslowski*

This subject contributes a large component of the essential skills and knowledge that are required for traditional Chinese diagnosis. The subject and workshops underpin not only the clinical experiences of the student, but also the differentiation of disease states when biomedical and Chinese medical systems are integrated.

### 99576

#### Clinic – Level 4 (A&M) and Point Location 2

*6cp; Clinical Assistant Level 4: 35 hours; workshops: 2hpw; prerequisites: all subjects of Stage 3; corequisites: 99540 Pathophysiology 2 (TCM); 99511 History and Philosophy of TCM; 99575 Advanced Chinese Diagnosis; subject coordinator: Mr C X Yang*

This subject revisits and extends the students' knowledge of acupuncture point location as well as complementing the knowledge of point function provided in Advanced Chinese Diagnosis. Clinical training is continued through the clinical program of the College of Acupuncture.

### 99577

#### Clinic – Level 4 (CHM) and Chinese Herbal Practice

*6cp; Clinical Assistant Level 4: 35 hours; workshops: 2hpw; prerequisites: all subjects of Stage 3; corequisites: 99540 Pathophysiology 2 (TCM); 99511 History and Philosophy of TCM; 99575 Advanced Chinese Diagnosis; subject coordinator: to be advised*

This subject revisits and extends the students' knowledge of script writing of Chinese herbal formulae. Clinical training is continued through the clinical program of the College of Acupuncture.

### 99578

#### Microsystems

*6cp; 5hpw; prerequisite: 99575 Advanced Chinese Diagnosis; corequisite: 99582 Clinic – Level 5 (A&M) and Advanced Treatment Techniques; subject coordinator: Mr C X Yang*

The theoretical information provided by this subject is applied and practised in the subject workshops on Advanced Treatment Techniques. Much of the information contained in this subject is applicable to the treatment of sports injuries, pain control and paralysis.

**99579****Chinese Massage (Tuina)**

*6cp; workshops and clinical internship 4 x 14 hours (over 2 semesters); prerequisites: all subjects of Stage 4; subject coordinator: Associate Professor C Rogers*

The subject combines the acupressure techniques with general Chinese massage (*tuina*) techniques. It enables the student to assist the practitioner in the clinical situation where specific massage is required after the removal of needles to increase the effectiveness of acupuncture treatment.

**99580****Pharmacognosy**

*6cp; 5hpw; prerequisites: 99572 Chinese Herbal Formulae; 99540 Pathophysiology 2 (TCM); subject coordinator: to be advised*

The student now has an understanding of basic chemistry and Western pharmacology. This subject relates that material to the specific area of Chinese herbs, examining the action of the active constituents of herbs, the toxicity of certain formulae and their synergistic effects in medicinal use.

**99581****Chinese Herbal Medicine I**

*6cp; 6hpw; prerequisites: all acupuncture subjects of Stage 4; subject coordinator: to be advised*

Chinese herbal medicine involves the diagnosis of specific disorders, and the discrimination of variations within these diagnosed disorders. Students are trained in the selection and formulation of individual herbal prescriptions appropriate to the patient's individual presenting symptoms. This subject provides the student with practice in analysing the presentation of various disorders, especially pulmonary and gastrointestinal conditions.

**99582****Clinic – Level 5 (A&M) and Advanced Treatment Techniques**

*6cp; Clinical Assistant Level 5: 35 hours; workshop: 2hpw; prerequisites: all subjects of Stage 4; corequisites: 99579 Chinese Massage (Tuina); 99578 Microsystems; 99584 Clinical Features of Disease; subject coordinator: Mr C X Yang*

This subject provides practical experience in the application of information provided in Microsystems and serves to integrate theory

and develop advanced clinical skills. Clinical training continued through the clinical program of the College of Acupuncture.

**99583****Clinic – Level 5 (CHM) and Chinese Herbal Practice**

*6cp; Clinical Assistant Level 5: 35 hours; workshop: 2hpw; prerequisites: all subjects of Stage 4; corequisites: 99580 Pharmacognosy; 99584 Clinical Features of Disease; subject coordinator: to be advised*

This subject extends the students' ability to dispense Chinese herbs within the clinical setting. Clinical training is continued through the clinical program of the College of Acupuncture.

**99584****Clinical Features of Disease**

*6cp; 4hpw; prerequisite: 99540 Pathophysiology 2 (TCM); subject coordinator: Associate Professor C Rogers*

This subject builds on the theoretical material offered in Health Science 1 & 2. It also develops the students' ability to differentiate, in an acupuncture clinical setting, those conditions that should be referred to a medical practitioner or other health care professional.

**99585****Disease States**

*6cp; 6hpw; prerequisites: all acupuncture subjects of Stage 5; subject coordinator: Ms M Garvey*

The subject moves its emphasis from the 'learning' of acupuncture to the clinical practice of acupuncture. After determining that acupuncture is appropriate to the patient's condition, the student must then differentiate the pattern of disharmony as identified in Traditional Chinese Medicine, decide on the treatment principle and devise a course of treatment. Some of the conditions examined may include: paralysis (*wei* syndrome); neurological disorders; lumbar and back pain; disorders of neck and shoulders; musculoskeletal disorders, arthritis and rheumatism (*bi* syndrome), and sports enhancement.

**99586****Chinese Herbal Medicine 2**

*6cp; 6hpw; prerequisites: all acupuncture subjects of Stage 5; subject coordinator: to be advised*

Chinese herbal medicine involves the diagnosis of specific disorders, and the discrimination of variations within these diagnosed disorders. This subject builds on the work undertaken in Chinese Herbal Medicine 1.

**99587****Clinical Chinese Herbalism**

*5cp; 5hpw; prerequisites: all subjects of Stage 5; subject coordinator: to be advised*

In the final year of training the student will be responsible for patient care, treatment and clinical management under the supervision of a practitioner. This subject prepares the student for this increased degree of clinical responsibility, as well as integrating material and skills previously studied. It emphasises diagnosis and treatment in the four main TCM specialist areas of gynaecology, dermatology, traumatology and paediatrics.

**99588****Clinical Theory and Clinic – Level 6 (A&M)**

*6cp; workshops and planning sessions: 2hpw; Clinical Assistant Level 6: 35 hours; prerequisites: all subjects of Stage 5; subject coordinator: Mr C X Yang*

This module builds on the first three years of theoretical, practical and clinical training and acquaints the student with skills and duties required by a 'student-practitioner' working in the University's outpatient clinic. Clinical training is continued through the clinical program of the College of Acupuncture.

**99589****Clinical Theory and Clinic – Level 6 (CHM)**

*6cp; workshops and planning sessions: 2hpw; Clinical Assistant Level 6: 35 hours; prerequisites: all subjects of Stage 5; corequisites: 99586 Chinese Herbal Medicine 2; 99587 Clinical Chinese Herbalism; subject coordinator: Mr C Zaslowski*

This module builds on the first three years of theoretical, practical and clinical training and acquaints the student with skills and duties required by a 'student-practitioner' working in the University's outpatient clinic. Clinical

training is continued through the clinical program of the College of Acupuncture.

**99590****Special Topics in TCM (Intermodal and Professional)**

*8cp; 6hpw; prerequisites: 99585 Disease States; subject coordinator: Mr Z Shiping*

This subject acquaints the student with the current requirements of private TCM practice. Workshops are provided in: current research, bioethics and professional issues. This subject also encourages students to see themselves as part of the wider health care community. Intermodality exchange is encouraged by lectures from visiting specialists in areas such as osteopathy, physiotherapy and veterinary acupuncture.

**99592****Clinical Internship (CHM)**

*12cp; 250 hours of supervised clinical practice and completion of 20 case histories; prerequisites: satisfactory completion of all Stage 1–6 course subjects; subject coordinator: Mr Y Congxing*

The student experiences the full range of practitioner responsibilities under the supervision of a clinical manager. This area of training is accomplished in the outpatient clinics of the College of Acupuncture which provide low-cost TCM services to the public.

**99593****Honours Project**

*48cp (over 2 semesters); prerequisites: 91608 Research Methods 2, 99517 Project Workshops*

This is an area of self-determined study. The Honours research project provides the student with the opportunity to extend their knowledge under the guidance of a suitably qualified member of academic staff and to establish a foundation for the development of their professional research and research reporting skills.



## SUBJECTS OFFERED FOR FACULTY OF NURSING STUDENTS

### 91518

#### Physiological Foundations of Health I

*6cp; Bioscience component 4hpw; Physical Science component 2hpw; subject coordinator: Ms D Edwards*

This subject introduces students to anatomy and physiology, levels of organisation and homeostasis. The subject covers the following topics: integumentary system – skin structure and function, specific and non-specific defence mechanisms, wound healing; introductory microbiology – transmission of micro-organisms, aseptic technique; the musculoskeletal system – bone structure, organisation of the axial and appendicular skeleton, joints, muscular system, muscle tissues, principal skeletal muscles, muscles and movement; the gastrointestinal system – anatomy and histology of the gastrointestinal tract, digestion and its control, absorption of nutrients; the hepatic portal system – the structure of the liver and its role in metabolism, fluid balance in the tissues; the cardiovascular system – structure of blood vessels and their distribution, heart function, blood pressure; the renal system – gross anatomy and histology of the kidney, waste product elimination, ultrafiltration and urine production, water and electrolytic balance; measurement – scientific notation and basic mathematics; electricity – static electricity, electric currents, magnetism, applications of electricity in the hospital and electrical safety; heat and temperature – heat transfer and temperature regulation of the body, fluids; the building blocks of life – molecular and ionic compounds; ions in the body – electrolytes, acids, bases and salts; how atoms join together to form molecules – obeying the rules of valence, polar and non-polar bonds, forces of attraction between molecules; hydrocarbons and lipids and the structure of lipid bilayers; biologically important families of carbon compounds; and chemical reactions in digestion and excretion.

### 91519

#### Physiological Foundations of Health 2

*6cp; Bioscience component 4hpw; Physical Science component 2hpw; subject coordinator: Ms M Wilson*

This subject covers the following topics: the endocrine system – the major endocrine glands and their hormones, feedback control of hormones, hormone disorder; reproductive systems and development – anatomy of male and female reproductive systems, mitosis and meiosis, formation of gametes and fertilisation, hormones and the female reproductive cycle, pregnancy, an overview of embryonic and foetal development including development of major organ systems; the nerve cell – the nerve impulse and its propagation, synaptic transmission; nervous system organisation – the peripheral and autonomic nervous system, the segmental nature of the spinal cord, spinal and autonomic reflexes; the cranial nerves – introduction to main functional areas of the brain; voluntary movement – the neural pathway, light and sound; quantities of chemical substances – moles solutions and their concentrations, osmosis; the chemical basis for respiration and acid/base balance – chemical equilibrium, with acids and bases, pH and buffers, acidosis and alkalosis, and gases; respiratory system – gross and fine anatomy, mechanism of breathing, gas exchange and gas transport, role of haemoglobin, and oxygen dissociation curves.

### 91520

#### Pathophysiology I

*6cp; 6hpw; subject coordinator: Ms M Wilson*

This subject covers the following topics: the immune system and its role in resistance to disease; the main groups of micro-organisms which affect humans – their biology, concept of normal flora, opportunistic pathogens and compromised host; methods of limiting the spread of micro-organisms and controlling infection, including sanitation, sterilisation, disinfection, asepsis; and the use of specific nursing precautions and isolation procedures; the collection and transport of microbiological specimens; pathogenesis of specific common and/or serious infectious diseases; diseases acquired via the gastrointestinal tract, the urinary tract, the respiratory tract and the genital tract; diseases acquired parenterally either via trauma, insect bite or hospital procedures; alterations in nutrition and metabolism; alterations in motility,

malabsorption; alterations in the function of the liver, hepatitis; alterations in gallbladder function; diabetes – types, acute and chronic complications; and alterations in nervous system function.

**91521**

**Pathophysiology 2**

*6cp; 6hpw; subject coordinator: Ms J Wyndham*

This subject covers the following topics: cellular homeostasis and normal and abnormal cellular growth and development, and diseases of the blood; the major classes of cardiovascular disorders and their evolution from normal control mechanisms; the major respiratory disease processes and their relationship to normal respiratory function and defence mechanisms; the major renal disorders including acute and chronic renal failure; the major types of fluid and electrolyte disturbances and their contribution to altered homeostasis; basic principles of pharmacology with specific emphasis on drugs used in the treatment of cardiovascular, respiratory, renal and nervous system disorders; principles of absorption, metabolism, distribution and excretion of drugs and how they relate to onset and duration of action; mechanisms of action and side effects of therapeutic groups of drugs that affect organ systems; principles of anaesthesia and analgesia; interactions of drugs both beneficial and adverse; and problems of toxicity, tolerance and addiction.

**SUBJECTS OFFERED BY OTHER FACULTIES**

Various general studies elective subjects available from other faculties are listed below. Further details are available from other faculty handbooks, or from the Information Office in each faculty.

**023001**

**Psychology of Secondary Students**

*Offered by the Faculty of Education  
3cp; 3hpw*

The aim of this subject is to provide students with the following: an understanding of the principles and patterns of human growth and development in the secondary school years; a knowledge of types of learning and their interaction with teaching approaches and strategies; and a knowledge of effective ways of interacting with students.

**023002**

**Meeting Special Needs in the Secondary School**

*Offered by the Faculty of Education  
3cp; 4hpw*

The aim of this subject is to provide students with effective ways of interacting with students; with strategies for identifying students with learning or behavioural difficulties; knowledge of how secondary school teachers can meet the challenges presented by students with special needs, including those with learning or behavioural difficulties, and gifted and talented students; and an understanding of the educational issues relevant to the use of alternative curricula and learning contexts, including alternate pathways in post-compulsory education.

**023502**

**Social Bases of Education**

*Offered by the Faculty of Education  
4cp; 2hpw*

Enables students to appreciate the nature of social relationships in the school and how these affect teacher and student behaviour; understand the education system in New South Wales and the role of the Federal Government in education; understand how social characteristics influence the educational outcomes of certain social groups; understand the part that the socialisation process plays in shaping educational outcomes; identify and

evaluate government and school policies and programs designed to address existing inequalities of opportunity and outcome; and study the implications of these for change in schools, the direction of social change, and the interaction between schools and society in this context.

**023191****Secondary Practicum 1**

*Offered by the Faculty of Education  
12cp; 4hpw plus practical experience*

This subject introduces students to professional practice in the secondary school by drawing together the theory and practice necessary for an effective educational practitioner. It enables students to address skills, understandings, procedures and policy issues that are essential to effective professional practice by all teachers in present-day secondary schools and assists them to combine the knowledge and insights which are provided by all the other subjects which they undertake in the program.

**023192****Secondary Practicum 2**

*Offered by the Faculty of Education  
12cp; 3hpw plus practical experience*

This subject prepares students for implementing current developments in learning and teaching by addressing a range of policy issues and their implications for professional practice in the school. An emphasis is also placed on the development of professional commitment and its implications for lifelong learning. Further integration of theory and practice occurs as students engage in and reflect upon their school-based practice.

**028001****Learning in Science 1**

*Offered by the Faculty of Education  
7cp; 8hpw*

This subject aims to develop the craft of teaching science while blending professional skill with suitable academic insights. The students will develop a range of approaches and strategies to use in the classroom and laboratory which reflect research findings in science education. They will develop a philosophy of teaching science consistent with current syllabuses and policies and demonstrate understanding of the professional insights and demands of the practising science teacher.

**028002****Learning in Science 2**

*Offered by the Faculty of Education  
7cp; 8hpw*

This subject aims to prepare proficient beginning teachers in science. It is intended as a foundation for continuing professional development. On completion of this subject students will competently apply their educational studies to the teaching of science; be able to design, organise and evaluate methods and materials for science teaching; and have a theoretical framework on which to base their future careers in science teaching.

**21139****Business Organisation**

*Offered by the Faculty of Business  
2cp; 2hpw*

Examines the various types of private sector business in Australia and studies the manner in which these businesses are managed. Develops decision-making, problem-solving and planning skills.

**31870****Introduction to Microcomputers**

*Offered by the Faculty of Mathematical and  
Computing Sciences  
2cp; 2hpw*

Structure and use of computers, including the use of software packages; hardware and software; operating systems (MS-DOS); file management; spreadsheets, word processing and databases.

**31871****Computing for Science**

*Offered by the Faculty of Mathematical and  
Computing Sciences  
3cp; 3hpw; prerequisites: 31870 Introduction to  
Microcomputers; 33170 Basic Science  
Mathematics*

Structured programming. Elements of FORTRAN: variables, control structures and formatting. File handling in FORTRAN. Subroutines and functions; array structures; applications to numerical analysis and problems from the physical sciences.

**33101****Mathematics I (Life Sciences)**

*Offered by the Faculty of Mathematical and Computing Sciences*  
3cp; 3hpw

Aspects of measurement; sequences and series; convergence and limits; graphical representation of functions; sigmoid curve; differentiation; integration; elementary differential equations; periodic functions. All topics are illustrated by problems relevant to biology.

**33103****Statistics for Life Sciences**

*Offered by the Faculty of Mathematical and Computing Sciences*  
3cp; 3hpw

Descriptive statistics; measures of central tendency and dispersion; probability; discrete distributions including binomial, Poisson; continuous distributions including uniform, Normal; simple random sampling; standard tests of significance and estimation for population means and variances; goodness-of-fit tests.

**33105****Introductory Biometrics**

*Offered by the Faculty of Mathematical and Computing Sciences*  
3cp; 3hpw; prerequisite: 33103 Statistics for Life Sciences

Design and analysis of biological experiments; completely randomised design; randomised block design; regression analysis and correlation; multiple and polynomial regression; Latin square design; two factor designs with interaction; analysis of covariance distribution free tests.

**33120****Engineering Mathematics I**

*Offered by the Faculty of Mathematical and Computing Sciences*  
6cp; 6hpw

Presents basic aspects of calculus to engineering students. On completion of the subject, students should have a knowledge of the following topics: matrices and determinants; vectors; limits; continuity and differentiation; applications of differentiation; integration and applications; elementary functions; methods of integration; sequences, series and complex numbers.

**33121****Engineering Mathematics IA**

*Offered by the Faculty of Mathematical and Computing Sciences*  
3cp; 3hpw

Presents basic aspects of calculus to engineering students. On completion of the subject, students should have a knowledge of the following topics: matrices and determinants; vectors; limits; continuity and differentiation; applications of differentiation.

**33170****Basic Science Mathematics**

*Offered by the Faculty of Mathematical and Computing Sciences*  
3cp; 3hpw

Basic mathematics for scientists. Quadratic and linear equations. Functions; limits; continuity; derivatives. Trigonometric functions. Introduction to integral calculus.

**33171****Science Mathematics I**

*Offered by the Faculty of Mathematical and Computing Sciences*  
4cp; 4hpw; prerequisite: 33170 Basic Science Mathematics or 70/100 2-unit HSC Mathematics or 100/150 3-unit HSC Mathematics or permission

A subject which develops the essential mathematical tools used in the physical sciences. Determinants and matrices; differentiation; trigonometric functions; implicit differentiation; integration; the natural logarithm and exponentials; inverse trigonometric functions; sequences and series; complex numbers.

**33172****Science Mathematics 2**

*Offered by the Faculty of Mathematical and Computing Sciences*  
3cp; 3hpw; prerequisite: 33171 Science Mathematics I

An introduction to areas of application of differential and integral calculus in the physical sciences. Applications of differentiation; maximising functions; Newton's method for finding roots. Applications of integration; areas, volumes, mass centres, arc lengths. Techniques for integrating; integration by parts; use of trigonometric identities; partial fractions.

Functions of many variables; partial differentiation; chain rule. Variable separable differential equations; applications.

### 33173

#### Science Mathematics 3

*Offered by the Faculty of Mathematical and Computing Sciences*

*3cp; 3hpw; prerequisite: 33171 Science*

*Mathematics 1; corequisite: 33172 Science*

*Mathematics 2*

Mathematical techniques for the physical sciences. Matrices; inverse; eigenvalues and eigenvectors. Three-dimensional coordinate geometry; vectors. Hyperbolic and inverse hyperbolic functions. Linear and exact first order differential equations. Infinite sequences and series.

### 33221

#### Engineering Mathematics 2A

*Offered by the Faculty of Mathematical and Computing Sciences*

*3cp; 3hpw; prerequisites: 33172 Science*

*Mathematics 2; 33173 Science Mathematics 3*

Functions of several variables. Limits and continuity. Partial derivatives. Chain rule. Gradient. Differentials. Maxima and minima. Lagrange multipliers. Least squares. Double integrals in Cartesian coordinates. Repeated integrals. Application to areas and volumes. Jacobians. Use of polar coordinates. Centre of mass and moment of inertia of plates. Triple integrals in Cartesian coordinates. Repeated integrals. Spherical and cylindrical coordinates. Quadric surface. Applications to volume, centre of mass. Moment of inertia, surface area. Differential equations. First order variables separate and linear equations. Higher order linear equations. Homogenous constant coefficient linear equations. Methods of undetermined coefficients.

### 33330

#### Physical Mathematics

*Offered by the Faculty of Mathematical and Computing Sciences*

*3cp; 3hpw; prerequisite: 33221 Engineering*

*Mathematics 2A*

Vector calculus: vector fields, line and surface integrals, conservative fields, Green's theorem, divergence and curl, Gauss's theorem and the equation of continuity, Stokes's theorem and circulation. ODEs: series solutions of linear equations with non-constant coefficients,

Legendre's and Bessel's equations and functions. Boundary value problems: one-dimensional heat and wave equations, separation of variables Fourier sine and cosine series, vibrating circular membrane. Fourier analysis: introduction to Fourier integral, the triangle, sign step, delta and sinc functions.

### 46110

#### Mechanics I

*Offered by the Faculty of Engineering*

*6cp; 4.5hpw*

An introduction to the principles of Newtonian mechanics, applied to planar motion. The behaviour of non-rotating bodies is analysed through an explicit investigation of Newton's three laws of motion, extending to energy and momentum methods. This subject lays the foundation for more advanced work in mechanics in succeeding subjects. Through both discussion and selected exercises, students are also introduced to professional methods of dealing with engineering problems.

### 47117

#### Statics

*Offered by the Faculty of Engineering*

*4cp; 3hpw*

Provides students with the fundamental concepts of statics and the application of the basic principles of statics to solving engineering mechanics problems. Much emphasis in the course will be placed on the concepts of free body diagrams and equilibrium of the free body. At the end of the course students should be able to confidently apply these basic principles to solve statically determinate problems involving non-deformable bodies.

### 47127

#### Mechanics of Solids I

*Offered by the Faculty of Engineering*

*4cp; 3hpw; prerequisite: 47117 Static*

Aims to develop an understanding of the behaviour of deformable solids responding to loads, deformations and temperature changes, leading to analysis of structure and machine elements utilising established principles. The subject emphasises the use of fundamental techniques for formulating and solving problems in the mechanics of deformable solids based on equilibrium and compatibility relationships and material properties. The

subject will provide the required knowledge necessary for understanding more advanced topics in 47137 Mechanics of Solids 2 and the underlying principles in structural analysis as well as design subjects.

### 51368

#### Written and Oral Reporting

*Offered by the Faculty of Humanities and Social Sciences*

*2cp; 2hpw*

This is a seminar course which focuses on the written and oral presentation of scientific and technical information in workplace settings for professionals in science-based disciplines. Areas covered include the qualities of scientific and technical writing, the tools of technical communication, oral presentation of science-based information, and effective workplace skills in communication.

### 51389

#### Professional Writing and Communication

*Offered by the Faculty of Humanities and Social Sciences*

*3cp; 2hpw*

This is a practical workshop course designed to help students in health sciences improve their skills in written and speech communication. The course covers the variety of forms of written and oral communication required in health care settings and emphasises specific skills in the writing of essays and reports. Students will also develop their understanding of communication principles and processes.

### 79990

#### Legal System

*Offered by the Faculty of Law*

*4cp; 2hpw; subject coordinator: Mr M Adams*

This subject will provide the student of forensic science with an understanding of the law and legal system.

### 79991

#### Forensic Science Case Study

*Offered by the Faculty of Law*

*6cp; 3hpw; prerequisites: all Stage 6 subjects;*

*subject coordinator: Mr M Adams*

Students will receive training in the preparation of reports and in the presentation of evidence in court. A substantial component of this subject is a Moot Court.

### 92167

#### Foundations of Helping and Caring

*Offered by the Faculty of Nursing*

*4cp; 4hpw*

Part 1: Interpersonal and Counselling Skills; Part 2: Theoretical Foundations of Psychological Health; Part 3: Human Responses to Health and Illness

This subject will provide an understanding of Western models of health care with a particular focus on the psycho-social components contributing to health and disease. It facilitates the development of essential interpersonal skills required for the practice of acupuncture and a helping role.

### 99591

#### Practice Management

*Offered by the Faculty of Business*

*4cp; 3hpw*

This subject emphasises the need for proper planning in the management of a small business. Issues such as professionalism, location, record-keeping, taxation, insurance, advertising, multidiscipline practices and legal requirements are examined.

# Alphabetical list of subjects

Acupuncture Diagnosis of Musculoskeletal Disorders	99554	Applied Optics S	68732
Acupuncture Health Politics in Australia	99533	Applied Organic Chemistry 2 (Advanced)	65702
Acupuncture Microsystems	99558	Applied Organic Chemistry 2 (Advanced)	65752
Acupuncture Treatment of Musculoskeletal Disorders	99557	Applied Physics 1	68312
Advanced Bioinstrumentation	91437	Applied Physics 2	68412
Advanced Chinese Diagnosis	99575	Applied Physics (Materials)	68071
Advanced Electron Microscopy Techniques	68557	Applied Thermodynamics	68603
Advanced Engineering Geology	66607	Applied Thermodynamics S	68763
Advanced Fossil Fuels	66605	Approved External Subject	68943
Advanced Geological Mapping	66506	Approved External Subject	68946
Advanced Materials and Characterisation	67652	Aquatic Ecology	91364
Advanced Mathematics in the Life Sciences	91436	Australian Biota	91309
Advanced Petrology	66502	Australian Soils	91308
Advanced Petrology (Honours)	66552	Basic Science Mathematics	33170
Advanced Programming – Life Sciences	91465	Basin Analysis	66405
Advanced Solid-state Physics	68655	Behavioural Sciences	91704
Advanced Structural Geology	66505	Bioassays/Toxicological Testing	91473
Advanced Structural Geology (Honours)	66551	Biochemical and Analytical Toxicology	91471
Advanced X-ray Techniques	68556	Biochemical Pathophysiology	91411
Analytical Biochemistry	91326	Biochemistry 1	91313
Analytical Biochemistry Project 1	91414	Biochemistry 2	91320
Analytical Biochemistry Project 2	91415	Biocomputing	91395
Analytical Chemistry 1	65401	Bioelectronics	91405
Analytical Chemistry 2	65501	Bioinstrumentation and Physiological Systems	91316
Analytical Chemistry 2 (Advanced)	65551	Biological Hazards and Toxicology	69324
Analytical Techniques in Biochemistry	91426	Biological Resources and Assessment	98715
Anatomical Pathology	91354	Biology 1	91311
Animal Ecophysiology	91363	Biology 1 (SL)	91389
Applied and Environmental Microbiology	91369	Biology 2	91312
Applied Clastic Basin Analysis (Honours)	66653	Biology 2 (SL)	91390
Applied Mechanics	68402	Biomedical Science Upgrade	91609
Applied Mechanics S	68742	Biomedical Sciences 1	91412
Applied Mycology	91373	Biomedical Sciences 2	91413
Applied Optics	68302	Biomonitoring	91315
		Bioprocessing	91368
		Biosensors and Transducers	91438
		Biostatistics	91433
		Biosystems	91493
		Business Organisation	21139
		Case Studies in Clinical Biochemistry	91419

Ceramics 3 (Honours)	67553	Clinical Internship (A&M)	99538
Chemical Process Control	65502	Clinical Internship (CHM)	99592
Chemical Safety	65504	Clinical Laboratory Management	91417
Chemical Safety (OHS)	69332	Clinical Practice 1	99553
Chemical Thermodynamics	65404	Clinical Practice 2	99559
Chemistry 1 (Life Sciences)	65012	Clinical Review (Clinical Practice)	99546
Chemistry 1 F/T	65011	Clinical Theory and Clinic – Level 1 (A&M)	99561
Chemistry 1 (SL)	65013	Clinical Theory and Clinic – Level 1 (CHM)	99562
Chemistry 1M	65101	Clinical Theory and Clinic – Level 6 (A&M)	99588
Chemistry 2 (Life Sciences)	65022	Clinical Theory and Clinic – Level 6 (CHM)	99589
Chemistry 2 F/T	65021	Coastal Resource Planning	98717
Chemistry 2 (SL)	65025	Coastal Resource Policy	98711
Chemistry 2M	65201	Coastal Resource Project	98721
Chinese Diagnostic System	99571	Coastal Zone Law	91479
Chinese Herbal Formulae	99572	Communication in Industry	51390
Chinese Herbal Medicine 1	99581	Communication Physics	68035
Chinese Herbal Medicine 2	99586	Community and Population Ecology	91307
Chinese Massage ( <i>Tuina</i> )	99579	Composites	67507
Chinese Medical Approach to Health and Disease, The	99551	Computational Physics	68406
Chinese Model of <i>Qi</i> and its Pathways, The	99552	Computer Modelling of Physical Systems	68553
Clinic – Level 2 (A&M)	99568	Computing for Groundwater Specialists	49550
Clinic – Level 2 (CHM)	99569	Computing for Science	31871
Clinic – Level 3 (A&M)	99573	Concepts in Biochemistry	91319
Clinic – Level 3 (CHM)	99574	Concepts in Biology	91388
Clinic – Level 4 (A&M) and Point Location 2	99576	Concepts in Environmental Science	91380
Clinic – Level 4 (CHM) and Chinese Herbal Practice	99577	Conceptual Models of Ore Deposits (Honours)	66652
Clinic – Level 5 (A&M) and Advanced Treatment Techniques	99582	Contaminated Site Management	66025
Clinic – Level 5 (CHM) and Chinese Herbal Practice	99583	Convergent Margin Tectonics (Honours)	66651
Clinical Acupuncture	99521	Coordination and Organometallic Chemistry	65704
Clinical Aspects of Acupuncture 1	99544	Coordination and Organometallic Chemistry (Advanced)	65754
Clinical Aspects of Acupuncture 2	99545	Corrosion and Degradation of Materials	67606
Clinical Aspects of Acupuncture 3	99547	Corrosion Science	65705
Clinical Bacteriology	91338	Corrosion Technology for Engineers	65071
Clinical Biochemistry – Advanced Aspects A	91423	Current Topics in Medical Microbiology	91481
Clinical Biochemistry – Advanced Aspects B	91424	Current Urban and Environmental Issues A	91280
Clinical Biochemistry 1	91344		
Clinical Biochemistry 2	91345		
Clinical Chinese Herbalism	99587		
Clinical Features of Disease	99584		



## 168 ALPHABETICAL LIST OF SUBJECTS

Current Urban and Environmental Issues B	91281	Environmental Management Procedures	91327
Current Urban and Environmental Issues C	91282	Environmental Measurement	91376
Cytopathology	91377	Environmental Microbiology	91328
Data Analysis in Occupational Health and Safety	69325	Environmental Microbiology for Engineers	91651
Design and Selection of Materials	67605	Environmental Science for Engineers	91379
Device Physics	68652	Environmental Toxicology	91324
Digital Processing of Signals and Images in Medicine	91462	Environmental Toxicology Project F/T	91476
Disease States	99585	Environmental Toxicology Project P/T	91475
Earth Science 1	66011	Epidemiology and Disease Control	91480
Earth Science 1M	66101	Estuarine and Coastal Chemistry	98712
Earth Science 1 (SL)	66013	Eukaryotic Microbiology	91352
Earth Systems and the Environment	66062	Evaluating Occupational Health and Safety (Construction Industry)	69336
Ecological Modelling	91318	Experimental Design and Methods	91440
Ecological Sampling	91329	Experimental Design in Ecology	91303
Economic Geology	66403	Exploration and Mining Geology	66601
Economics of Coastal Resources	91478	Exploration Geochemistry	66504
Electrical Engineering 1 (Mechanical)	68012	Exploration Geophysics	66406
Electrical Power Generation	68034	Extractive Metallurgy	65062
Electricity and Magnetism S	68714	Field Project	66604
Electrochemistry	65403	Field Studies: Marine Sciences	91375
Electronics 1	68304	Field Studies: Mountain Ecology	91371
Electronics 1 S	68734	Field Studies: Semiarid Ecology	91370
Electronics 2	68404	Field Surveillance, Fate and Management of Toxic Substances	91472
Electronics 2 S	68744	Field Theory	68502
Electrotechnology	68303	Fire Investigation	65758
Electrotechnology S	68733	First Aid	99536
Engineering and Environmental Geology	66501	Forensic Examination of Physical Evidence 1	65556
Engineering Chemistry	65023	Forensic Examination of Physical Evidence 2	65656
Engineering Mathematics 1	33120	Forensic Examination of Physical Evidence 3	65756
Engineering Mathematics 1A	33121	Forensic Science Case Study	79991
Engineering Mathematics 2A	33221	Forensic Toxicology 1	65557
Engineering Physics (Civil)	68021	Forensic Toxicology 2	65657
Engineering Physics (Civil) S	68712	Fossil Fuels	66503
Engineering Physics (Mechanical)	68011	Fossil Fuels (Honours)	66553
Engineering Physics 1 (Electrical)	68031	Foundations of Helping and Caring	92167
Engineering Physics 2 (Electrical)	68032	Foundations of TCM	99502
Engineering Physics 3 (Electrical)	68033	Geochemistry	66303
Environmental Assessment and Planning	49121	Geodynamics	66203
Environmental Chemistry	65601	Geological Mapping	66201
Environmental Chemistry (Advanced)	65651	Geology for Engineers	66032
Environmental Geology	66061		

Geophysics and Remote Sensing of Groundwater Resources	66016	Individual Project – Life Sciences	91399
Geopollution Management	66017	Individual Project P/G – Life Sciences	91499
Groundwater Computing	49554	Industrial Metallurgy	67408
Groundwater Engineering Project (GD) F/T	44153	Industrial Training (Applied Chemistry Honours)	65995
Groundwater Engineering Project (GD) P/T	44157	Industrial Training (Applied Chemistry) P/T	65998
Groundwater Engineering Project (M) F/T	44152	Industrial Training (Applied Geology) P/T	66998
Groundwater Engineering Project (M) P/T	44156	Industrial Training 1 (Applied Physics Honours)	68995
Groundwater Geophysics	66018	Industrial Training (Honours)	66995
Groundwater Modelling	49555	Industrial Training (Honours)	67995
Groundwater Science Project (GD) F/T	66022	Industrial Training (Materials Science) P/T	67998
Groundwater Science Project (GD) P/T	66024	Industrial Training 1 (Applied Chemistry)	65996
Groundwater Science Project (M) F/T	66021	Industrial Training 1 (Applied Geology)	66996
Groundwater Science Project (M) P/T	66023	Industrial Training 1 (Materials Science)	67996
Haematology 1	91355	Industrial Training 1 (Physics)	68996
Haematology 2	91358	Industrial Training 2 (Applied Chemistry)	65997
Hardware for Clinical Data Acquisition and Control	91463	Industrial Training 2 (Applied Geology)	66997
Health Sciences 1	99563	Industrial Training 2 (Materials Science)	67997
Health Sciences 2	99570	Industrial Training 2 (Physics)	68997
History and Philosophy of TCM	99511	Inorganic Chemistry	65302
Honours Project	67851	Instrumentation for Materials Scientists	67410
Honours Project	99593	Integrated Coastal Resource Management	98720
Honours Project Proposal	67751	Introduction to Biological Fluids	91382
Honours Research Project	65858	Introduction to Botany	99566
Honours Seminar	65853	Introduction to Chinese Herbal Medicine	99567
Horticultural Financial Management	91229	Introduction to Environmental Biology	91650
Horticultural Production Management	91224	Introduction to Environmental Engineering and Management	49122
Horticulture 1	91231	Introduction to Materials	67101
Horticulture 2	91232	Introduction to Microcomputers	31870
Hospital Training in China	99527	Introduction to <i>Tai Qi Chuan</i> , An	99528
Human Biology	91317	Introduction to TCM	99560
Human Factors/Ergonomic Design	69323	Introduction to Traditional Acupuncture Theory	99548
Human Fungal Disease	91483	Introductory Biometrics	33105
Human Parasitology	91482		
Human Viral Disease	91485		
Hydraulics	98713		
Hydrogeochemistry	66015		
Hydrogeology	66014		
Immunology 1	91351		
Immunology 2	91359		
Independent Research Project (Postgraduate)	99537		

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Introductory Coastal Geology	98714	Meeting Special Needs in Secondary School	023002
Introductory Medical Science 1	91701	Metallurgical Chemistry	65703
Introductory Medical Science 2	91702	Metallurgical Chemistry (Advanced)	65753
Laboratory Biocomputing	91464	Microbiology 1	91314
Landscape Design	91230	Microbiology 2	91330
Learning in Science 1	028001	Microbiology 3	91331
Learning in Science 2	028002	Microprocessors in Instrumentation	68504
Legal Aspects of Occupational Health and Safety	69342	Microprocessors in Instrumentation S	68754
Legal System	79990	Microsystems	99578
Lithology	66202	Mineral Deposits	66606
Management of the Microbiology Laboratory	91486	Mineral Science Project	66608
Mapping and Remote Sensing	91323	Mineralogy and Petrology	66301
Master's Thesis (Applied Chemistry) F/T	65990	Molecular Biology 1	91332
Master's Thesis (Applied Chemistry) P/T	65991	Molecular Biology 2	91335
Master's Thesis (Applied Geology) F/T	66990	Molecular Microbiology – Techniques and Diagnosis	91488
Master's Thesis (Applied Geology) P/T	66991	Narcotics and Drugs of Abuse	65757
Master's Thesis (Applied Physics) F/T	68990	Neuroscience	91706
Master's Thesis (Applied Physics) P/T	68991	Nuclear Physics	68501
Master's Thesis (Biol and Biomed) F/T	91777	Nuclear Physics S	68751
Master's Thesis (Biol and Biomed) P/T	91778	Nutrition in a Traditional Chinese Medical Context	99535
Master's Thesis (Materials Science) F/T	67990	Occupational Hazard Analysis	69312
Master's Thesis (Materials Science) P/T	67991	Occupational Health and Safety in Society	69311
Materials 1	67011	Occupational Health and Safety Management	69343
Materials Engineering 1	67021	Occupational Health and Safety Project	69351
Materials Engineering 2	67061	Occupational Health Services	69334
Materials Physics	68503	Open Space Management	91325
Materials Physics S	68753	Organic Chemistry 1	65202
Materials Science 1	67201	Organic Chemistry 2	65402
Materials Science for Engineers	67022	Organisational Behaviour and Communication	69313
Materials Technology	67023	Pathophysiology 1	91520
Mathematics 1 (Life Sciences)	33101	Pathophysiology 1 (TCM)	99539
Mechanical Properties of Materials	67303	Pathophysiology 2	91521
Mechanics 1	46110	Pathophysiology 2 (TCM)	99540
Mechanics of Solids 1	47127	People and the Physical Environment	69335
Medical Devices and Diagnostics	91705	Pharmacognosy	99580
Medical Imaging	91403	Pharmacology 1	91707
		Pharmacology 2	91709
		PhD Thesis (Biol and Biomed) F/T	91988
		PhD Thesis (Biol and Biomed) P/T	91987
		Philosophy, Religion and Culture	99530

Physical Geology of the Coastal Zone	98716	Principles of Pharmacology and Toxicology	91350
Physical Mathematics	33330	Principles of Toxicology	91441
Physical Metallurgy	67304	Professional Experience (Biol/Biom) F/T	91997
Physical Metallurgy (Honours)	67554	Professional Experience (Biol/Biom) P/T	91999
Physical Optics	68602	Professional Writing and Communication	51389
Physical Properties of Materials	67407	Project (Clinical Measurement) F/T	91406
Physics 1	68101	Project (Clinical Measurement) P/T	91407
Physics 1 (Life Sciences)	68041	Project (Honours)	66858
Physics 1 S	68711	Project (Honours)	68858
Physics 1 (SL)	68081	Project (Medical Physics) F/T	91484
Physics 2	68201	Project (Medical Physics) P/T	91489
Physics 2 S	68721	Project 1 (Chemistry)	65851
Physics 2 (SL)	68082	Project 2 (Chemistry)	65852
Physics 3	68301	Project 1 (Clinical Biochemistry)	91456
Physics 3	68311	Project 2 (Clinical Biochemistry)	91459
Physics 3 S	68731	Project A	68508
Physics 4	68411	Project B	68608
Physics 5	68511	Project Proposal (Clinical Biochemistry)	91453
Physics 6	68611	Project Seminar	66507
Physics for Electronics S	68713	Project Workshops	99517
Physics in Medicine	91404	Psychology of Secondary Students	023001
Physiological Foundations of Health 1	91518	Psychophysiology	91708
Physiological Foundations of Health 2	91519	<i>Qi Gong: Its Use in Acupuncture</i>	99543
Physiological Measurement	91439	Quantum Physics 1	68401
Physiological Modelling	91461	Quantum Physics 1 S	68741
Physiological Systems	91703	Quantum Physics 2	68601
Physiology of Qi, The	99564	Quantum Physics 2 S	68761
Plant Genetics and Breeding	91271	Radiation Protection	91434
Plant Pathology	91237	Reaction Kinetics	65602
Plant Physiology	91270	Recreation, Tourism and Natural Resource Management	98719
Plant Production and Growth Media	91233	Remote Sensing	66603
Plant Tissue Culture	91236	Research Design and Methods	91477
Plants in the Landscape	91207	Research Developments in Geoscience	66654
Point Location	99549	Research Methodology – Medical Microbiology	91487
Point Location 1 (and Treatment Techniques)	99565	Research Methods 1	91607
Pollution Assessment	98718	Research Methods 2	91608
Polymer Science	67305	Research Project	65856
Polymer Technology	67409	Research Project – Medical Microbiology F/T	91492
Practice Management	99591		
Principles of Biocomputing	91408		
Principles of Clinical Biochemistry	91410		
Principles of Human Biology	91421		
Principles of Instrumentation	68604		
Principles of Instrumentation S	68764		

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Research Project – Medical Microbiology P/T	91491	Structural Geology of Ore Deposits (Honours)	66655
Research Proposal Design – Medical Microbiology	91490	Subtle Dimensions of Healing, The	99531
Research Proposal (Occupational Health and Safety)	69353	Surface Chemistry	65603
Research Workshops 1	99550	Surface Hydrology and Groundwater	49551
Research Workshops 2	99556	Surface Properties of Materials	67602
Resource Management	66404	Systems View of Life, A	99529
Risk Management	69341	Technical Ceramics	67506
Science Mathematics 1	33171	Technical Communication	66401
Science Mathematics 2	33172	Technical Communication	51357
Science Mathematics 3	33173	Techniques in Materials Science	67203
Secondary Practicum 1	023191	Techniques of Materials Analysis	68516
Secondary Practicum 2	023192	Technology and Innovation Forum	68515
Sedimentary Geology	66302	Tectonics	66602
Social Bases of Education	023502	Terrestrial Ecosystems	91306
Social Crisis	99532	Therapeutic Techniques and <i>Tuina</i> (Chinese Massage)	99555
Solid-state Physics	68505	Thermodynamics	65031
Solid-state Physics S	68755	Thermodynamics and Energy	68403
Specialisation Project	67607	Thermodynamics and Energy S	68743
Special Points and Systems	99509	Toxic Materials in the Environment	91347
Special Reading Assignment – Life Sciences	91398	Traditional Ceramics	67306
Special Reading Assignment P/G – Life Sciences	91498	Transducers and Devices	68605
Special Topics in TCM (Intermodal and Professional)	99590	Transfusion Science	91340
Spectroscopy and Structure	65301	Treatment of Scientific Data	60301
Statics	47117	Undergraduate Research Project	91283
Statistics for Life Sciences	33103	Urban Water Quality Management	49124
Statistics in Bioscience	91474	Uses of Australian Plants	91234
Structural Geology	66402	Vacuum and Thin Film Physics	68405
		Waste Minimisation and Advances in Pollution Control	49123
		Written and Oral Reporting	51368

# ***Boards and committees***

## **FACULTY BOARD IN SCIENCE**

### **Ex officio members**

Dean of the Faculty  
 Professor A R Moon (Chair)  
 Associate Dean (Undergraduate Programs)  
 Associate Professor A G Dawson  
 Associate Dean  
 (Graduate and Research Programs)  
 Professor R L Raison  
 Faculty Administrator  
 Mrs I Costabile  
 Faculty Technical Manager  
 Mr D Edwards  
 Head, Department of Applied Geology  
 Dr G Skilbeck  
 Head, Department of Applied Physics  
 Professor G Smith  
 Head, Department of Cell and Molecular  
 Biology  
 Associate Professor K Broady  
 Head, Department of Chemistry  
 Associate Professor A Baker  
 Head, Department of Environmental Biology  
 and Horticulture  
 Associate Professor R Buckney  
 Head, Department of Materials Science  
 Dr A Ray  
 Head, Department of Health Sciences  
 Associate Professor P Miller

### **Professors**

Professor A Johnson  
 Professor E Leitch  
 Professor J Unsworth  
 Professor M A Wilson

### **Nominated members**

Dr S C Beecham  
 Faculty of Engineering  
 Dr T Langtry  
 Faculty of Mathematical and Computing  
 Sciences  
 Ms J Forbes  
 Faculty of Nursing  
 Dr K Coleman  
 Centre for Learning and Teaching

Ms S Scholfield  
 University Library

### **Elected members**

#### **Academic staff**

Dr R Ashby  
 Associate Professor K Brown  
 Dr G Caprarelli  
 Dr D Cobbin  
 Dr K Cordatos  
 Associate Professor A Craig  
 Dr E Frankel  
 Dr T George  
 Dr D C Green  
 Dr K Johnson  
 Associate Professor P F Logan  
 Dr R McConchie  
 Dr R Morrison  
 Dr H Patney  
 Ms A Pulkownik  
 Associate Professor C Rogers  
 Dr A Simpson  
 Dr M Stevens  
 Dr I Stevenson  
 Dr J Swann  
 Dr R L S Woolcott  
 Dr W Y Yeung

#### **Support staff**

Mr A Barnes  
 Mr A Buttenshaw  
 Mrs G Goldsack  
 Ms B Kitto  
 Mr B Peters  
 Mr J Phillips  
 Mr M Rosenbaum  
 Mr A Rubel

#### **Student members**

Ms A F Adams  
 Vacant  
 Mr R Crooks  
 Vacant

#### **Appointed members**

Professor M J Knight

## **COURSE ADVISORY COMMITTEES**

### **Aim of the Course Advisory Committees**

The Course Advisory Committees are Faculty-based committees whose aim is to provide a link between the Faculty, its Departments, professional bodies, industry, commerce and graduates. It is anticipated that these committees will assist the Faculty by offering advice on relevance and appropriateness of the Faculty's courses and alert the Faculty to current and future trends in industry and in the professions. Members of these committees provide advice and counsel to the Faculty for a variety of purposes, including Faculty Developmental Reviews, reviews by AVCC standards panels and accreditation of courses by professional associations.

### **Composition of the Course Advisory Committees**

Course Advisory Committees in the Faculty of Science usually have a majority of members external to the Faculty, normally including the following:

- a Chairperson external to the University who is eminent in the field
- the Dean of the Faculty
- the Head of the relevant Department
- one or more staff members of the Department
- external members from business and/or industry, professional associations and recent graduates of the Faculty

### **Terms of Reference for the Course Advisory Committees**

- To consider and make recommendations to the Dean on any matters referred to it by the Vice-Chancellor, Faculty Board, the Dean, Associate Deans or the Head of Department.
- To examine course planning documentation for the review of an existing course as well as new courses planned for introduction by the Department (or multidisciplinary group). The committee must meet at least once prior to the course planning documentation being presented to Faculty Board. The committee is required to assess the

proposal and to provide comments and advice on the Faculty's proposed course of action and approach. Minutes of the meetings of the advisory committee should be forward with a letter from the Chair and incorporated in the documentation submitted to Faculty Board.

- To examine course accreditation documentation for the review of an existing course as well as new courses planned for introduction by the Department (or multidisciplinary group). The committee must meet at least once prior to the course accreditation documentation being presented to Faculty Board. The committee should examine and comment upon the proposals. This need not necessarily involve a detailed look at the curriculum, but the committee could consider matters such as objectives, balance and appropriateness of the proposed student outcomes. Minutes of the meetings of the advisory committee should be forwarded with a letter from the Chair and incorporated in the documentation submitted to Faculty Board.
- To examine and comment on all proposed major changes to existing courses. Minutes of the meetings of the advisory committee should be forwarded with a letter from the Chair and incorporated in the course planning document submitted to Faculty Board.

In addition, advisory committees are expected to report on the following:

- the Department's place in the profession(s);
- future developments within the Department and potential impact of strategic plans on the Faculty;
- adequacy of resources supplied by the University to the Department (needs versus supply);
- value, nature and scope of the professional experience component (if any) of the Department's courses;
- admissions and enrolment policies and practice of the Department;
- graduation rates in the Department;
- any other matters as appropriate.

In the case of a multidisciplinary course, the terms of reference are to be adapted to refer to the course's impact on the professions(s), the Faculty's strategic plan, resources, policies, admission and enrolment practices, graduation rates and any other matters as deemed appropriate.

### **Course Advisory Committee in Applied Chemistry – Forensic Science**

#### **Internal members**

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Associate Professor A G Dawson  
Associate Dean (Undergraduate Programs)

Associate Professor A Baker  
Head, Department of Chemistry

Associate Professor G Norton  
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Dr J Robertson  
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### **Course Advisory Committee in Cell and Molecular Biology**

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*Laboratory Cleaners*

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In conjunction with the Faculty of  
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